NBP Narodowy Bank Polski

NBP Working Paper No. 255

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Economic Institute
Warsaw, 2017

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The opinions expressed in the paper are those of the authors and do not reflect a view of Narodowy Bank Polski or Warsaw School of Economics. The authors would like to thank Tomasz Łyziak and participants of the conference *Economic Challenges in Enlarged Europe* held in Tallinn in June 2016 for their comments. Any remaining errors are solely responsibility of the authors.

Published by:
Narodowy Bank Polski
Education & Publishing Department
ul. Świętokrzyska 11/21
00-919 Warszawa, Poland
phone +48 22 185 23 35
www.nbp.pl

ISSN 2084-624X

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Abstract

We explore the relation between inflation expectations of consumers and their spending and saving behavior (proxied by buying and saving attitude) using micro data from Consumer Opinion Survey. This issue has gained attention in recent times due to the continuing deflation in Poland, raising concerns about consumption dynamics.

The analysis suggests that inflation expectations negatively affect the saving attitude, especially in the group of consumers characterized by very good financial situation. Moreover, the role of inflation expectations has increased since the global financial crisis. The results for the buying attitude are somewhat puzzling – especially if we try to interpret them together with the results for the saving attitude – as they suggest also negative (although very weak) link to inflation expectations. We suspect that it is related to the formulation of the survey questions and attach more weight to the conclusions from analysis of the saving attitude.

JEL: D12, D14, E31

Keywords: inflation expectations, consumption, savings, survey data, consumer sentiment

1. Introduction and literature review

Recent years have brought increased interest in investigating the link between inflation expectations and consumption. Attention to this issue was driven by search for tools that could help raise inflation in the environment of policy rates at the zero lower bound. Monetary policy oriented on elevating inflation expectations was hoped to stimulate spending and, in further stages, result in higher inflation and economic recovery.

Polish economy, similarly as many advanced economies in the world, have been recently experiencing a prolonged period of low inflation due mainly to falling energy and food prices on the global markets. Inflation started to decrease at the beginning of 2012 and since 2nd quarter 2013 stays below 1.5%, the lower limit of deviations from the central bank inflation target. Moreover, starting from July 2014 price changes are negative. Central bank interest rates have been lowered to historically low levels, but remain above zero with a save margin, thanks to which monetary authorities do not have to resort to unconventional tools. However, very low inflation expectations of consumers have raised concerns about their negative influence on consumption. If consumers postponed their purchases waiting for lower prices, this would harm economic growth and additionally lower inflation. The question on relationship between inflation expectations and consumption – its' direction and strength – have become a live issue.

The problem of relation between inflation expectations and consumption is closely tied to a question about an effect of real interest rate on consumption, as the real interest rate – according to the Fisher equation – matches a nominal interest rate minus an expected inflation rate. If we assume that fall in expected inflation is equivalent – in terms of its impact on consumption – to rise in nominal interest rates, three effects of higher real interest rates are distinguished: the substitution effect, the income effect and the wealth effect (Fernandez-Corugedo, 2004). Firstly, the rise in real interest rate makes future consumption cheaper in relation to the current consumption and therefore depresses the current consumption (the substitution effect linked to the Euler equation for consumption). Secondly, thanks to the income effect found in the intertemporal budget constraint, the higher interest rate should enhance current and future consumption. So the income effect works on current consumption in the opposite direction than the substitution effect. Thirdly, the rise in the interest rate affects negatively the current value of lifetime resources and therefore decreases the current consumption (the wealth effect). It is believed that the substitution effect dominates, which gives the general conclusion that lower inflation expectations – by increasing real interest rate – should result in reduced current consumption. However, as stressed in Ichiue and Nishiguchi (2015), the final effect must be determined empirically.

Going deeper into details of the link between inflation expectations and consumption, two points are often made in the literature. The strength of reaction of consumption

to change in the real interest rate might depend on the net position of a household (Bachmann et al., 2015; Burke and Ozdagli, 2013). The rationale is that higher interest rate makes savers better off, while it hurts debtors. Therefore, the direction of income effect might depend on household balance sheet. Ichiue and Nishiguchi (2015) point on different issue: the substitution effect should be stronger for assets holders as they are less likely to be liquidity constrained. The consumption of households with binding borrowing constraint is more dependent on current income. Additionally, Bachmann et al. (2015) show in a simple model that consumption of both, the durables and non-durables, is sensitive to changes in the expected inflation, but reaction of durables should be stronger.

The empirical literature on inflation expectations and consumption is quite scarce and limited to recent few years. Bachmann et al. (2015), using Michigan Survey of Consumers, investigate influence of consumer inflation expectations on readiness to spend in the US during period of zero lower bound and "normal" times. They find that this impact is negative and very weak: at the zero lower bound the increase of inflation expectations by 1 p.p. is connected with fall of probability of positive assessment of buying conditions by about 0.5 p.p. Outside the zero lower bound this effect is statistically insignificant. They explain these results by nominal interest rate illusion, due to which consumers do not understand difference in nominal and real interest rates.

Burke and Ozdagli (2013) analyze the same problem with use of different dataset on US consumers expectations (New York Fed/RAND-American Life Panel), which has advantage over the Michigan data in the way that provides information on actual spending rather than buying attitude. Their research indicate that inflation expectations have no effect on spending on large items (home appliances and electronics) and very small (quantitatively) positive effect on nondurable goods, however, this result is not very robust. They find, however, some evidence that higher inflation expectations are related to higher probability of buying a car. Burke and Ozdagli (2013) offer a different explanation of very weak relationship between inflation expectations and spending than Bachmann et al. (2015) and argue that higher expected inflation may reduce expected income. This claim is supported by the fact that consumers expected their wages to grow at much slower rate than inflation.

Contrary to the mentioned above studies, Ichiue and Nishiguchi (2015), employing Japanese data, find that consumers with higher inflation expectations have tendency to increase current spending and decrease expected spending in next year. Their results indicate also that this effect is stronger for asset holders and older people. One explanation of different outcomes presented in these studies is that Japanese consumers might better understand policy of keeping interest rates fixed at a very low level as they lived in such an environment for longer time than American consumers. Second explanation points that inflation expectations question in the Michigan survey asks

about overall consumer prices, while buying attitude question refers only to durables. So, if development of durable prices diverges significantly from overall consumer prices, the impact of inflation expectations on readiness to spend might be underestimated. This problem is not present in Japanese survey, as consumer spending question refers to all items (durable and non-durables).

Another evidence on positive association between inflation expectations and buying attitude is presented in D'Acunto et al. (2015) for German consumers. Consumers expecting faster inflation are more likely to have positive attitude toward spending than others (by about 9 p.p.). This conclusion, based on analysis of the survey data, was confirmed by investigating consequences of pre-announced VAT increase. According to our best knowledge, D'Acunto et al. (2015) is the only paper investigating the link between saving attitude and inflation expectations. Their analysis confirms that higher inflation expectations are linked with higher probability of declaring that currently it is a bad time to save.

This paper aims at examining the relationship between inflation expectations and buying attitude as well as saving attitude of Polish consumers. As mentioned above, the theory is ambiguous with this respect and empirical evidence from other countries is mixed. In our research we discuss carefully a choice of control variables in our model. We extend the analysis of inflation expectations and consumer buying and saving attitude by investigating stability of these relationships over time. Our analysis is prone to critique on the ground that survey data refers to consumer opinions and not actual spending decisions. However, as we show later in the text, buying attitude and saving attitude are correlated with economy-wide measures of consumption and saving rate (at least at the aggregated level).[1]

The paper is structured as follows. Section 2 introduces the consumer survey, with focus on finding a link between the reported consumer attitudes and aggregate statistics on consumption and savings, as well as on understanding the structure of relationships in the dataset. In section 3 we present our main results for both, buying and saving, attitudes, while in the next section we investigate stability of the analyzed relationships over time. Apart from investigating the effect of inflation expectations on consumer attitudes in the full sample, in section 5 we check whether there are any differences with this respect if we take into account financial situation of respondents. The last section concludes.

[1]This issue is related to measuring consumer sentiment and examining its links with consumption. It is well known that consumer sentiment indices correlate with current consumption (e.g. Dees and Brinca, 2013) and many studies examine usefulness of such indices in forecasting consumer spending (Carroll et al., 1994; Ludvigson, 2004). Although this problem is only loosely related to ours, it is worth mentioning that the data on buying attitude shows the strongest connection with total consumption (Wilcox, 2007).

2. Data description

2.1. Consumer Opinion Survey

Our study employs data from Consumer Opinion Survey conducted by the Polish Central Statistical Office (GUS) in cooperation with Narodowy Bank Polski (NBP). This survey provides information on consumer opinions about country economic performance and consumer financial situation, attitudes and plans regarding spending and saving. The questionnaire corresponds closely to the European Commission Consumer Survey (the questions of interest are given in appendix A.1). The sample covers 144 monthly surveys, from 2004:01 to 2015:12. Each month about 1500-1700 households are interviewed.

Our main interest lies in three questions. First one concerns 12 month-ahead inflation expectations and is formulated in a qualitative form – respondents declare whether future consumer prices will be rising faster than currently, rising at similar pace, rising at slower pace, stay at the same level or fall. Next two questions ask about assessment of current buying and saving conditions. Consumers judge whether the current period is in general favorable for making major purchases and whether the current period is good to save. Responses to these two questions describe consumer *buying attitude* and *saving attitude*. It should be noted that the question on buying conditions refers only to *major purchases* (with several examples given: furniture, electrical and electrotechnical appliances), which might be interpreted as spending on durables. On the one hand, purchases of durable goods should be more sensitive to inflation expectations than purchases of non-durable goods, so we would expect stronger effect in the case of buying attitude than saving attitude question (given that savings constitute the opposite side of all spending). On the other hand, however, inflation expectations question refers to *consumer prices* and not sub-basket of durable goods, which might result in problems with establishing firm relationship between these variables. Tables 1 and 2 summarize distribution of responses.

During the whole analyzed period, about 50% of consumers expected during next 12 months a similar inflation rate as currently perceived and less than 1% of respondents expected fall in prices. We decided not to omit (or merge) observations with deflationary expectations, despite their very low frequency, for two reasons. Firstly, the analyzed period covers a year and half of deflation, so deflationary expectations cannot be treated as outliers (it is somehow puzzling why so few consumers expected deflation).[2] Excluding them from the analysis could give an incomplete picture. Secondly, expecting stable inflation or slightly smaller inflation than currently might not lead to very different opinions about spending and saving conditions contrary to expecting fall in prices. It

[2]Another survey question, referring to current price changes, shows that also a very small fraction of respondents notice price decreases, even when deflation reached -1.6% in annual terms.

Table 1: Absolute and relative frequencies between buying attitude and inflation expectations

Prices will...	Moment to buy				Total
	good	neutral	bad	don't know	
grow faster	7 311 (2.9%)	14 917 (6.0%)	16 192 (6.5%)	4 924 (2.0%)	43 344 (17.5%)
grow at similar pace	21 733 (8.8%)	49 723 (20.0%)	37 862 (15.3%)	15 119 (6.1%)	12 437 (50.2%)
grow slower	5 635 (2.3%)	10 751 (4.3%)	8 340 (3.4%)	3 508 (1.4%)	28 244 (11.4%)
stay about the same	7 154 (2.9%)	13 526 (5.5%)	9 745 (3.9%)	4 887 (2.0%)	35 312 (14.2%)
fall	288 (0.1%)	332 (0.1%)	356 (0.1%)	119 (0.05%)	1 095 (0.4%)
don't know	2 207 (0.9%)	4 526 (1.8%)	4 393 (1.8%)	4530 (1.8%)	15 645 (6.3%)
Total	44 326 (17.9%)	93 785 (37.8%)	76 888 (31.0%)	33 067 (13.3%)	248 088 (100%)

Source: own calculations based on GUS data.

Table 2: Absolute and relative frequencies between saving attitude and inflation expectations

Prices will...	Moment to save			Total
	bad	good	don't know	
grow faster	34 584 (13.9%)	5 912 (2.4%)	2 848 (1.2%)	43 344 (17.5%)
grow at similar pace	92 699 (37.4%)	23 020 (9.3%)	8 718 (3.5%)	124 437 (50.2%)
grow slower	20 024 (8.1%)	6 252 (2.5%)	1 968 (0.8%)	28 244 (11.4%)
stay about the same	23 914 (9.6%)	8 379 (3.4%)	3 019 (1.2%)	35 312 (14.2%)
fall	710 (0.3%)	308 (0.1%)	77 (0.0%)	1 095 (0.5%)
don't know	10623 (4.3%)	2 184 (0.9%)	2 849 (1.5%)	15 656 (6.3%)
Total	182 554 (73.6%)	46 055 (18.6%)	19 479 (7.9%)	248 088 (100.0%)

Source: own calculations based on GUS data.

is of the highest interest to see how deflationary expectations, compared to inflationary expectations, affect spending and saving attitudes. However, while analyzing our results we keep in mind this very small occurrence of deflationary expectations and interpret them with caution. When it comes to the buying attitude, about 38% of consumers choose a neutral answer, and about one-third of respondents assess current period negatively. Almost 75% of consumers declared negative saving attitude and less than 20% declared that there is a good time to save (there is no option for neutral response). These numbers suggest that consumers are in general pessimistic when it comes spending and saving conditions.

Similarly as in the related studies mentioned in the introduction, our research is conducted on disaggregate level. The micro-based approach helps to alleviate the problem of endogeneity between inflation expectations and consumer attitudes. At the aggregate level, consumer spending and inflation expectations are most likely determined simultaneously. On the contrary, buying/saving attitude of individual consumer should not affect the aggregate consumption/savings.

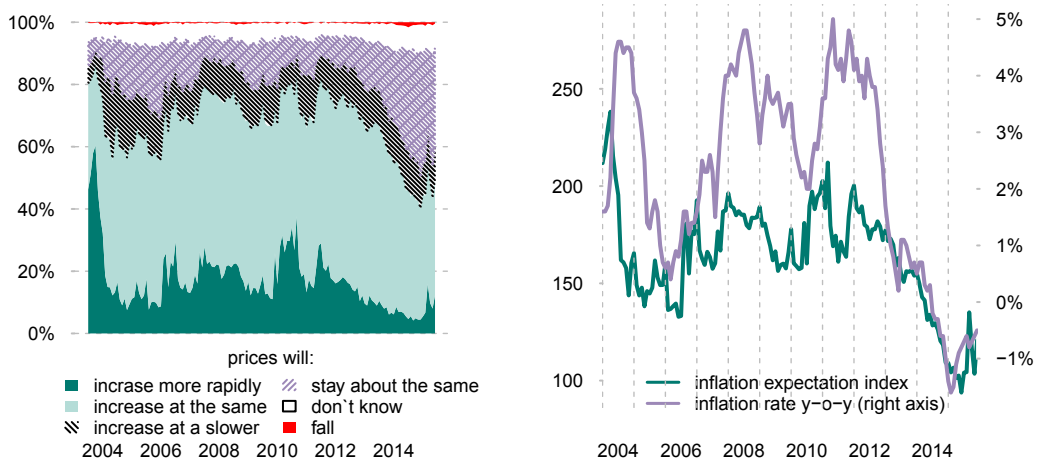
Looking at aggregate data, however, helps to present macroeconomic context for our study, and to justify drawing conclusions about consumption/savings from analysis of attitudes (see next section). Until end of 2012 the CPI inflation in Poland oscillated broadly around the central bank inflation target (equal to 2.5%), but in subsequent years it felt down rapidly to very low levels (Figure 1, right panel). The main drivers of decreasing inflation were external, related to fall of energy and agricultural commodities prices worldwide (Hałka and Szafranek, 2016). Nevertheless, their influence on domestic prices was strengthened by low demand pressure. In June 2014 negative annual price change was noticed for the first time and deflation has been continuing since then. At the same time consumer inflation expectations have been falling as indicated by the balance statistic (see Figure 1, right panel).[3] Consumers did not expect deflation

[3]Balance statistic is calculated as a sum of shares of respondents declaring that prices will rise faster

during next year (the share of those declaring that prices will fall increased slightly, but remained negligible), but rather stable prices (Figure 1, left panel). Inflation expectations measured by balance statistic felt to historical minimum in June 2015. In the environment of deflation, declining inflationary expectations raised concerns about their negative impact on consumption, leading to preserved deflation and weak economic growth. Extremely low inflation expectations could lead to postponing purchases, especially in the case of durable goods.

When it comes to buying and saving attitude, their development over time was to certain degree similar: aggregate indices (difference between share of positive and negative responses) had been growing until 2008, and then since 2013 till the end of the sample (Figure 2). The buying attitude was strongly affected by the global financial crisis as indicated by a sharp drop in the index around 2008/2009 and later on in 2011-2013. The saving attitude also deteriorated in 2011, but to a lesser degree, and remained roughly stable for some time. In the period of very low inflation during last three years of our sample both indices showed an upward tendency.

Figure 1: Consumer inflation expectations (structure of responses and balance statistic) and annual CPI inflation



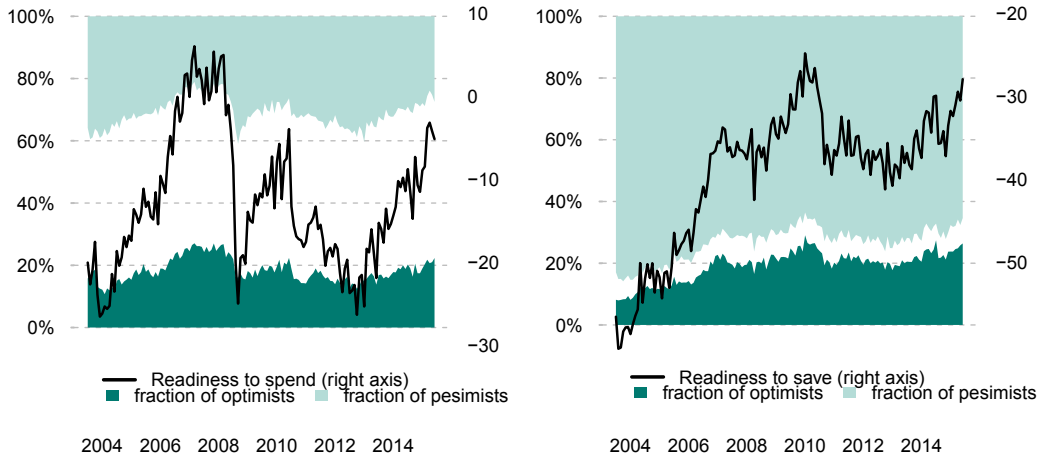
Source: own calculations based on GUS data.

2.2. Note on usefulness of survey data in analysis

Using survey data on consumer inflation expectations in economic analysis is sometimes treated with a caution. It is claimed that consumers are not able to formulate unbiased economic expectations (especially in a quantitative or probabilistic form) due to e.g. lack of financial literacy, behavioral biases (like the framing effect) or their responses might

than currently (with weight equal to 3), will rise at similar pace (weight: 2) and will rise at slower pace (weight: 1) minus share of respondents declaring that prices will fall (weight: 1).

Figure 2: Consumer attitudes regard buying and saving – fraction of responses and balance statistics



Source: own calculations based on GUS data.

not be well-thought-of as consumers have no economic incentive to reveal their true expectations (for further discussion see e.g. Gouret and Hollard, 2011). The criticism refers mostly to questions formulated in quantitative terms (asking about specific number), which are believed to be more difficult for consumers (Pesaran and Weale, 2006). Therefore, in many consumer surveys the question on inflation expectations is formulated in a qualitative way. Despite some shortcomings of survey data on consumer inflation expectations, they are closely monitored by many central banks conducting inflation targeting strategy, as well as used in economic analyses and research (e.g. Mahadeva and Sterne, 2000; Domit et al., 2015; Coibion and Gorodnichenko, 2015).

Consumer Opinion Survey asks both kinds of questions, formulated quantitative and qualitative, but in our study we use the latter, as they seem more reliable. The properties of these inflation expectations are well recognized – they are not rational, but also not fully backward looking – and they proved to be useful in modeling inflation (Łyziak, 2014; Kapuściński et al., 2016).

The second issue that needs some comment is that our dataset contains only information about buying and saving attitudes of consumers and not their actual spendings/savings. Therefore, a natural question about relationship between the opinions and actual behavior reflected in public statistics emerges. To address this issue we confront balance statistic describing buying attitude of households with total consumption and consumption of durables from national accounts. We use two indicators of consumption as consumption of durables might correspond more closely to the survey question. In the case of saving attitude we look at correlation with gross saving rate of households. Table 3 shows that at aggregate level there is a reasonably strong link between consumer attitudes and spending decisions. The linear correlation coefficients between the buying

attitude and annual changes in consumption are slightly below 0.5, while between change in saving attitude and saving rate – slightly above 0.5. This evidence, in our opinion, justifies using data on consumer attitudes as a proxy for consumption and savings.

Table 3: Correlation between consumer attitudes and the actual data on consumption and savings

	Buying attitude &		Saving attitude &
	consumption of durables	total consumption	saving rate
Correlation coefficient	0.49	0.48	0.53
p-value	(0.00)	(0.00)	(0.00)

Notes: Sample from 2004q1 to 2015q3. Buying attitude (balance statistic) is expressed in levels, while saving attitude (balance statistics) is expressed as yearly changes. Consumption of durables and total consumption refer to household sector and are expressed as yearly change. Saving rate (seasonally adjusted) equals gross savings of the household sector to gross disposable income of the household sector. Source: own calculations based on GUS data.

2.3. Principal component analysis

The Consumer Opinion Survey includes a wider set of questions than discussed so far, referring to consumers' opinions about the economy current and expected performance, household current and expected financial situation, and unemployment expectations. Responses to such questions were used in the previous research as control variables in regressions (Bachmann et al., 2015; Ichiue and Nishiguchi, 2015; Burke and Ozdagli, 2013; D'Acunto et al., 2015). Including these variables was believed to help to isolate independent effect of inflation expectations on buying and saving attitude within an econometric model. For example, Bachmann et al. (2015) include the following covariates in the model : consumer opinions about their (current and expected) financial situation, expected real income, current and expected aggregate business conditions, expected change in unemployment rate and expected change in nominal interest rate. The rationale was twofold: (1) to proxy respondent's natural optimism or pessimism, and (2) to control for positive (negative) assessment of buying conditions resulting from expected future state of the economy, which in turn is linked with inflationary expectations (the endogeneity problem). Cochrane (2015), however, criticizes including in the regression expectations concerning the aggregate economy, especially unemployment expectations, on the ground that it undermines interpretation of marginal effects of inflationary expectations on the buying attitude. He reminds that the marginal effect of rise in inflation expectations should be interpreted as if all of the control variables, including unemployment expectations and expected future state of the economy, are held constant. This in turn sounds unreliable, as one might expect inflation expectations to vary because of changes in expected unemployment (in opposite direction) and expected aggregate business conditions.

To get more intuition on links among our potential control variables, we conducted principal component analysis (PCA) on the responses to the questions in the Consumer Opinion Survey that refer to past (the last 12 months) and expected (in the next12 months) financial situation of the household, past (the last 12 months) and expected (in the next 12 months) general economic situation in the country, past (the last 12 months) and expected (in the next12 months) price changes and expected unemployment level (in the next 12 months) (see appendix A.1 for details on the survey questions). The PCA analysis was based on polychoric correlation coefficients.[4]

The first component, explaining 40% of the total variance and strongly correlated with all variables, might be interpreted as consumer sentiment: it grows with improving financial position of household (current and expected), more favorable assessment of country economic situation (current and expected), falling inflation (its perception and expected changes) and expectations of lower unemployment (Table 4). The second component, explaining 15% of variance, is linked to prices (both current and expected), while the third (explaining 12% of variance) with household's financial position and expected unemployment level.

In the context of the potential control variables, the PCA analysis suggests that adding survey data concerning expected economic situation of the country we control for consumer sentiment rather than for expected economic growth. These two variables are related with each other but are not equivalent. Consumer sentiment is believed to measure expectations of households with regard to changes in their income in two dimensions: its level and uncertainty (Curtin, 2007). Growing consumer sentiment index suggests that consumers are more optimistic and more certain with regard to their expected income, while deteriorating consumer sentiment suggests more pessimistic and more uncertain prospects of future income. From the other point of view, consumer sentiment is related to Economic Discomfort Index defined by Okun as a sum of inflation and unemployment level, a simple measure that describes in a synthetic way the impact of economic conditions on consumers (Lovell and Tien, 2000). Therefore, it might be seen as a first approximation of consumers dis-utility function.

The second observation based on the PCA is that inflation expectations play an important role in shaping consumer sentiment, and therefore, indeed, considering changes in inflation expectations while holding expected economic situation constant could be misleading. Finally, changes in the inflation expectations are driven mainly by perception of current inflation and rather not by the unemployment expectations.

[4] As argued in Kolenikov and Angeles (2004) using polychoric correlations is preferable method in the PCA on discrete ordered data as gives consistent estimates of the explained proportion contrary to alternative approaches. Polychoric correlations and PCA were calculated using STATA *polychoric* procedure written by Kolenikov and Angeles (2004).

Table 4: Principal components analysis of survey data

Variable:	Loading factors						
	1	2	3	4	5	6	7
past change in financial position of household	**0.63**	0.36	**0.49**	-0.18	-0.18	0.38	0.19
expected change in financial position of household	**0.69**	0.32	0.30	0.23	-0.18	-0.44	-0.23
past change in country economic situation	**0.75**	0.16	-0.24	-0.08	0.40	0.27	-0.34
expected change in country economic situation	**0.76**	0.12	-0.30	0.25	0.27	-0.15	0.39
past price changes	**-0.53**	**0.54**	-0.23	0.53	-0.19	0.25	-0.04
expected price changes	**-0.42**	**0.70**	-0.20	-0.49	0.07	-0.21	0.04
expected change in unemployment level	**-0.60**	0.13	**0.52**	0.19	0.56	-0.03	0.02
Explained proportion of variance	0.40	0.15	0.12	0.10	0.09	0.08	0.05

Notes: Greater value of variable corresponds to more pessimistic opinion, while in questions about inflation smaller value corresponds to higher inflation. Coding of variables is presented in appendix A.1.
Source: own calculations based on GUS data.

If we include the additional variables from the Consumer Opinion Survey as controls in regression, the estimated effect of inflation expectations on buying and saving attitude could be underestimated, as it does not account for the fact that inflation expectations considerably affect the consumer sentiment which in turn might deteriorate or reinforce the spending/saving attitude. If we do not include these variables, however, then the results will be prone to the critique that respondents who are more optimistic (pessimistic) about future economic developments (including inflation expectations) might also be more optimistic (pessimistic) about spending and saving conditions (the endogeneity problem). We come back to this discussion later, where we present various specifications of probit models.

3. Link between inflation expectations and consumer attitudes

3.1. Correlations based on individual data

We begin analysis of relationship between inflation expectations and consumer attitudes by presenting empirical correlations between these two variables.

Table 5: Polychoric correlation coefficients between inflation expectations and consumer attitudes

Sample	Buying attitude		Saving attitude	
	Correlation	N	Correlation	N
All respondents	-0.07	203 875	-0.14	215 802
Sex: male	-0.08	90 829	-0.14	95 947
female	-0.07	113 046	-0.13	119 855
Age (years): below 25	-0.07	23 715	-0.14	24 791
between 26 and 35	-0.06	33 823	-0.12	35 229
between 36 and 45	-0.09	31 392	-0.13	32 680
between 46 and 55	-0.07	34 518	-0.14	36 221
between 56 and 65	-0.08	36 862	-0.13	38 948
above 66	-0.08	43 565	-0.14	47 933
Place of living: rural area	-0.07	75 556	-0.12	80 236
urban area	-0.08	128 319	-0.14	135 566
Education: elementary	-0.07	91 333	-0.12	97 890
secondary	-0.07	64 904	-0.13	68 220
college	-0.07	32 780	-0.12	33 859
Financial situation: saving	-0.05	62 378	-0.10	65 272
managing to make ends meet	-0.05	111 519	-0.10	118 634
drawing on savings/running into debt	-0.06	29 978	-0.12	31 896
Income: up to 1 500 PLN	-0.07	52 031	-0.12	56 426
between 1 501 and 2 400 PLN	-0.07	56 962	-0.13	60 477
between 2 401 and 3 400 PLN	-0.06	44 918	-0.12	47 000
above 4 300 PLN	-0.08	39 939	-0.13	41 393

Notes: Income means net monthly income of household. In all subgroup we strongly reject the null hypothesis in the LR test for no correlation.
Source: own calculations based on GUS data.

Due to the nature of our data (discrete ordered variables measured at individual level) we assess direction and strength of a relationship between them by means of polychoric correlation coefficients (Kolenikov and Angeles, 2004; Greene and Hensher, 2010). The polychoric correlation coefficient is an maximum likelihood estimator of correlation between two latent continuous normally distributed variables calculated on the basis of observed ordinal variables. In our case, these latent variables are consumers' inflation expectations and their buying (saving) attitude, which we observe only in a discrete form that results from censoring (similar assumption as in ordered choice models).

If we pool all monthly survey rounds, we get a negative correlation between inflation expectations and buying attitude, as well as inflation expectations and saving attitude (Table 5). Given that inflation expectations are coded from 1 (*prices will grow faster*) to 5 (*prices will fall*), buying attitude is coded from 1 (*good time*) to 3 (*bad time*), while saving attitude is coded from 1 (*good time*) to 2 (*bad time*), this means that higher inflation expectations go in line with less favorable assessment of buying and saving conditions. The correlation coefficients are small, equal to about -0.07 in the case of buying attitude and -0.14 in the case of saving attitude, but statistically significant. This result is robust across demographic groups classified by sex, age, place of living, education, financial situation of household or household income.

3.2. Results from ordered probit model – the spending attitude

In this section we present results from ordered probit regressions. Our main interest is in the impact of inflation expectations on the buying attitude. The reference category for the inflation expectations is a statement that prices are not going to change in the 12-month horizon. We consider several specifications, with different set of control variables. We drop cells where either a household does not know if prices will change or it is not able to assess the time to spend or save money.[5] Table 6 summarizes our results by showing marginal effects of inflation expectations on household‘s reported buying attitude.

For a robustness check purposes we tried OLS estimators to get the same marginal effects of interest. They seem especially relevant given the potential problems with identification of maximum likelihood (ML) estimates for small sub-populations in the sample. Moreover, R^2 statistics provide complementary information about the degree of correlation between regressors which might be useful while detecting the degree of endogeneity caused by the unobserved consumer sentiment. The dummy dependent variables have been constructed via indicator functions taking value one for a particular value of the variable of interest and zero otherwise. The results are presented in Tables 10 and 11 in appendix A.2. One can easily notice that the results are essentially the same regardless the method used in estimation. Both linear regression and maximum likelihood estimators provide information on the same marginal effects. The majority of results are qualitative similar besides cases where the efficiency of the results suffers because of limited number of observations within a subgroup.

In probit regressions, in general, the effects are highly significant for most categories of both inflation expectations and buying attitude. However, quantitative results differ with respect to what is controlled for. This phenomenon refers directly to the Cochrane (2015) critique of Bachmann et al. (2015) paper.

[5] We set the same sample among various specifications to be able to compare results of the buying and saving attitude.

We start with the raw correlation estimate, which reveals that consumers expecting higher inflation rate in the 12-month horizon have on average 6.5 p.p. lower probability of reporting that now it is a good time for major purchases comparing to consumers expecting no change in prices. For consumers expecting similar or lower rate of inflation the marginal effect is smaller and equal to -2.7 p.p. and -1 p.p. respectively. Expecting price falls during next year does not affect the buying attitude in statistically significant way. [6] If we include time dummies, the marginal effects remain almost unaltered. Another way to deal with only time-dependent factors, which is employed in Bachmann et al. (2015), consists in controlling for aggregate variables. We prefer using time dummies as it is easier and simultaneously more efficient. Nevertheless, we tried also a specification with aggregate variables (specification 4) and the results are almost the same. In the next step we add demographic characteristics. Controlling for such factors might capture heterogeneity in the process of expectations formation. Including the demographic controls lowers marginal effects just a little bit.

Adding time dummies removes all the time series variation in the data. Another approach to deal with only time-dependent factors, which is employed in Bachmann et al. (2015), consists in controlling for aggregate variables. They should be correlated with the outcome of interest. Cochrane (2015) suggests that as long as we are not interested in the measuring the effects of aggregate variables on individual readiness to spend (and we are not in our paper, the same as Bachmann et al. (2015) were not interested in their research) the easier and simultaneously more efficient approach is just to add time dummies. It will remove *all* time series variation, including the possible impact of aggregate variables on individual outcome. Controlling for time effects is rather uncontroversial, as it lets the researcher focus on cross section variability. Thus we will prefer specifications with time dummies. Nevertheless, we tried also a specification with aggregate variables (specification 4) to be able to compare the coefficients with parameters obtained by controlling for time dummies.

In the next step we add demographic controls. Following Cochrane (2015) they are also well-motivated as a part of a regression equation, as they might induce differences in inflation expectations between males and females, big and small families, etc. Controlling for such factors might capture also more economic heterogeneity in the process of expectations formation. An addition of demographic controls makes the coefficient indistinguishable with the raw correlation, where still we control for the time effects. Moreover, when one removes all time series variation the impact is even more negative

[6] This category of inflation expectations is statistically insignificant in all specifications considered. However, one has to remember that households that expect deflation constitute only 0.61% of the sample on average (see table 1), so probably there is not enough data points needed for ML identification. In contrast, the OLS estimates are significantly positive (around 5 p.p.) for specifications which do not involve other expectations.

than if one controls only for some aggregate variables. The possible source of bias in this case is the existence of some macro-level trends.

The most difficult part – and simultaneously the one that requires the most exhaustive commentary – is whether or not to control for consumer opinions and expectations regarding other issues. We divide the rest of survey questions into three groups. The first one contains consumers' evaluation of a current financial situation of their household (the situation in general and the perception of ability to save including being insolvent). The second one includes assessment of future financial situation of consumer (including the expected unemployment on the aggregate level and the idiosyncratic perspectives for household financial situation in 12-month horizon). Finally, in the third group we include the assessment of current and future economic situation in the country.

As argued above, controlling for all these opinions and expectations would imply an ambiguous interpretation of the coefficients of interest, as they inform about the marginal effects of distinct inflationary expectations holding the rest of expectations constant. It does not sound very plausible, as one might expect that change in opinion about the future inflation will be reflected also in adjusting the expectations regarding the economy as a whole. This hypothesis is strongly supported by the data. In the specifications (5)-(8) we add consecutive sets of consumer opinions and expectations as covariates in the regression equation. Starting with the opinions on current household's situation we see that the probability of positive spending attitude decreases by 4.1 p.p., which is a weaker result than without controlling for additional expectation, but still a pretty high one. It might mean that the current financial situation of household is not strongly correlated with the expected future inflation (which sounds reasonable). However, it is probably correlated with readiness to spend, as it has some explanatory power in the equation, reflected by almost doubled R^2. Note that R^2 here and in the subsequent part of the discussion comes from linear OLS models that serve as robustness checks for ML estimates (see tables 10 and 11 in appendix A.2). The correlation should be negative as we obtain the coefficient of interest smaller in absolute terms in comparison with the coefficients without controlling for this covariates. Similar story can be told about adding the opinions on future situation of household. In this case the coefficient of interest is even closer to zero, remaining statistically significant. Here one might expect that the expectations of future financial situation of a household are correlated with both the dependent variable (but weaklier, as the R^2 is smaller) and inflation expectations (which again sounds reasonable). Therefore, the correlation between inflation expectations and buying attitude is weaker among households that do not change an opinion about their financial situation than among those who adjust their assessment of personal financial situation.

Finally we add the subjective evaluation of current and future changes in economic situation in the country. This specification brings the result analogous to Bachmann

Table 6: Marginal effects of inflation expectations on buying attitude – results from ordered probit

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Good time to buy								
Price will...								
grow faster	-0.065***	-0.067***	-0.055***	-0.052***	-0.041***	-0.034***	-0.014***	-0.020***
grow at similar pace	-0.027***	-0.027***	-0.023***	-0.025***	-0.015***	-0.010***	-0.000	-0.002
grow slower	-0.010**	-0.006*	-0.009**	-0.011***	-0.006*	-0.004	-0.002	-0.002
fall	-0.002	0.003	0.002	-0.002	-0.003	-0.008	-0.014	-0.011
Bad time to buy								
Prices will...								
grow faster	0.086***	0.090***	0.077***	0.072***	0.055***	0.047***	0.019***	0.028***
grow at similar pace	0.033***	0.034***	0.030***	0.032***	0.019***	0.013***	0.000	0.003
grow slower	0.012**	0.007*	0.011**	0.014***	0.007*	0.006	0.003	0.003
fall	0.002	-0.003	-0.002	0.003	0.004	0.010	0.018	0.015
Controls:								
time dummies		✓	✓		✓	✓		✓
aggregate variables				✓			✓	
demography			✓	✓	✓	✓	✓	✓
financial situation					✓		✓	✓
expected situation						✓	✓	✓
country situation							✓	✓
N	179 826	179 826	179 826	179 826	179 826	179 826	179 826	179 826

Notes: Robust standard errors: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Demographic covariates include sex, marital status, age, education and labor market status of the respondent, voivodeship and binary indicator for city or rural area where a household lives, the number of household's members, and the household's income. Aggregated variables are inflation, interest rate, unemployment, and proxy for inflation uncertainty (interquartile range of inflation forecasts from Thomson Reuters survey of financial sector analysts). Financial situation concerns the opinion about financial situation of a household and its ability to save (or being insolvent). Expected situation concerns the expected financial situation of a household and the expected change in unemployment. Country's situation includes both opinion on current and expected situation of a country.
Source: own calculations based on GUS and Reuters Thomson data

et al. (2015). The expectation of faster inflation than currently is almost unrelated to the buying attitude. Depending on the specification it might be quantitatively insignificant or even statistically insignificant (when instead of time dummies we use aggregate time series). This means that among households with unchanged perception of economic situation in the country (and the rest of expectations), expecting higher pace of inflation is almost unrelated to the probability of positive buying attitude. Simultaneously the R^2 reveals the best fit in this specification, which suggest a certain degree of correlation between the assessment of economic situation in the country and the dependent variable.

To sum up, the economic significance of the effect of inflation expectations on the buying attitude depends on the subpopulation that it is measured on. We would rather opt for the specifications without other opinions and expectations, letting them differ among households. Firstly, we agree with Cochrane (2015) that it is not plausible to assume that a household will not change opinions on other issues while changing the inflation expectations. Secondly, the strong correlation between other opinions and expectations (especially the economic situation of the country) – representing most probably unobserved consumer sentiment – and both, inflation expectations and buying attitude, overwhelms a weaker relationship of interest. On the other hand, strong relationship between consumer sentiment[7] and expected inflation introduces an endogeneity problem in the equation of interest and therefore calls for including these variables as controls. If we do not proxy for the sentiment, the calculated effects describe the average correlation between the inflation expectations and buying attitude among all types of households, having in mind that the households might differ in their sentiment and therefore probably would exhibit different individual effects. It's not a perfect solution, but it might be sufficient as we want to analyze the relationship only on macro level, hence disregarding the individual causal effects.[8] Contrary, proxying for the unobserved sentiment would probably lower the endogeneity bias in the individual level, but is not going to bring any satisfying conclusion in the macro level as it describes the average effect for the individual that holds constant the rest of expectations. Moreover, if we believe that the sentiment is driven in large degree by the household inflation expectations, we cannot hold it constant in our analysis. That is why, despite some technical issues concerning the quality of estimates, our results may still be useful from the policy-making point of view. If the opinions about future changes in prices are changing similarly as the opinions about the whole economy (and in general, the rest

[7] Which might be approximated by the expectation of the economic situation in the country.

[8] It is related to another problem, also mentioned by Cochrane (2015), concerning the aggregation issues. Namely, it is hard to derive macro conclusions on the basis of household-level analysis. One would easily agree that the coefficients are significantly different with respect to the subpopulation of households that they are describing (it depends on what characteristic of household is held constant). It does not provide any clear answer whether in general higher inflation expectations among households are correlated with the readiness to spend, once again in general.

of expectations), the policy maker might expect the fall in readiness to spend. On the other side, if the changes of inflation expectations are rather isolated from the rest, and are made almost exogenously towards the rest of expectations, than readiness to spend should remain unaffected.

As some light is shed on the credibility of model specification, let us present briefly the rest of the results. In line with the discussion presented above, we focus on the specifications (3) – with only time dummies and demographic controls – and (8) – including additionally the other opinions and expectations of consumers. Regardless the specification, our results exhibit some robustness by means of the sign of a correlation. In each case they are either always positive (or negative) or insignificantly different from zero.

Considering positive buying attitude, the probability of such a response is lower on average if a household expect a rise in prices with comparison to the household that assumes prices will not change. If a household expect negative inflation the ML estimates for the effects of interest are insignificant. However, one has to remember that households that expect deflation constitute only 0.61% of the sample on average in the period analyzed[9] (see table 1), so probably there is not enough data points needed for ML identification. In contrast, OLS estimates are significantly positive (around 5 p.p.) for specifications which do not involve other expectations. For households that expect deflation OLS parameters uncover almost symmetric effects in comparison with the marginal effects given the opinion that prices will rise in faster pace.

On the contrary, the economic sentiment and inflation expectations seem to have the strongest explanatory power if we model the negative buying attitude. Besides the highest R^2, the coefficients are the most vulnerable to changes in specification. If we do not proxy for the economic sentiment, the probability of negative attitude is 7.7 p.p. higher for those expecting higher inflation in comparison with those expecting zero inflation. If we control for other opinions and expectations, this coefficient falls to 2.8 p.p., which is still significant. The effects for the remaining groups are insignificant in specifications using the full information on expectations. The effect for households that expect the similar rate of inflation amounts to 3.0 p.p. if one does not hold the rest of expectations fixed. However, if one applies OLS these effects become negative and significantly different than zero at 5% level. This illustrates some caveats concerning our analysis. The average effect over the group with different economic sentiment is positive, whereas if we compare units given the constant value of economic sentiment, it becomes negative. It might suggest that the differences in negative buying attitude are pretty high among households with different economic sentiment. Nevertheless, it probably refers to a limited number of households as ML estimation failed to uncover this regularity. Finally, once again the results for the smallest group of households

[9] 0.4% if the *don't know* answers are kept.

expecting deflation is robust to the choice of specification given OLS estimator (and insignificant using the ML devices).

3.3. Results from probit model – saving attitude

In this section we move to models, where the dependent variable is the indicator of saving attitude. In this case the variable is dichotomous, as the questionnaire does not allow for a neutral response. The ordered probit framework simplifies here to the binomial probit model. The same considerations about specification issues discussed previously apply also in this section.

From theoretical point of view one might expect a negative correlation between the inflation expectations and saving attitude. If a household expects higher inflation in the following 12 months it would be better for it to do major purchases in the current period instead of saving. Simultaneously, if a household assumes that prices will fall, or at least will not change, it might be better if it saves and do the major shopping in one of the next periods taking an advantage of lower real spending. The results of estimation partially (only with respect to the effects on saving attitude) support that hypothesis.

The economic theory suggests that household‘s spending and saving should be correlated negatively. However, when considering readiness to buy or save, both of the variables might be strongly positively correlated with the overall economic sentiment, which would induce a positive correlation between them. If one perceives that the overall economic conditions are favorable, then they probably find both good time to do major shopping and simultaneously to save. It comes from the higher expected marginal income, which would be distributed equally (holding other factors constant) between saving and spending.

As it can be learned from Table 7, if a household expects increased pace of inflation, it is less likely to declare that now it is a good time to save in comparison to a similar household that assumes no change in prices (and also to a household that expects fall in prices, as the effects for the latter category are either positive or insignificant). The effect is quite strong, both if we allow households to differ with respect to the economic sentiment (-8.9 p.p.) and when we hold it constant (-4.2 p.p.). Nevertheless, one should interpret these results together with the estimates from models explaining the buying attitude. The direction of association between inflation expectations and both, spending attitude and saving attitude, is the same. Consumers do not treat this two activities like substitutes but rather complementaries, conditional on favorable (perceived) economic conditions (which might be treated as a proxy for additional marginal income or employment security).

The effects are getting monotonically smaller if a household expects the similar pace of

Table 7: Marginal effects of inflation expectations on saving attitude – results from probits

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Good time to save				
Prices will...								
grow faster	-0.114***	-0.110***	-0.089***	-0.086***	-0.067***	-0.062***	-0.041***	-0.042***
grow at similar pace	-0.061***	-0.062***	-0.053***	-0.051***	-0.039***	-0.035***	-0.021***	-0.023***
grow slower	-0.024***	-0.016***	-0.020***	-0.019***	-0.016***	-0.014***	-0.009*	-0.011**
fall	0.040*	0.051**	0.043**	0.043**	0.027	0.026	0.017	0.013
Controls:								
time dummies		✓	✓		✓	✓		✓
aggregate variables				✓			✓	
demography			✓	✓	✓	✓	✓	✓
financial situation					✓		✓	✓
expected situation						✓	✓	✓
country situation							✓	✓
N	179 826	179 826	179 826	179 826	179 826	179 826	179 826	179 826

Notes: Robust standard errors: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Demographic covariates include sex, marital status, age, education and labor market status of the respondent, voivodeship and binary indicator for city or rural area where a household lives, the number of household's members, and the household's income. Aggregated variables are inflation, interest rate, unemployment, and proxy for inflation uncertainty (interquartile range of inflation forecasts from Thomson Reuters survey of financial sector analysts). Financial situations concern the opinion about financial situation of a household and its ability to save (or being insolvent). Expected situation concerns the expected financial situation of a household and the expected change in unemployment. Country's situation includes both opinion on current and expected situation of a country.
Source: own calculations based on GUS and Reuters Thomson data

rise in prices or lower inflation respectively. Moreover, once again the parameters do not differ a lot between OLS and ML estimates (see Table 11 in appendix A.2).

3.4. Discussion of results

We have found a robust evidence on a weak and negative relationship between consumer inflation expectations and the buying attitude. This finding contradicts the general belief about positive correlation between these variables. On the contrary, the direction of relationship between inflation expectations and saving attitude is in line with the substitution effect. Higher inflation expectations, holding nominal interest rates constant, mean lower real interest rates, which promotes current consumption and discourage from saving. Considering these two results together, we get the following, a little bit puzzling, picture: consumers holding higher inflationary expectations, have more negative buying attitude and, at the same time, more negative saving attitude than consumers expecting stable prices. One might ask whether this is not an artifact, a consequence of not controlling (or not perfectly controlling) for respondent's natural pessimism or optimism. Pessimistic consumers would declare higher inflationary expectations, as well as and negative buying and saving attitudes. We argue that this is not the case, because even if we control for other opinions and expectations included in the questionnaire, we still get statistically significant negative relationship between the variables of interest. Some other explanation is needed.

Let us first address the question on negative correlation between inflation expectations and the buying attitude. The literature offers at least three explanations for this phenomenon (Bachmann et al., 2015; Burke and Ozdagli, 2013). First group of arguments refers to the real interest rate. Consumers might not be able to distinguish the nominal and real interest rates (real interest rate illusion, Bachmann et al., 2015) or do not make use of information on real interest rate due to bounded rationality (Maćkowiak and Wiederholt, 2010). The second group of arguments points out on relation between inflation expectations and expected real income. Burke and Ozdagli (2013) show that rise in inflation expectations might lead to lower consumption (current and future) due to its negative impact on expected future income. This effect will not occur only if nominal income of individual consumers will increase in line with inflation. Similarly, Bachmann et al. (2015) argue that owing to wage rigidities higher inflation expectations translate into decreased expected wealth of households. Thirdly, higher inflation expectations might be connected with higher uncertainty with regard to future monetary policy and signal difficult times (Bachmann et al., 2015). Negative impact of uncertainty on consumption is emphasized, for example, in buffer stock savings model (Carroll et al., 1992; Carroll, 1997).

Which of these explanations might play role in Poland? We know from other research

on inflation expectations that Polish consumers are not fully rational, as they form biased inflation forecasts and do not process all available information while formulating inflation expectations (e.g. Łyziak, 2016). We might suspect that they do not behave optimally (do not exploit all available information) making also other decisions, like one on making major purchases. On the other hand, if we consider the impact of inflation expectations on savings, the nominal interest rate illusion argument seems implausible. The claim that higher inflation expectations translate into lower expected income and greater uncertainty finds some support in our results. We have showed that higher inflation expectations contribute to deterioration of consumer sentiment, which suggests both, prospects of lower income and higher uncertainty about future income. However, it does not explain the whole story – even if we control for other economic expectations (describing consumer sentiment), inflation expectations still have some, although very small, explanatory power for the buying attitude. Moreover, if higher inflation expectations indicated also significantly higher uncertainty, we would get positive, not negative, impact on savings in line with the precautionary savings motive.

In our opinion, the problem might lie in the survey question on the buying attitude. This question concerns major purchases only (like furniture, electrical and electrotechnical appliances), while the inflation expectations question – consumer prices in general. If the dynamics of the prices of these major items diverges significantly from the CPI index, there might be no clear relationship between these two variables.[10] Such an argument was raised by Ichiue and Nishiguchi (2015). On the contrary, the question on savings is more straightforward, and therefore might lead to more reliable conclusions.

[10] At least from beginning of 2007, when the detailed data became available, prices of goods belonging to categories like household articles, audiovisual and telecommunication devices and information technology devices have generally been falling in annual terms, while furnitures – usually growing at lower rate than the CPI inflation.

4. Stability of parameters across time

The data cover monthly observations for 12 years. During the observational period some exogenous macroeconomic shocks took place, by which we mean mainly the financial crisis in 2008-2009 followed by the Euro-zone sovereign debt crisis. That is why in this section, while considering the same relationships as in the previous part of the paper, we let the parameters vary with time. We present the results of OLS estimates of parameters of interest obtained in a rolling estimation window (as they are computationally more tractable and simultaneously do not differ much from the ML estimates).[11] For a given period t the parameter is estimated using data from periods between $t-11$ and t, both including. For example, a coefficient for 12m2015 is estimated using the sample that covers the whole 2015 year. We consider two specifications, one with time dummies and demographic variables only (specification (3) from the previous sections) and another with full a set of proxies for the unobserved consumer sentiment (specification (8) from the previous sections). As Figures 4 and 5 show, the dynamics of parameters is very similar regardless of the specification. Nevertheless, coefficients from the model with only time and demographic controls are shifted vertically in comparison with the parameters from models that control also for the unobserved consumer sentiment.[12] In general, they remain stable by means of the direction of correlation in time, but the quantitative results change. Moreover, all of the time series of parameters are subject to shocks, especially during the financial crisis 2008-2009 and later in 2013, during the intensification of the debt crisis in Europe. In this section we present only estimation results for models explaining positive buying attitude and positive saving attitude – the results for neutral and negative buying attitude are included in appendix A.3.[13]

Recall the considerations about the impact of expecting higher pace of inflation on the probability of positive buying attitude. The time series of coefficients in specification (3) is almost always significantly negative (Figure 4a), with the long term average equal to -4.4 p.p. (the OLS parameter in the model from the previous section was -4.5 p.p. and ML estimate -5.5 p.p.). If we consider the case in which we control for other expectations, the series is shifted upwards and oscillate around long term average -1.1 p.p. (the whole sample parameters were: -2.0 (ML) and -0.9 (OLS) p.p.; Figure 4b). However, one might distinguish two local minima, common for the two series, in which the negative effect of interest is the strongest in the specification (3) and become significant in the (8) specification (the overall coefficient in the whole sample is significant just because of the changed behavior in these two periods). Firstly, in 2008

[11] Each category of the buying and saving attitude variable is taken as a binary dependent variable.

[12] The vertical character of the shift partially results from the dummy nature of additional variables in the second specification.

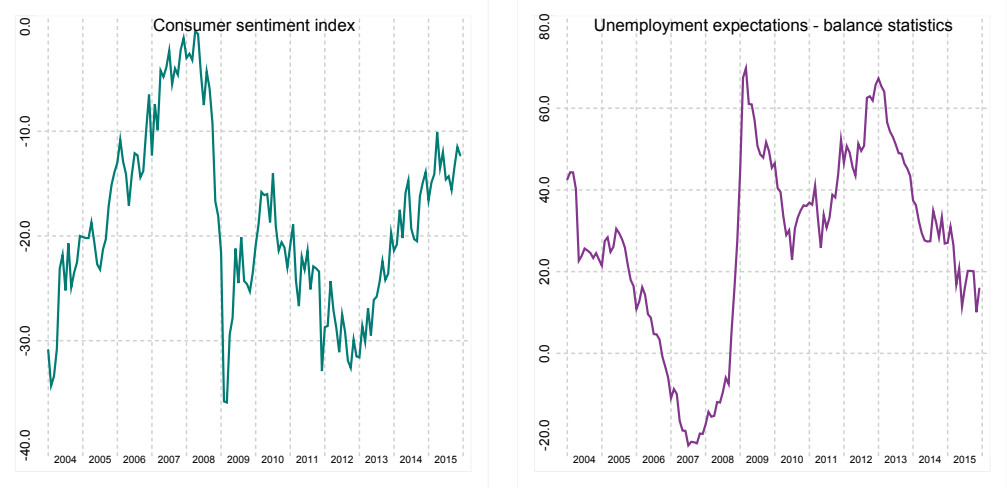
[13] We do not calculate the time varying effect of deflationary expectations due to very low number of observations in each estimation window.

the parameters of interest sharply declined and stabilized its values in the negative, statistically significant zone for about 1.5 year. In 2010 a slow recovery took place. Secondly, another fall took place in 2013. However, the recovery was immediate and from early 2014 parameters have stabilized once again around the long term average. Interesting properties can be observed in the end of 2015, when in specification (3) the effect increased by a fast manner, remaining almost constant in specification (8).

The effect of expecting similar inflation is subject to a weak negative trend from the beginning of the sample (Figure 4c). In the middle of the first decade of XXI century households expecting that the inflation rate will be maintained in the next 12 months have on average almost identical probability of saying that now it s a good time for shopping as households who expect zero inflation. In the end of 2015 this effect amounts to -6 p.p. However, only about a half of that is driven by the unobserved sentiment (Figure 4d). The effects for households that expect slower inflation are indistinguishable from the effects for households expecting zero inflation through the whole sample (Figure 4e and 4f).

Finally let us make a comment on time-varying effects on the readiness to save. In this case, regardless of a specification, the probability of positive saving attitude is significantly lower for consumers expecting higher inflation than for those expecting stable prices in the next 12 months. The time series follows U-shape curve with the minimum during the crises period in 2009. From this point of time line the effect has been subject to increasing trend, however it probably has not reached the insignificant zone before 2015 is finished.

Figure 3: Consumer sentiment index and unemployment expectations



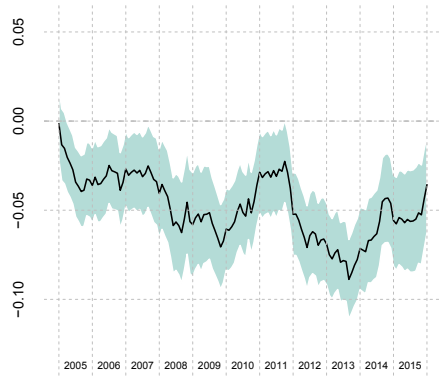
Source: own calculations based on EC and GUS data.

Summing up, the analysis of time-varying effect of inflation expectations on buying and

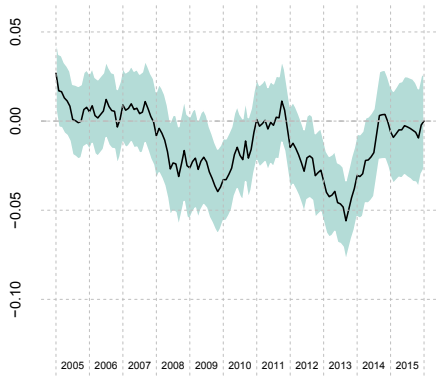
spending attitudes suggests that their importance increased since the outburst of the global financial crisis in 2008. Before that date inflation expectations had very small or even insignificant impact on the buying attitude and relatively small impact on the saving attitude. Some intensification of the analyzed relationship was observed in years 2008-2009 and about 2013, which correlates with increased uncertainty about future economic outlook connected with severe phase of the global financial crisis and the debt crisis, as indicated by the consumer sentiment index and the balance statistics for unemployment expectations question (Figure 3).

The diminishing effect of inflation expectations at the end of the sample might be partially linked to lower consumer inflation expectations in this period, who declared that inflation will rise faster than currently. Due to the fact that the survey question on inflation expectations is qualitative and employs the current inflation level as a reference point, consumers choosing the same response category (e.g. *prices will grow faster*) when CPI inflation is 5% and when it is close to zero, probably have different level of expected inflation in mind.

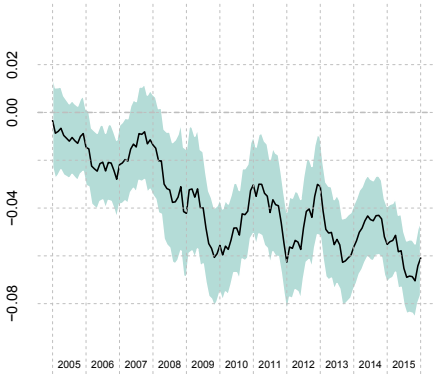
Figure 4: Effects of inflation expectations on probability of positive buying attitude



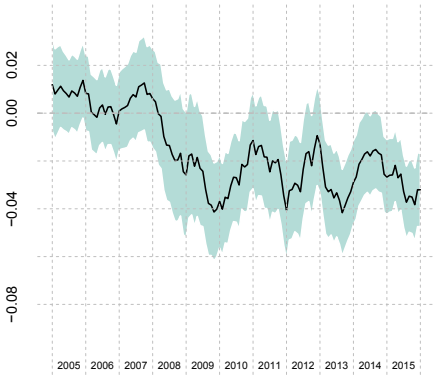
(a) prices will grow faster, spec. (3)



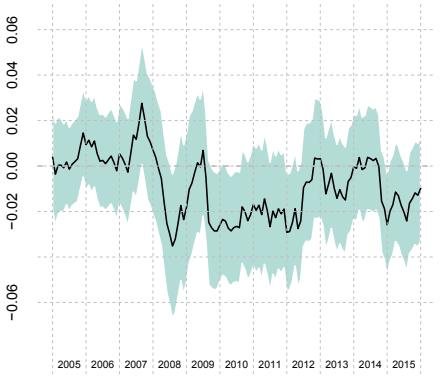
(b) prices will grow faster, spec. (8)



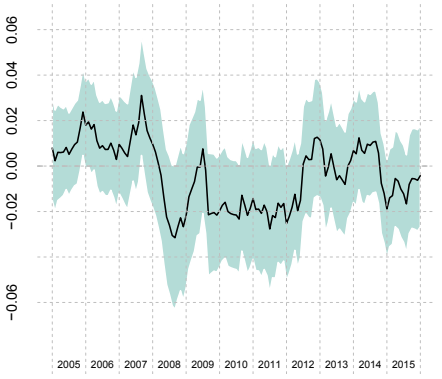
(c) prices will grow at similar pace, spec. (3)



(d) prices will at similar pace, spec. (8)



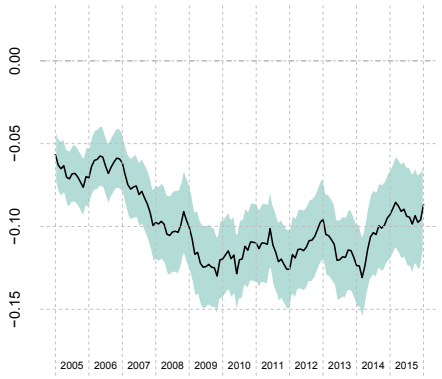
(e) prices will grow slower, spec. (3)



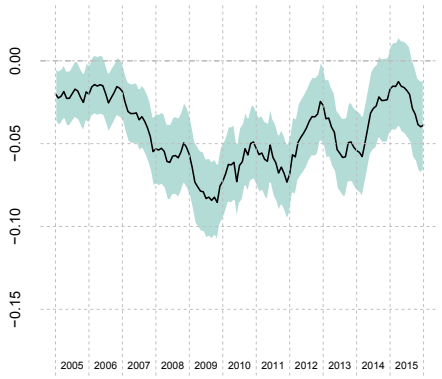
(f) prices will grow slower, spec. (8)

Note: The green area presents 95 CI for the parameters.
Source: own calculations.

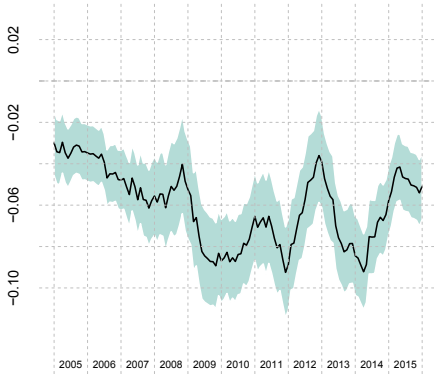
Figure 5: Effects of inflation expectations on probability of positive saving attitude



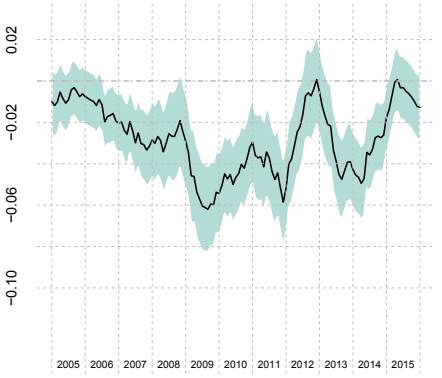
(a) prices will grow faster, spec. (3)



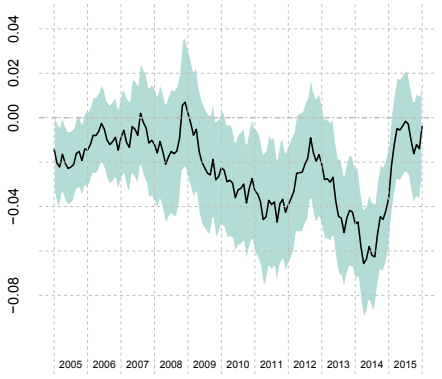
(b) prices will grow faster, spec. (8)



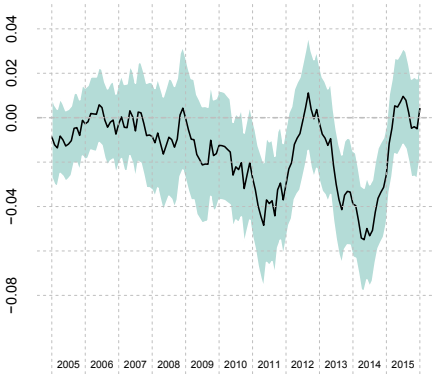
(c) prices will grow at similar pace, spec. (3)



(d) prices will grow at similar pace, spec. (8)



(e) prices will grow slower, spec. (3)



(f) prices will grow slower, spec. (8)

Note: The green area presents 95 CI for the parameters.
Source: own calculations.

5. The role of respondent's financial situation

In line with a redistribution channel (Auclert, 2015; Sufi, 2015) change in real interest rate has different consequences for households who are net debtors and net creditors. We do not have information on household net position, but the question on household current financial position might serve as a proxy. Therefore, as an extension we estimate our models for three subgroups of respondents in a distinct financial situation: in good financial situation (making savings), having stable financial situation (balancing income and expenses) and in financial distress (drawing on savings or falling into debts). In this section we show the results analogical to specification (3) (with time dummies and demographical characteristics as control variables), while results based on specification (8) (with consumer opinions and expectations about other issues as additional control variables) are relegated to appendix A.4.

In all three regressions, inflation expectations are statistically significant and point on negative association with the buying attitude (Table 8). The size of the marginal effect differs only slightly. In the group of consumers accumulating savings declaring positive buying attitude is only a little bit more sensitive to change in inflation expectations than in the case of others groups. These consumers have tendency to change their opinion from negative to positive (or vice versa) under influence of change in inflation expectations, while the neutral buying attitude stays almost unaltered. In the case of consumers in worse financial situation, rise in inflation expectations affects also probability of the neutral attitude. These two groups of respondents are generally more pessimistic with regard to buying conditions and higher inflation expectations make them more inclined to declare negative attitude.

Adding more control variables we get smaller marginal effects, as in the regressions for the full sample, and inflation expectations for consumers with insufficient income become statistical insignificant.

Saving attitude is the most sensitive to changes in inflation expectations in the case of respondents who are currently able to save (Table 9). The marginal effects of inflation expectations are almost twice that large as estimated for the whole sample and for other subgroups of consumers. It seems that consumers are worrying that high inflation will dampen their savings. Nevertheless, inflation expectations affect negatively saving attitude in all three groups of respondents. Extending set of control variables also lowers marginal effects, but they stay statistically significant in all sub-populations.

Table 8: Marginal effects of inflation expectations on buying attitude depending on consumer financial situation – ordered probit results

	Growing savings	Balancing income and expenses	Drawing on savings or falling into debt
		Good time to buy	
Prices will...			
grow faster	-0.054***	-0.037***	-0.037***
grow at similar pace	-0.039***	-0.008**	-0.012*
grow slower	-0.019**	-0.003	0.001
fall	-0.029	0.014	0.001
		Bad time to buy	
Prices will...			
grow faster	0.048***	0.059***	0.065***
grow at similar pace	0.033***	0.011**	0.020*
grow slower	0.016**	0.005	-0.001
fall	0.025	-0.020	-0.002
N	55 254	97 975	26 597

*Notes: Robust standard errors. * p<0.05, ** p<0.01. *** p<0.001*
Control variables: time dummies and demographic characteristics (sex, marital status, age, age^2, education, labor market status, city or rural area as place of living, voivodeship, household size (number of household members), household income.
Source: own calculations based on GUS data.

Table 9: Marginal effects of inflation expectations on saving attitude depending on consumer financial situation – probit results

	Growing savings	Balancing income and expenses	Drawing on savings or falling into debt
		Good time to save	
Prices will...			
grow faster	-0.120***	-0.042***	-0.068***
grow at similar pace	-0.071***	-0.023***	-0.045***
grow slower	-0.036***	-0.005	-0.019*
fall	0.009	0.047*	0.020
N	55 254	97 975	26 597

*Notes: Robust standard errors. * p<0.05, ** p<0.01. *** p<0.001*
Control variables: time dummies and demographic characteristics (sex, marital status, age, age^2, education, labor market status, city or rural area as place of living, voivodeship, household size (number of household members), household income.
Source: own calculations based on GUS data.

6. Conclusion

The paper employs individual consumer opinion survey data in order to investigate whether inflation expectations have any effect on consumption. This issue have recently become important as consumer inflation expectations in Poland, similarly as inflation itself, have reached historically low levels, which raised concerns about weakening of the spendings dynamics. We look at this issue from two perspectives, by linking inflation expectations with the buying attitude and with the saving attitude, both declared in the survey.

We find a negative relationship between inflation expectations and the saving attitude – consumers who expect that during next 12 months inflation will be higher than currently are less inclined to declare positive saving attitude than consumers expecting stable prices. The quantitative size of this effect depends on whether we control for respondents economic sentiment or not. If we allow the economic sentiment to vary across consumers, we get the marginal effect of inflation expectations twice as large as if we restrict the analysis to a situation when differences in inflation expectations are not reflected in consumers' opinions about the future situation of the country. Nevertheless, in all model specifications considered, the impact of inflation expectations on the saving attitude is statistically significant. We find also that the effect of inflation expectations on the saving attitude depends on the financial situation of consumers – in the group of respondents in the best financial situation (who are able to make savings) it is about twice that strong as in the remaining groups (those who are making both ends meet and those in financial distress). Finally, we find evidence of a stronger influence of inflation expectations on the saving attitude since the beginning of the global financial crisis, especially in the periods that correspond to the greatest consumers' uncertainty.

The results for the buying attitude are more difficult to interpret. First of all, they suggest a weak negative relationship with inflation expectations, which conflicts the general belief about the dominance of the substitution effect of change in the real interest rate on consumption. Nevertheless, this result is in line with evidence for the US (Bachmann et al., 2015; Burke and Ozdagli, 2013). Secondly, the negative impact of inflation expectations on the buying attitude is difficult to reconcile with also negative impact on the saving attitude. We interpret this puzzle by referring to the wording of the survey question on the buying attitude: it concerns the major purchases while the inflation expectations question to consumer prices general. Therefore, the expected changes in prices of a wide basket of goods and services do not necessarily correspond to expected changes in prices of large items. On the contrary, the question on the saving attitude is more straightforward, so it might be easier to establish on this basis a link with inflation expectations.

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Appendices

A.1. Survey questions

The inflation expectations question:
Comparing to the previous 12 months, what changes in consumer prices do you expect during the next 12 months? 1) they will grow faster, 2) they will grow at similar pace, 3) they will grow slower, 4) they will stay about the same, 5) they will fall, 6) don't know.

The buying attitude question:
Considering current general economic conditions, in your opinion, is the current period favorable for people to make major purchases (e.g. furniture, electrical and electrotechnical appliances, etc.)? 1) yes, now the time is favorable, 2) current period is neither favorable nor unfavorable, 3) no, now the time is not favorable, 4) don't know.

The saving attitude question:
In view of the general economic situation, do you think that now is? 1) very good time to save, 2) a fairly good time to save, 3) not a good time to save, 4) a very bad time to save, 5) don't know.

Other questions on consumers' opinions and expectations employed in the paper:
How has the financial situation of your household changed over the last 12 months? 1) it is a lot better, 2) it is a little better, 3) it is about the same, 4) it is a little worse, 5) it is a lot worse, 6) don't know.

How do you expect the financial situation of your household to change over the next12 months? 1) it will get a lot better, 2) it will get a little better, 3) it will get about the same, 4) it will get a little worse, 5) it will get a lot worse, 6) don't know.

In your opinion, how the general economic situation in the country has changed over the past 12 months? 1) it is a lot better, 2) it is a little better, 3) it is about the same, 4) it is a little worse, 5) it is a lot worse, 6) don't know.

What changes in the general economic situation in the country do you expect over the next12 months? 1) it will get a lot better, 2) it will get a little better, 3) it will get about the same, 4) it will get a little worse, 5) it will get a lot worse, 6) don't know.

In your opinion, how have consumer prices changed during the last 12 months? 1) they have increased considerably, 2) they have increased moderately, 3) they have increased slightly, 4) they have stayed about the same, 5) they have fallen, 6) don't know.

How do you expect the unemployment level in the country to change over the next 12 months? 1) it will increase significantly, 2) it will increase slightly, 3) it will stay about

the same, 4) it will fall slightly, 5) it will fall significantly, 6) don't know.

Which of these statements best describes the current financial situation of your household? 1) we are saving a lot, 2) we are saving a little, 3) we are just managing to make ends meet on our income, 4) we are drawing on our savings, 5) we are running into debt, 6) don't know.

A.2. Linear probability models

Table 10: Linear probability model for buying attitude

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Good time to buy								
Price will...								
grow faster	-0.047***	-0.055***	-0.045***	-0.038***	-0.029***	-0.023***	0.000	-0.009**
grow at similar pace	-0.035***	-0.039***	-0.035***	-0.035***	-0.027***	-0.022***	-0.010***	-0.013***
grow slower	-0.007	-0.005	-0.008*	-0.009*	-0.005	-0.004	-0.002	-0.002
fall	0.051***	0.055***	0.054***	0.051***	0.046**	0.039*	0.029	0.031*
R^2	0.002	0.014	0.033	0.026	0.054	0.046	0.068	0.070
Bad time to buy								
Price will...								
grow faster	0.102***	0.099***	0.083***	0.083***	0.061***	0.054***	0.030***	0.035***
grow at similar pace	0.025***	0.023***	0.017***	0.021***	0.007*	0.002	-0.010**	-0.009**
grow slower	0.015***	0.008	0.012**	0.015***	0.008	0.006	0.003	0.002
fall	0.053**	0.046**	0.049**	0.054***	0.051**	0.055***	0.059***	0.055***
R^2	0.005	0.015	0.043	0.036	0.067	0.055	0.075	0.077
Controls:								
time dummies		✓	✓		✓	✓		✓
aggregate variables				✓			✓	
demography			✓	✓	✓	✓	✓	✓
financial situation					✓		✓	✓
expected situation						✓	✓	✓
country situation							✓	✓

*Notes: Robust standard errors: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*
Demographic covariates include sex, marital status, age, education and labor market status of the respondent, voivodeship and binary indicator for city or rural area where a household lives, the number of household's members, and the household's income. Aggregated variables are inflation, interest rate, unemployment, and proxy for inflation uncertainty (interquartile range of inflation forecasts from Thomson Reuters survey of financial sector analysts). Financial situation concerns the opinion about financial situation of a household and its ability to save (or being insolvent). Expected situation concerns the expected financial situation of a household and the expected change in unemployment. Country's situation includes both opinion on current and expected situation of a country.
Source: own calculations based on GUS and Reuters Thomson data

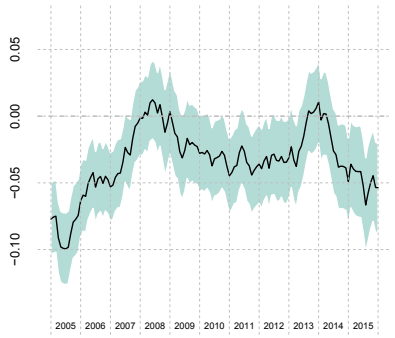
Table 11: Linear probability model for saving attitude

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Good time to save								
Prices will...								
grow faster	-0.114***	-0.110***	-0.092***	-0.089***	-0.065***	-0.064***	-0.040***	-0.040***
grow at similar pace	-0.061***	-0.062***	-0.055***	-0.054***	-0.039***	-0.038***	-0.023***	-0.024***
grow slower	-0.024***	-0.017***	-0.021***	-0.021***	-0.016***	-0.017***	-0.011**	-0.013***
fall	0.040*	0.048**	0.041**	0.041**	0.026	0.024	0.015	0.012
R^2	0.008	0.025	0.078	0.076	0.150	0.101	0.167	0.171
Controls:								
time dummies		✓	✓		✓	✓		✓
aggregate variables				✓			✓	
demography			✓	✓	✓	✓	✓	✓
financial situation					✓		✓	✓
expected situation						✓	✓	✓
country situation							✓	✓

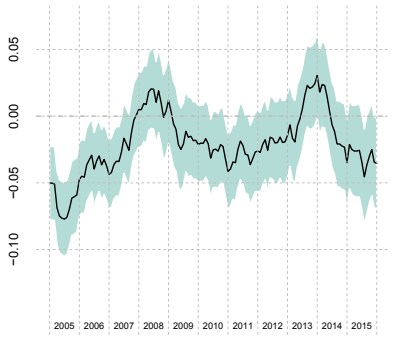
*Notes: Robust standard errors: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*
Demographic covariates include sex, marital status, age, education and labor market status of the respondent, voivodeship and binary indicator for city or rural area where a household lives, the number of household's members, and the household's income. Aggregated variables are inflation, interest rate, unemployment, and proxy for inflation uncertainty (interquartile range of inflation forecasts from Thomson Reuters survey of financial sector analysts). Financial situation concerns the opinion about financial situation of a household and its ability to save (or being insolvent). Expected situation concerns the expected financial situation of a household and the expected change in unemployment. Country's situation includes both opinion on current and expected situation of a country.
Source: own calculations based on GUS and Reuters Thomson data

A.3. Additional figures

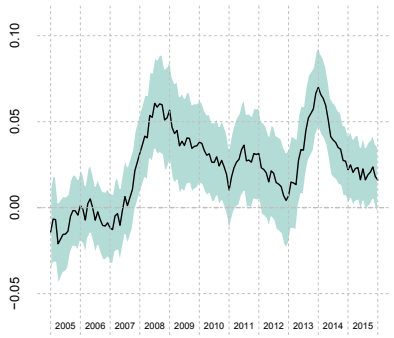
Figure 6: Effects of inflation expectations on probability of neutral buying attitude



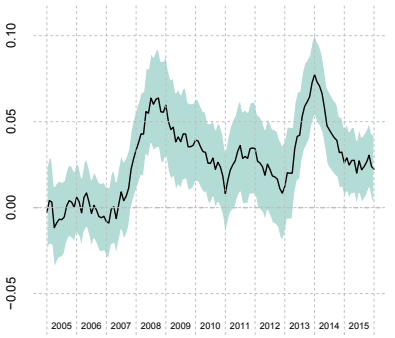
(a) prices will grow faster, spec. (3)



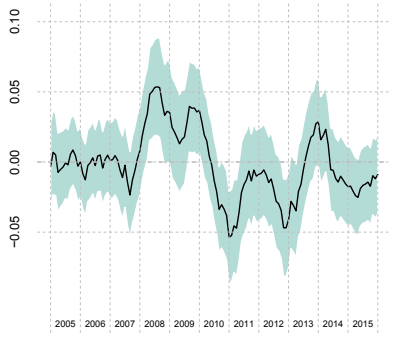
(b) prices will grow faster, spec. (8)



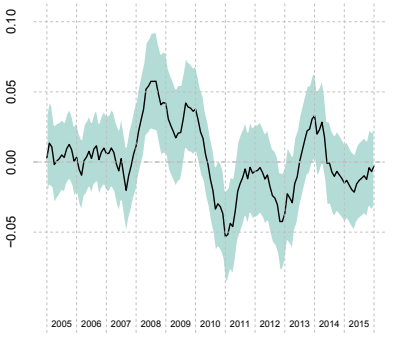
(c) prices will grow at similar pace, spec. (3)



(d) prices will grow at similar pace, spec. (8)



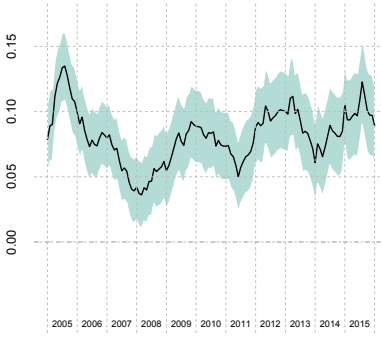
(e) prices will grow slower, spec. (3)



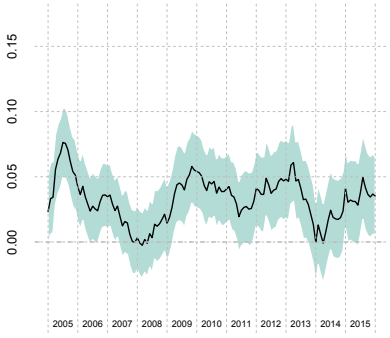
(f) prices will grow slower, spec. (8)

Note: The green area presents 95 CI for the parameters. Source: own calculations based on GUS data.

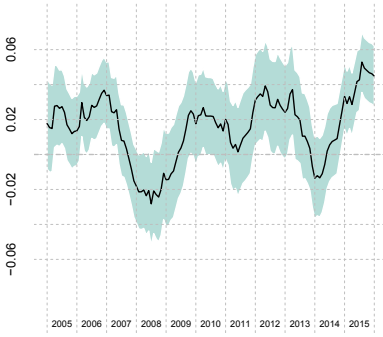
Figure 7: Effects of inflation expectations on probability of negative buying attitude



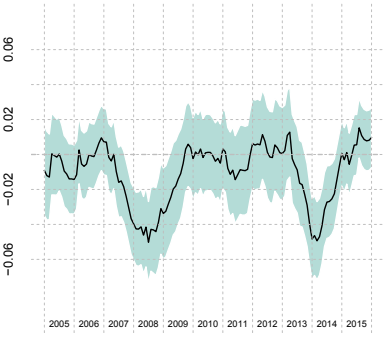
(a) prices will grow faster, spec. (3)



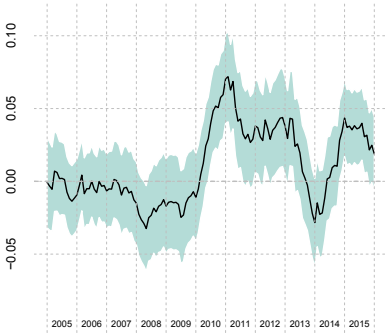
(b) prices will grow faster, spec. (8)



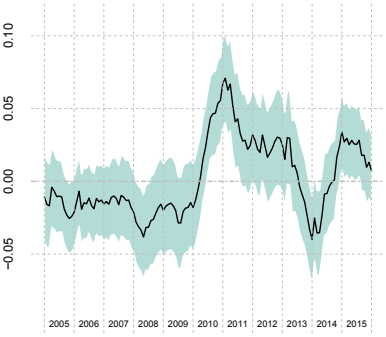
(c) prices will grow at similar pace, spec. (3)



(d) prices will grow at similar pace, spec. (8)



(e) prices will grow slower, spec. (3)



(f) prices will grow slower, spec. (8)

Note: The green area presents 95 CI for the parameters.Source: own calculations based on GUS data.

A.4. Marginal effects of inflation expectations depending on consumer financial situation – specification (8)

Table 12: Marginal effects of inflation expectations on buying attitude depending on consumer financial situation – ordered probit results

	Growing savings	Balancing income and expenses	Drawing on savings or falling into debt
		Good time to buy	
Prices will...			
grow faster	-0.023***	-0.020***	-0.007
grow at similar pace	-0.020***	0.005	0.007
grow slower	-0.012*	0.000	0.008
fall	-0.039	0.007	-0.005
		Bad time to buy	
Prices will...			
grow faster	0.022***	0.030***	0.011
grow at similar pace	0.019***	-0.007	-0.012
grow slower	0.011*	0.000	-0.012
fall	0.038	-0.010	0.008
N	55 254	97 975	26 597

*Notes: Robust standard errors. * p<0.05, ** p<0.01. *** p<0.001*
Control variables: time dummies and demographic characteristics (sex, marital status, age, age^2, education, labor market status, city or rural area as place of living, voivodeship, household size (number of household members), household income.
Source: own calculations based on GUS data.

Table 13: Marginal effects of inflation expectations on saving attitude depending on consumer financial situation – probit results

	Growing savings	Balancing income and expenses	Drawing on savings or falling into debt
		Good time to save	
Prices will...			
grow faster	-0.074***	-0.024***	-0.037***
grow at similar pace	-0.044***	-0.009**	-0.024***
grow slower	-0.026***	-0.002	-0.009
fall	-0.012	0.033	0.014
N	55 254	97 975	26 597

*Notes: Robust standard errors. * p<0.05, ** p<0.01. *** p<0.001*
Control variables: time dummies and demographic characteristics (sex, marital status, age, age^2, education, labor market status, city or rural area as place of living, voivodeship, household size (number of household members), household income.
Source: own calculations based on GUS data.

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