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Long-run inflation expectations in the ECB survey of professional forecasters: what do the survey responses tell us?

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Keywords: *inflation expectations; policy credibility; survey data*

Abstract

Research background: At the background, there are issues related to policy credibility and policy targets. For these issues, long-term forecasts can provide important information. Of course, long-term forecasts are needed also e.g. for evaluation of real returns.
Purpose of the article: This paper tries to find out how informative the ECB Survey of Professional Forecasters data on long-term inflation prospects are from the point of view of the overall quality of the survey and on the other hand from the point of view of monetary policy credibility.
Methods: The analysis makes use of individual forecaster level quarterly panel data for the period 1999Q1–2018Q4. Conventional panel econometrics tools are used to find out whether forecasts are sensitive to changes in actual inflation and other relevant variables.
Findings & Value added: We find some weaknesses considering the size of the survey, the selection of the sample (more precisely the participation to the survey) and the inertial responses of forecasters which suggest that the survey values are not actively updated. Moreover, we find that towards the end of the sample period, the survey values are related to actual inflation and to short-term expectations, which is not consistent with the credibility of the official inflation target.

Introduction

This paper deals with the question of how reliable are the ECB Survey of Professional Forecasters' (SPF) long-term inflation expectations. Are they genuinely unbiased (rational) forecasts based on all possible information and expertise of the respondents or are they merely some byproducts of surveys so that the responses are not seriously evaluated and updated over time. Or, do they just repeat the public authorities' policy statements?

Here we try to find out some answers by scrutinizing the responses of the ECB SPF survey of long-term inflation for the period of 1999–2018. First, we scrutinize the data of responses. Are they in any way related to short-term expectations or expectations derived from assets prices or actual developments of consumer prices? Moreover, can we distinguish between different behavioral models among the forecasters e.g. in terms of changes (or no changes) of forecast values (pick up a number and stick to it, or adjust the forecast when new information arrives)?

The analysis makes use of conventional panel econometrics tools in assessing the persistence of survey responses, the frequency in participating in the survey and the sensitivity of expectations to changes in actual inflation and other relevant variables. The paper also provides descriptive data on response rates and response patterns.

Literature review and research questions development

The question of the validity of long-term inflation expectations is by no means new. All the way since inflation targets became a policy issue there has been a lot of interest to see whether the expressed target values are consistent with the general public's expectations. The problem is that there have been very few proper survey data sources for the required analyses. Long-term inflation expectations that have been derived from asset prices have provided more opportunities for comparison and analysis. The problem is only that the latter mentioned proxies for long-term inflation expectations have been largely different from existing survey data (see e.g. Gerlach-Kristen *et al*., 2017; Christensen & Lopez, 2016)[1]. And *a priori*, it is not clear how the expectations should be measured. What assets should be considered and which kind of survey should be used? If survey data are used, should the data be collected from households, firms, financial market

[1] As for short-term forecasts, the difference between survey and asset price based measures appears to be rather small. Both of them appear to provide better forecasts of the actual inflation than data-based time-series models (See Grothe & Meyler, 2015).

participants or all of them? It has been shown in many places that the composition of survey respondents makes a lot of difference. For instance, Coibion *et al.* (2018a) pointed out that professional forecasters' expectations are largely different from business and consumers' expectations. In recent times, the latter have been much higher, more volatile and their dispersion has been much larger. As the consequence, they found consumer expectations more explanatory e.g. for "missing disinflation" puzzle in the US in the post-crisis period. Even "professional forecasters" are a heterogeneous group in terms of background, information set and motivation to respond to the survey. Thus, the results may not follow a simple behavioral pattern. Although the "professional forecasters" are supposed to be experts in economics, they are not active traders and thus they may not perform better in terms of forecasting accuracy or they may not be more forward-looking. For instance, Gerberding (2001) found French professionals less forward-looking than consumers. Coibion *et al.* (2018b) also show in a different paper that in particular firms are not so interested in inflation, at least in countries where the rate of inflation is low. Thus, only a few of them devote much resources to collecting and processing information about inflation. The problem might well be more serious in the case of long-term expectations. Market participants might not consider them utterly important for their own activities especially in the current single-digit inflation environment.

It is well-known that survey studies are akin to several problems. Different types of questions may lead to different interpretation. A more severe (potential) problem arises because of socially desirable responding. Respondents may answer in a manner that will be viewed favorable by the issuer of the questionnaire (see e.g. Paulhus, 2002). Thus, in our case, forecasters may respond in line with the ECB's official inflation target.

In the literature, long term inflation expectations have played a major role — maybe not so much as expectations itself, but because they provide a means to assess the credibility of the central bank's inflation target. Thus, it has been studied in several papers (see e.g. Demertzis *et al.,* 2011) whether the long-term expectations have been constant and unrelated to actual development of inflation (and other macro variables). In general, it has been found that this is indeed roughly true, at least for Europe. The observation is not particularly striking because the time series of long-term inflation expectations do indeed look like a constant term which obviously cannot be correlated with any other variable. However, the most recent data suggest that some form of de-anchoring has taken place after the financial crisis (see Kenny & Dovern, 2017; Lyziak & Paloviita, 2016; Pagenhardt *et al*., 2017). Recently, Coibion *et al.* (2020) showed that FED's decision to

adopt the new average inflation targeting rule in August 27, 2020 did not make any difference in inflation expectations among the households. This example shows how difficult it is to communicate the meaning of inflation targeting to the general public, not to speak of the credibility of this target.

In what follows, we first scrutinize the basic properties of the data: what kind of changes have taken place over time, what kind of responses the respondents give and what kind of profiles we find among the respondents? Then the basic research question is: *does the way of responding to the survey show up in the forecast values?* First, we pay special attention to those who do not update their forecasts and compare their responses to responses of new forecasters and those who change their values. We also investigate whether there is a difference between the "first" forecasts of the respondent and subsequent forecasts and whether the number of forecasts provided by the respondent ("forecast experience") makes a difference?

The second research questions deals with the question of *whether the long-term expectations are indeed unrelated to actual inflation, short-term expectations and long-term expectations derived from asset prices.* In the end, we discuss our findings and try to make a final assessment of the reliability of long-terms SPF expectations and make some proposals of possible ways to increase the reliability of the survey answers.

In what follows, we first characterize the data. Then we analyze the response rates and the sensitivity of expectations to other variables. Some concluding remarks are presented in the final section.

Analysis

Data

The ECB Survey on Professional forecasters has been carried out since the beginning of 1999. The long-run (five-year) inflation forecasts have belonged to the menu already from the beginning, but during the two first years the long-run forecasts were made only once a year (in the first quarters of 1999 and 2000). Thus, altogether we have data for 74 quarterly observations. The short-run (one year) survey covers the whole period and contains 80 observations. As for the other details of the survey, see e.g. ECB (2019). In total 104 forecasters have participated the survey over time. If all had responded to every survey, the number of observations would be 7693 in the long-run inflation survey and 8320 in the short-run inflation survey. In practice, the data consist of 3284 (7692) answers to the long-run

(short-run) inflation question while lags reduce the data even more: with one lag to 2574 (7592) data points.

The sample size is rather small compared e.g. to usual consumer surveys. Thus, despite the total number of respondents is 104, there is a quite a lot turnover among the participants so that on average only 44 respondents/institutes responded to the long-run inflation questions. The smallest sample was 32.

As said, the respondents are practically all institutes (proceedings inside the institute are obviously a black box). According to ECB (see ECB, 2018), most of institutions are financial institutions. More precisely, 45 of the 81 institutions that have allowed their name to be listed on ECB internet page, 23 are research/forecast organizations and 13 other economic organizations (representatives of firms/entrepreneurs).

Recently, ECB made a questionnaire to all respondents on how they made their forecasts that were published in the survey (ECB, 2018). The answers are quite interesting because they tell that in the case of long-term inflation predictions the institutions rely mainly (over 50%) on judgement. As for judgement, one can see that over 80% of respondents tell that they use the ECB inflation objective as one point of reference in their forecasts. The second most often cited source of information is the trend developments of actual inflation, which was mentioned by over 50% of survey respondents, see ECB (2019).[2]

Analysis of the response rates

The survey the forecasters' responses represent a quarterly dated panel but the panel is very incomplete as is shown in Figure 1. The average number of occasions that a respondent has participated to the survey is 30 and furthermore in many cases there are long periods of time during which a respondent has not provided a long-term inflation forecast (according to the data the total number of observations in which the previous value is missing is 22% (with the short-term inflation expectations the corresponding number is 17%). This "incompleteness" of the panel shows up in Figure 2, in which we have the shares of respondents (out of all respondents during the sample period 1999Q1–2018Q4). Quite clearly, the response rates vary a lot over time and show up as declining tendency towards the end of the period. The response rates for short-term and long term inflation questions are far from being perfectly correlated[3]. Moreover, the probability to

[2] In this survey, only about 20% of respondents told that long-term inflation and output (unemployment) forecasts were updated together.

[3] The coefficient of correlation is 0.75; moreover the AR(1) coefficient of long-term

response seems to depend on the average level of individual forecasts. Thus, the response rate is higher for respondents with a higher average long-term inflation forecast. In other words, there are some, even though not very strong evidence of sample selection in the response rates suggesting that the response rates are not completely unrelated to the overall view of inflation developments.[4] The response rate does not seem to be related to actual inflation but, as we can see from Table 1, the response rate is related to inflation uncertainty in such a way that long-term uncertainty seems to increase response activity and short-term uncertainty to decrease it. Basically, a similar relationship applies to the response rate of short term inflation. It is interesting to note that short- and long term inflation uncertainties measured by the dispersion (standard deviation of point forecasts) are not strongly correlated (see the graphs in the Appendix). In fact, the coefficient of correlation is only 0.34. All in all, the participation decision (and the resulting sample selection) is to some extent the weak link of the system and given the very small sample size it may have some impact on the (reported) forecast outcomes.

As for the forecast values, "experience" (measured by the total number of forecasts supplied by an individual forecaster during the whole sample period) does not seem to affect very much the forecast values. It is only that "new" forecasters seem to begin their forecast career with somewhat lower values. This level difference also shows up in estimates (see the last columns of Table 4).

Another typical feature in the responses is persistence, or as we call it "inertia". The respondents do only rarely change their forecast from the previous round. 59% of long-term responses are such that the values are the same as the previous quarter's values (first-time responses are not included in comparisons). 37% of answers the response is the same as a year ago. With the short-run (one-year) inflation forecasts, the "no change" number at the quarterly level is only 15%. The short-term and log-term inertia values are correlated, but not very strongly ($r = 0.37$). Thus, the long-term values are updated in a completely different way compared with the treatment of other forecast variables.

It is, however, interesting that the forecasts for the long-term inertia and non-inertia periods do not seem to differ. In other words, it does not make much difference whether the forecast value is the same as in previous peri-

(short-term) responses is 0.66 (0.69).

[4] Average values (of each respondent) of long- and short term forecasts (in a cross-section sense) are positively correlated but not very much ($r = 0.19$). The number of responses (of each respondent) and the average forecast value are not related in a significant way.

od or a new one. In the case of (individual) short-term forecasts, there is already considerable difference between the values, even though at the sample average level the difference is negligible also here. To some extent, the result is consistent with the findings of Lahiri and Zhao (2020), who scrutinize the answers from *Blue Chip Economic Indicators* survey. In their study, zero revisions dominate in the short run (up to 80%) with inflation forecasts. For the long run forecasts, only 40% of zero revisions are zeros.[5] The somewhat surprising result is that the updaters (those who make non-zero revisions), are not found to perform better than their "inattentive" peers.

But let us first have a look at the numbers that the respondents provide. Table 2 gives a short summary of the most typical numbers. Not surprisingly, number 2 is the most popular, comprising of roughly one third of all answers. Then come numbers 1.8% and 1.9%, which already cover over two thirds of responses. If one takes into account all first digit numbers between 1.5 and 2.0 (plus number 1.75), we have already 83% of all responses. By contrast, values below 1.5 and above 2.0 represent only 12% of all reported values.

It is interesting to see how much the responses for each respondent deviate from the most popular values (modes). That shows up in Figure 3 where we have the difference between quarterly forecast values and the sample mode value for each forecaster. The mean values of this difference come quite close to zero; the average deviation is 0.006. The median values are zero (with two exceptions), while the median absolute values (as shown in the figure) are even smaller. Quite interestingly, for 2009–2013 the median value is practically always zero, suggesting that the forecasters just stick to their "whole sample best estimates". The estimates between forecasters could, of course, still deviate.[6]

Instead of looking at the mean/median/mode values of inflation expectations, we should perhaps look at measures of expectation uncertainty. Thus, we could follow the approach of Grishchenko *et al* (2017). For that purpose, we compute the probability that expectations fall inside some range of values. Here we use the range of 1.5–2.0% as the relevant corridor. The

[5] This pattern is clearly at odds with the ECB SPF data where zero revisions dominate the long forecasts.

[6] First differences of long-term inflation forecasts are negatively (and significantly) autocorrelated (ρ_1 being -0.225), which illustrates the temporary nature of the eventual changes in the forecast values. Similar values are obtained when the RHS variable is the lagged long-term survey value variable in an error-correction type specification (for details, see the Appendix).

result can be seen in Figure 4. The probability is about 0.90 for the whole period. Only in the aftermath of the financial crisis, the probabilities are somewhat lower. The mean values are almost always below 2% but the 2% value is always inside the confidence interval. From this point of view, one may say that expectations are anchored but as we see later on, results that are conditional to past information cast some doubt on the anchoring property.

Testing the invariance of long-term expectations

Now let us turn to time series evidence, starting with the question whether the forecast values of (long-term) inflation are constant over time? If that were the case, first differences of these time series would just be "white noise". But that is not the case. The AR1 coefficient is -0.225 (2.80) even though higher order AR coefficients are just zeroes. Therefore, it is worth scrutinizing the existence of possible relationships between expectations and other variables.

If one scrutinizes the time series of inflation, trend inflation or long-term inflation expectations values derived from 5/10-year inflation swap rates it is more than obvious that they have very little in common with the SPF long-term inflation expectations. The long-term SPF expectations exceed the short-term expectations almost over the whole Euro period (the only difference is the period 2006–2008). The long-term SPF forecasts (opposite to short-run forecasts) reflect only poorly changes in the long-term expectations derived from the swap rates even though the series are clearly positively correlated. With the short-term rates, these two series come quite close to each other, even though there is a small permanent level difference after 2012 so that the SPF values are higher. Prior to 2008, the opposite holds (see Figure 5).

But from the point of view of causality, the case is not clear because it looks like both actual inflation and short-term forecasts seem to Granger cause long-term forecasts (and vice versa) indicating that the long-term expected values are sensitive to current developments in macro variables (Table 3). Also, the panel regression results in Table 4 confirm the same outcome: the long-term results seem to be, after all, sensitive to both short-term inflation expectations and asset-price based (SWAP) inflation expectations (thus confirming earlier findings of e.g. Lyziak & Paloviita, 2016, as well as Pagenhardt *et al.*, 2017)[7]. The result seems to be rather robust in terms of particular panel estimation set-up and also in terms of the estima-

[7] Both papers find that the sensitivity has increased markedly after the financial crisis.

tor. True, with panel GMM with differencing, the coefficients are much smaller but the dependencies are still statistically significant. Much stronger relations exist between short-term SPF expectations and the asset price-based (SWAP) expectations but this is surprising given the Figure 6.

As for relationship between (actual) inflation and expectations, we find that long-term inflation expectations depend on past inflation (cf. Table 4), and moreover, the dependency seems to have even increased after the 2008 (outbreak of financial crisis)[8]. Thus, we found the following relationship between long-term expectations (long) and lagged actual inflation (CPI)

$$\begin{gathered} long = \underset{(256.4)}{1.835} + \underset{(7.74)}{.129} * CPI_{-1} + \underset{(4.67)}{.018} * CPI_{-1} | \mathrm{t} > 2008 \\ SEE = 0.187, R^2 = 0.327, DW = 0.638 \end{gathered} \tag{1}$$

Another interesting feature in the expectations — inflation relationship is the fact that the probability of expectation revision seems to depend on the level of inflation and the relationship is nonlinear. Thus, if we estimate a Probit model in terms of a change in expectations, we get the following estimates:

$$\begin{gathered} NC = \underset{(2.97)}{-.417} + \underset{(14.14)}{1.457} NC_{-1} + \underset{(3.05)}{.285} * CPI_{-1} + \underset{(2.61)}{.793} * CPI_{-1} | CPI_{-1} \\ < 0 - \underset{(1.66)}{.267} * CPI_{-1} | CPI_{-1} > 2.| \\ SEE = 0.427, R^2(MF) = 0.084 \end{gathered} \tag{2}$$

where NC denotes "no change" in expectations (NC = 1, if ΔLong=0), R^2(MF) is the McFadden R squared and the numbers inside parentheses robust t-values. Perhaps somewhat surprisingly, the results tell that the probability of expectation revision depends on the rate of inflation so that the sensitivity is particularly high when inflation is low (even deflation). If the inflation rate exceeds 2%, sensitivity tends to decrease. Thus, the long-run expectations are not totally immune to current/past developments of inflation witch is at odds with the idea of expectations being anchored to the inflation target.

The dominant feature of long-term expectations is huge persistence. Thus, it is hard to find clear signs of sensitivity either in terms of the participation rate or the forecast values. The problem is probably due to the fact that the whole period is characterized by very low and almost constant in-

[8] The significant long-term inflation forecast — actual inflation relationship also holds in first differences of the data.

flation. In this kind of environment, it is hard to identify possible regime changes and interlinkages with third variables. Persistence could just be due to the fact that incentives to make big changes has been very small.

Conclusions

Our preliminary conclusion is that long-run inflation expectations in the ECB Survey of Professionals suffer from some weaknesses. First of all, the sample of forecasters is very small, especially when taking into account the "efficient" number of respondents. In this environment, the sample selection problem is of some importance. Moreover, the background of respondents is rather specific. Another problematic feature of the data is the fact that the predictions stay constant for a very long time and deviations from this constant term appear to be rather erratic, if not being some sort of mistakes. On the basis of the response rates, one may suspect that the respondents do not consider the long-term inflation forecasts as the main item of the survey. This is probably true for all similar surveys as well. The fact that all forecast values come close to 2% may be explained by the respondents' interpretation of ECB's policy goals. As pointed out earlier, ECB's own questionnaire to survey participants indicate that ECB' inflation target is indeed the most important point of reference for the respondents of the survey. After all, a substantial part of the respondents come from the financial community and they are probably more than the general public willing to take the ECB' policy targets as granted and thus find no reason to challenge openly the Central Bank in this respect while responding to other survey questions in the "usual way". Of course, the respondents (some of them or all of them) may also firmly believe in scenario where inflation returns to the level of the official inflation target.

The long-run inflation forecasts are not entirely independent of current and lagged inflation and short-term inflation forecasts, but it is not clear how much this means from the point of view of the credibility of the CB's inflation target. The magnitude of the effects is anyway rather small, suggesting that the forecasters just routinely make some minor changes in the long-term predictions when major changes take place in the current inflation environment, especially when inflation is very low or even negative. It is only that changes are typically temporary and the predicted values return to "normal" in a quarter or two.

But what to do to get more affirmative results? Maybe, some estimates of the forecast time path of inflation (not just 12 months and 5 years) would nail down the values more accurately? Perhaps more information could be

obtained if we turned the whole thing upside down and asked what about your opinion of the proper inflation target in the current environment or in an environment of a completely different economic outlook?

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Annex

Table 1. Responses to SPF survey

Dependent variable	constant	VIX	SDL	SDS	R^2/FE/Estimator
long-term	-.237	-.001	.008		0.774/FE/OLS
forecast	(534.32)	(0.32)	(2.03)		
-"-	.421	.001	.010	-004	0.775/FE/OLS
	(480.07)	(074)	(2.27)	(1.90)	
-"-	-.273		.186		0.001/NO/Probit
	(5.17)		(0.90)		
short-term	.4409	.002	.007	-.006	0.358/FE/OLS
forecast	(568.23)	(1.11	(1.81)	(2.54)	
-"-	-.046			-.102	0.000/NO/Probit
	(0.48)			(0.49)	

Note: The dependent variable is a 0/1 indicator of participation to the survey. Numbers inside parentheses are corrected/clustered t-ratios. VIX is the VIX (Europe) uncertainty index, SDL (SDS) the standard deviation of long (short) CPI forecasts. In the case Probit estimation, R^2 is the McFadden R^2. Fixed affects (FE) are used for each respondent.

Table 2. Most popular long-term inflation forecast numbers

predicted number	observations
2	1010
1.5	171
1.75	26
1.8	577
1.9	610
1.7	225
1.6	123
Total of these numbers	2742
<1.5	44
>2	376
All	**3284**

Table 3. Granger causality tests and selected correlation coefficients

Granger causality tests:			
	N	**F stat**	**Prob.**
Long does not Granger Cause Short	2043	0.688	0.5024
Short does not Granger Cause Long		7.740	**0.0004**
Short inertia does not GC Long inertia	2079	3.965	**0.0191**
Long inertia does not GC Short inertia		2.013	0.1338
Long does not Granger Cause CPI	2175	0.051	0.9499
CPI does not Granger Cause Long		8.893	**0.0001**
Short does not Granger Cause CPI	2822	1.918	0.1470
CPI does not Granger Cause Short		182.9	**0.0000**
Correlations:			
Between ΔLong and ΔShort = 0.082 (4.07) all obs.			
Between ΔLong and ΔShort = 0.204 (3.47) if no inertia			
Between Long inertia and Short inertia = 0.512 (21.63)			

Note: CPI denotes actual inflation (the Euro Area Harmonized CPI). "Long" denotes long-term inflation expectations and "Short" their short-term counterparts.

Table 4. Dependency of survey values on various explanatory variables

	1	**2**	**4**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
constant	.413	.437	.428		.258	.416	.424	.482	.268	1.903	1.638
	(17.14)	(17.62)	(5.73)		(4.94)	(8.13)	(13.86)	(19.25)	(11.94)	(433.3)	(223.7)
Long					.111						
					(4.06)						
$Long_{-1}$	.740	.740	.763	.320		.029	.744				
	(60.30)	(57.82)	(19.11)	(108.1)		(1.11)	(50.31)				
Short	.050										
	(8.06)										
$Short_{-1}$		.035		.022	.714	.715		.534	.576		
		(5.46)		(24.12)	(51.02)	(52.20)		(29.37)	(37.27)		
CPI			.013					.159			
			(3.68)					(20.19)			
Swap55							.029				
							(3.21)				
Swap11									.259		
									(20.91)		
new_long										-.022	
										(2.30)	
new_short											-.083
											(4.66)
dep.var	Long	Long	Long	Long	Short	Short	Long	Short	Short	Long	Short
R^2	*0.619*	*0.579*	*0.589*	..	0.526	0.527	0.564	0.607	0.621	0.002	0.005
SEE	*0.127*	*0.131*	*0.214*	0.154	0.289	0.289	0.139	0.264	0.274	0.222	0.420
DW	2.21	2.05	1.97	*)	2.11	2.12	1.90	2.07	2.02	0.42	0.54

Note: The data cover 1999Q1-2018Q4, but with the Swap series the cover is 2004Q3-2018Q4 only. new_long (new_short) denote an indicator for new (first-time) long-term (short-term) forecasts. The reported equations do not include fixed effects but if they are used, basic features of the results do not change. Thus, for instance, in case of equation 2, the following coefficients are obtained when both time and cross-section fixed effects are used: c .701 (21.99), $long_{-1}$ .597 (38.46) and $short_{-1}$ .040 (4.11). Estimates are OLS estimates except for *) column 4, where we have Generalized Method of Moments (GMM) estimates with first differences of the data. The J-statistic and its P-value for the instruments are is 76.82 (0.327). SEE = the standard error of estimate and DW the Durbin-Watson statistic.

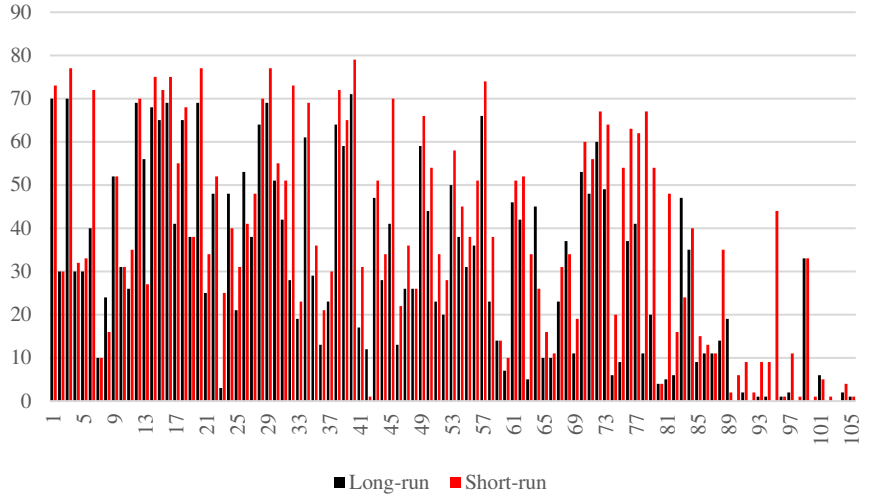
Table 4. Continued

Appendix "Error-correction estimates" for long-term survey values

	1	**2**	**3**	**4**
constant	.045	.674	.737	.048
	(19.15)	(23.63)	(24.88)	(12.28)
$Long_{-1}$	-.237	-.354	-.387	
	(19.24)	(23.71)	(24.95)	
EC_{-1}				-175
				(16.74)
ΔShort	.029	.026	.021	.114
	(3.44)	(3.12)	(2.30)	(10.35)
fixed effects	none	CS	CS&TS	CS&TS
R^2	0.139	0.221	0.262	0.127
SEE	0.128	0.124	0.123	0.138
DW	2.20	2.13	2.12	2.42

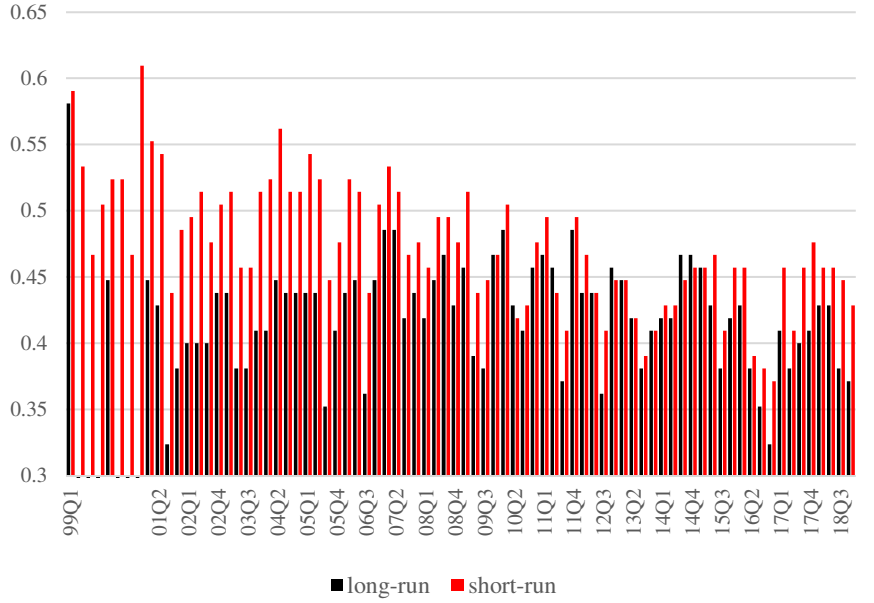
Note: The dependent variable is ΔLong. EC is Long - Short. CS denotes fixed cross-section and TS fixed time effects.

Figure 1. The number of answers of forecasters to inflation questions



Note: The x-axis corresponds to all 104 forecasters that have participated in the survey in 1999-2018.

Figure 2. The response shares



Note: The response rate indicates the share of responses of all survey respondents for 1999Q1-2018Q4. Keep in mind that in 1999 and 2000 the long-term inflation forecast question was asked only once.

Figure 3. Difference between long-term forecasts from the mode value of the forecaster

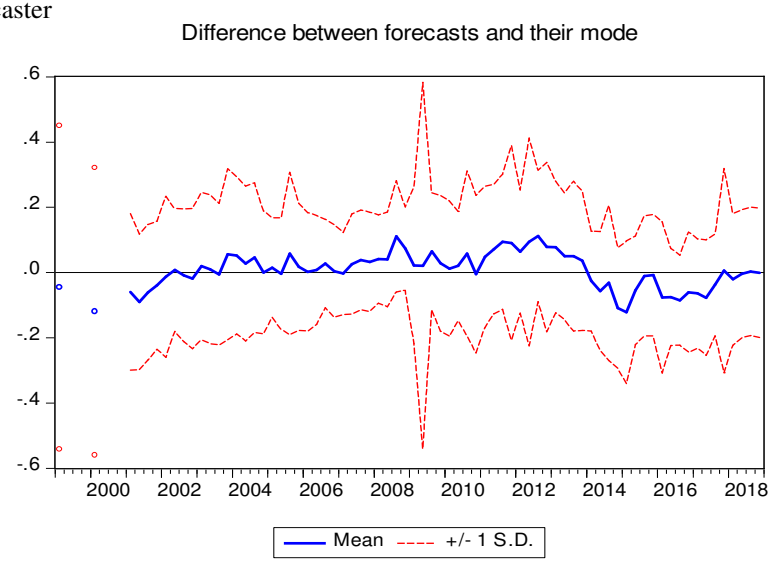
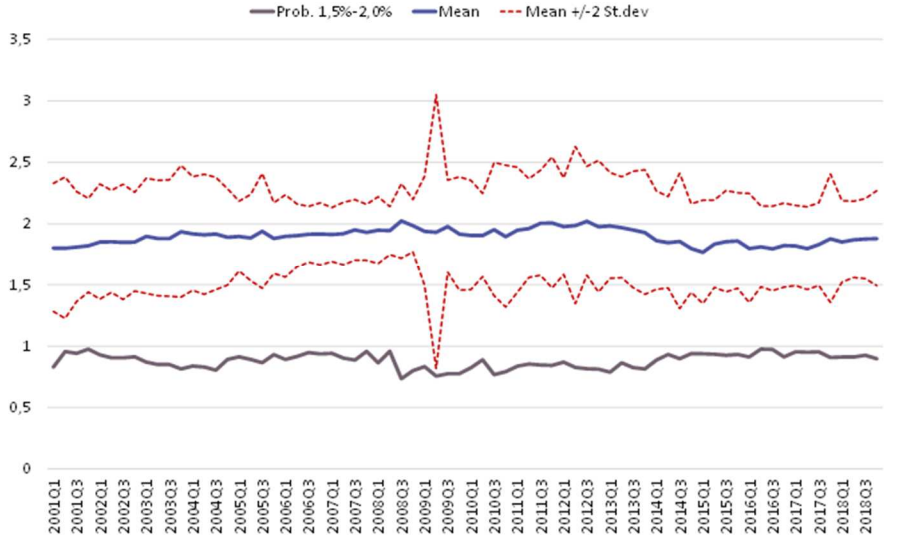


Figure 4. Long-run inflation forecasts' deviation from the inflation target



Note: "Prob 1.5-2.0" indicates the probability that long-term expectations are in the respective regime. The confidence intervals for the mean values of long-terms expectations are derived from subjective uncertainty measures of the respondents.

Figure 5. Difference between long and short-term SPF inflation expectations

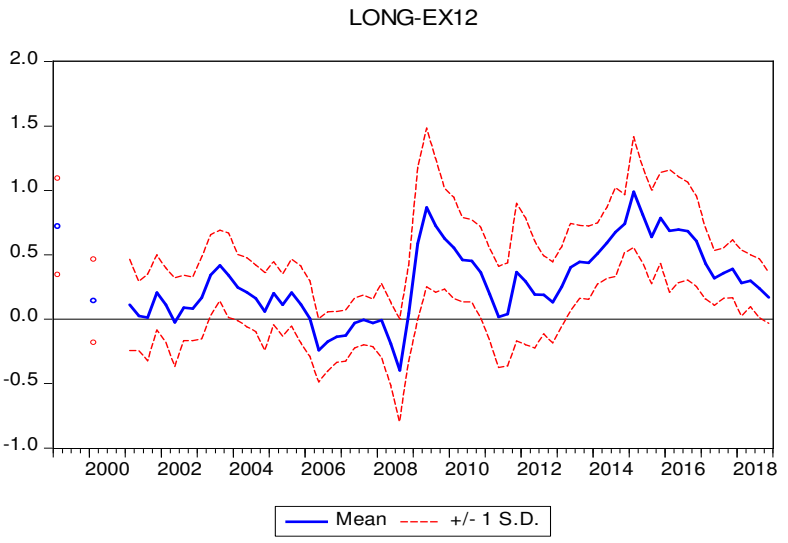


Figure 6. Inflation expectations according to SPF and Swap rates

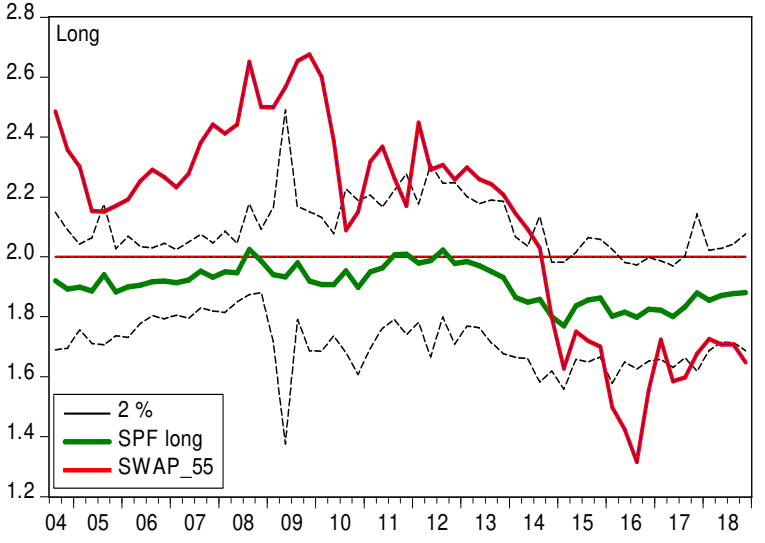
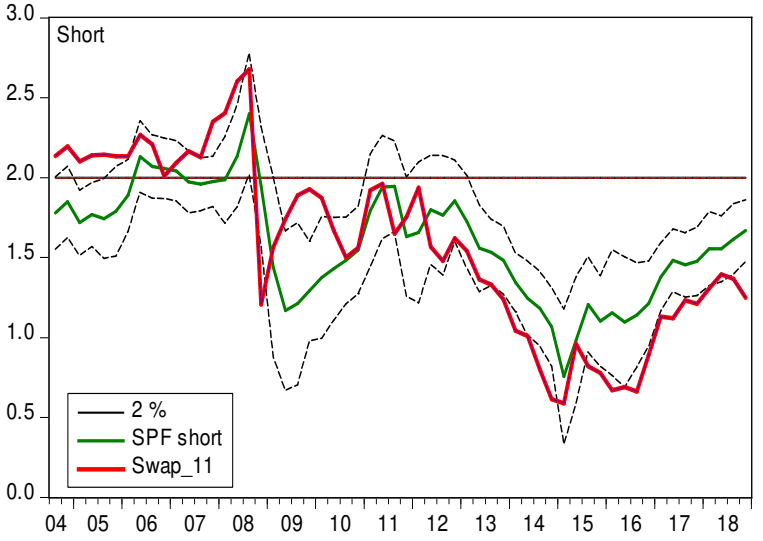


Figure 6. Continued



Note: Swap55 denotes the values derived from 5 and 10 year Swap rates. Similarly Swap denotes the values derived from 1 and 2 year Swap rates. The confidence bans for SPF are computed with +/- 1 standard deviation.

Appendix

"Error-correction estimates" for long-term survey values

	1	2	3	4
constant	.045	.674	.737	.048
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	(3.44)	(3.12)	(2.30)	(10.35)
fixed effects	none	CS	CS&TS	CS&TS
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SEE	0.128	0.124	0.123	0.138
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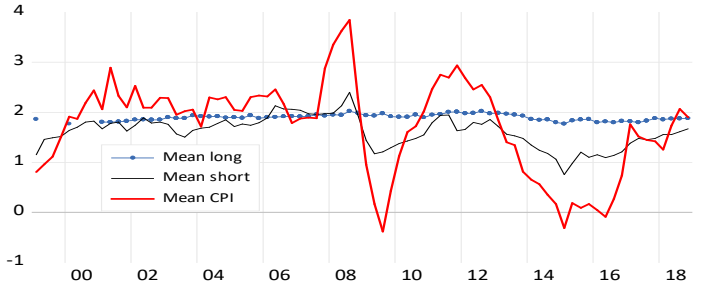
Note: The dependent variable is ΔLong. EC is Long - Short. CS denotes fixed cross-section and TS fixed time effects.

Times series of actual inflation and expectations of short and long-term inflation



Forecast uncertainty measured by the dispersion of forecasts