

Do private sector forecasters desire to deviate from the German council of economic experts?

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JEL classification: E37, D84, C33,

Keywords: Private Sector Forecasters; Herding; German Council of Economic Experts

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1 Introduction

Each year during the second week of November the German council of economic experts (Sachverständigenrat) reports its economic outlook to the German chancellor. Besides its recommendations for future economic policy actions, the report includes the forecasts made by the council and its staff. These projections receive considerable attention from the media, politicians, the academia, and financial market participants alike. While the German government uses the forecasts to prepare its estimate for the tax revenues and government expenditures, policy makers discuss and decide about future economic policy actions in the light of the council's forecast. Academic scholars evaluate the council's forecast performance. Dicke and Glismann (2002) find that the council's growth forecasts were too optimistic during the 1990'ies compared to the time before and, hence, the absolute forecast error has increased over time. Weidmann (2002) shows that other measures of forecast accuracy, e.g. the mean absolute error, do not show a trend in the council's forecast performance. Smolny (1998) concludes that the council's forecasts performed better than simple econometric models.

However, none of the studies contrasts the council's forecast to private sector forecasters which is a reasonable strategy to judge the council's forecast performance. This is done by the Financial Times Deutschland in its January ranking of German forecasters. Although it is not the main purpose of this ranking to evaluate the council's forecast, in this ranking the council's projection is published along more than 50 private sector forecasters. Although the council submits his forecast one month in advance to the private sector forecasters he performs quite remarkable and was placed at the 12th rank in the January 2007 ranking (Financial Times Deutschland 2007). In its 2010 ranking the council was placed the 22nd rank. The question is whether the financial market uses the council's

projection as a piece of information for its own assessment. To answer this question we contrast private sector forecasts to the council's projections to analyze whether private sector forecasters place their forecasts around the council's projection.

Such an analysis has important macroeconomic implications. If the council influences the private sector forecasts, it can act stabilizing on the economy. If private sector forecasters respond to the council's projections, sound macroeconomic forecasts serve as a yardstick for the private sector and reduce uncertainty regarding the future development of the macroeconomy. If, on the other hand, the private sector does not care about and respond to the council's forecast at all, this would indicate a lack of confidence in the quality of the council's projections.

The literature comparing private sector forecasts to intergovernmental forecasts is relatively sparse. Döhrn and Schmidt (2011) compare the forecast accuracy of German research institutions and find that the main determinant for forecast accuracy is the forecast horizon. Batchelor (2001) and Blix et al. (2001) compare intergovernmental forecasts to the mean of private sector forecasts and show that the IMF and the OECD provide less accurate forecasts compared to the private sector consensus forecast. Dreher et al. (2008) explain this lack of forecast accuracy reporting that the IMF delivers strategic forecasts to underpin their macroeconomic policy. However, Dovern and Weisser (2010) argue that aggregating among a group of forecasters is inappropriate when investigating the forecast properties, such as accuracy. Hence, this paper focuses on individual private sector forecasts. We document that the council's forecast accuracy for real economy variables is higher compared to private sector forecasters while for the inflation rate we do not find such a difference. We also provide an explanation of this result. We show that the lack in forecast performance of

private sector forecasters is related to the anti-herding behavior of private sector forecasters which implies that private sector forecasters deliberately place their forecasts away from the council's forecast. While there are many studies on the social interaction among private sector forecasters (Lux 2009), this is the first study which examines the interaction between private sector forecasts and institutional forecasts.

The paper is organized as follows. In Section 2 we describe in detail the data while in Section 3 we explain the test for herding and anti-herding. In Section 4 we present our main empirical results and a set of robustness tests while in Section 5 we offer some concluding remarks.

2 The Data

To compare the projections of the economic council to the private sector forecasts, we use monthly survey data for Germany published in the Consensus Economics forecast poll. In this survey, 54 private sector forecasters¹ are asked to submit their forecasts of several financial and real economy variables, including real growth, private consumption, investment and the fiscal deficit.² Our data cover forecasts for the sample period from October 1989 to December 2009 including more than 6,000 private sector forecasts and covering 21 annual reports of the economic council. The forecasters participating in the survey work with institutions such as banks, research institutes, and consultancies in Germany. A disadvantage of any study using private sector forecasts is the possibility that some forecasters simply use their old forecasts rather than submitting a new forecast. However,

¹The complete list of participants is downloadable on the journal's webpage.

²The exact definition of the variables are: the real growth rate ("Wachstumsrate"); the change in consumer prices ("Index der Verbraucherpreise"); the unemployment rate in percent of labor force; the real change in private consumption ("privater Verbrauch"); the real change in investment in machinery and equipment ("Ausrüstungsinvestitionen") and the general government balance ("Finanzierungssaldo des Staates").

since there is no identification strategy to separate the forecasts concerning their vintages we do not exclude some forecasts from the survey.

An interesting feature of the Consensus Economics data is that not only the individual forecasts are published but also the corresponding name of the forecasting institution. Thus, an evaluation of the accuracy of a particular institution's forecast is relatively easy to conduct, which may impinge back on the reputation of this institution with respect to its forecasting activities (Keane and Runkle 1990). The Consensus Economics survey also contains forecasts for different forecast horizons, i.e., for the current year and the next year. In order to correctly compare the forecast performance of the council to the private sector and in line with the methodology of the Financial Times Deutschland ranking, we only use the private sector forecasts which are published in the first week of December,³ i.e. shortly after the release of the council's report in mid of November.⁴

In order to examine the time-series dimension and the cross-sectional dimension of the survey data, Figure 1 plots the time series of (i) the council's current year forecast (black squares), (ii) the actual value⁵ (solid lines), and, (iii) the cross-sectional heterogeneity of the private sector forecasts submitted in December as measured by the cross-sectional range of forecasts (shaded areas) for the real growth rate, inflation rate and the unemployment rate. The vertical distance between the black squares and the solid line can be interpreted as the councils forecast error.

³Results bases on the forecasts published in January are similar and available upon request.

⁴Interestingly, the number of forecast revisions in December forecasts is higher than the average number. This points to the possibility that the forecasters update their forecasts in December.

⁵The actual values are taken from the German statistical office (Statistisches Bundesamt) and, hence, are revised series.

Since both types of forecasts are published at nearly the same time, they move basically in tandem. However, the figure provides some anecdotic evidence that the council predicted the real economy development better than the private sector forecasters. For instance, in November 1991 the council's growth rate (unemployment rate) forecast of 3.4 (5.8) was noticeably closer to the actual value of 3.4 (5.5) than the mean of the private sector forecasters of 3.2 (8.3). Compared to this, Panel B does not show that the forecast ability differs between both groups concerning the inflation rate. This is supported by Table 1 which reports the mean values, the root mean squared error as well as the mean absolute error for the council's forecasts and the private sector forecasts. Interestingly, the council significantly provides better forecasts than the private sector for the real growth rate,⁶ the unemployment rate and the fiscal deficit as indicated by the significantly lower forecast error. The mean absolute error of the council's (private sector's) growth forecast of about 0.18 (0.28) reflects that the forecast is on average 0.18 (0.28) percent away from the actual value. Looking at the mean of the council's (private sector's) forecasts of 1.51 (1.46) compared to the actual value of 1.54 shows that the council's projection tend to be less pessimistic compared to the private sector.

Insert Table 1 and Figure 1 about here.

Hence, the question is: Why is the forecasting performance of the private sector forecasters for some variables worse compared to the performance of the council? One explanation is that both groups have different incentives when submitting a forecast. This implies that forecasting success, when viewed from the perspective of an individual forecaster, depends on the forecaster's loss function, not necessarily on forecast accuracy. Laster et al. (1999) argue that private sector forecasters are not only interested in

⁶This applies only for the current year forecast while for the more interesting forecasting cycle of the next year forecast Table 1 does not report significant differences.

forecast accuracy but also want to increase attention. Therefore, they tend to submit extreme forecasts to gain attention on the potential expense of forecast accuracy. The gain in attention is more pronounced the further the forecasters are away from the benchmark forecast. This results in a so called *strategic behavior* of private sector forecasters which transmits into a *rational forecast bias* (Petersen 2001, Lamont 2002, Elliott et al. 2008). The next section analyzes the interaction between the private sector and the council by developing a herding test to explore whether the lack in forecast performance of private sector forecasters compared to the council is related to strategic behavior.

3 A Test for Herding and Anti-Herding

The large sample of private sector forecasters participating in the Consensus Economics forecast poll raises the question whether an individual forecaster is influenced by the council’s forecast, i.e., whether there is any herding or anti-herding behavior towards or away to the council’s forecast.⁷ Bernhardt et al. (2006) suggest an empirical test for herding or anti-herding that can be applied to this question and is used by Pierdzioch and Stadtmann (2010) and Rülke and Tillmann (2011). While Bernhardt et al. (2006) focus on financial analysts Pierdzioch and Stadtmann (2010) show that exchange rate forecaster deliberately placed their forecasts away from the consensus forecast. Rülke and Tillmann (2010) provide evidence for strategic forecasting behavior of the Federal Open Market Committee. The test involves studying the relationship between individual private sector forecasts, the council’s forecast, and the actual value. The test is based

⁷Our analysis concerns the cross-sectional herding or anti-herding of forecasters. In the empirical literature, researchers use the term “herding” to characterize the time-series properties of forecasts (Lakonishok et al., 1992). Our usage of the term herding, thus, should not be confused with the terminology used by other researchers who utilize the term herding to describe, e.g., destabilizing trend-extrapolative forecasts in a time series context.

on the following considerations. With new information arriving, every forecaster combines all available information to update and form a posterior distribution. The mean of this distribution is the forecaster's best estimate and represents his unbiased forecast. Herding occurs, when forecasters, being aware of the council's forecast, place their forecast closer to the council than they would have done otherwise. In this case, forecasters bias a forecast away from their best estimate towards the council's forecast. Likewise, anti-herding occurs when forecasters bias their forecasts further away from the council's forecast than they would have done otherwise.

If a private sector forecaster issues his best estimate, he submits an unbiased forecast. In this case, he is not influenced by the council's forecast. Since the council publishes its forecasts in mid November, we use the private sector forecasts compiled in the first week of December to make sure that the private sector forecasters know the council's forecast. If a private sector forecaster does not herd and, hence, issues an unbiased forecast, i.e., his best estimate, the probability that his forecast $E_{i,t}[v_{t+k}]$ exceeds (falls short of) the actual value, v_{t+k} , is equal to 0.5, both unconditionally, and conditional on anything in the information set available to the forecaster, including the council's forecast, $E_{C,t}[v_{t+k}]$.

A test for the herding or anti-herding behavior of forecasts, as proposed by Bernhardt et al. (2006), can be developed as follows: Under the null hypothesis of no herding and no anti-herding, the conditional probability, P , that a forecast overshoots (undershoots) the actual value is 0.5, regardless of the council's forecast. Accordingly, the conditional probability of overshooting the actual value given that the forecast is higher than the council's forecast is

$$P(v_{t+k} < E_{i,t}[v_{t+k}] | E_{i,t}[v_{t+k}] > E_{C,t}[v_{t+k}]) = 0.5 \quad (1)$$

likewise the conditional probability of undershooting the actual value given that the forecast is smaller than the council's forecast is

$$P(v_{t+k} > E_{i,t}[v_{t+k}] | E_{i,t}[v_{t+k}] < E_{C,t}[v_{t+k}]) = 0.5. \quad (2)$$

The two conditional probabilities, thus, average to 0.5. This is not the case under the alternative hypothesis of herding or anti-herding. If a forecaster herds, biasing the forecast towards the council's forecast, the forecast will be located between the unbiased private forecast and the council's forecast. In the case that the forecast exceeds (falls short of) the council's forecast, the conditional probability of overshooting (undershooting) the actual value is smaller than 0.5. This means

$$P(v_{t+k} < E_{i,t}[v_{t+k}] | E_{i,t}[v_{t+k}] > E_{C,t}[v_{t+k}]) < 0.5. \quad (3)$$

$$P(v_{t+k} > E_{i,t}[v_{t+k}] | E_{i,t}[v_{t+k}] < E_{C,t}[v_{t+k}]) < 0.5. \quad (4)$$

If forecasters herd, the average of the two conditional probabilities is smaller than 0.5. If forecasters anti-herd, in contrast, the average of the two conditional probabilities is larger than 0.5. In this case the forecast overshoots the unbiased private forecast in the direction away from the council's forecast. This means

$$P(v_{t+k} < E_{i,t}[v_{t+k}] | E_{i,t}[v_{t+k}] > E_{C,t}[v_{t+k}]) > 0.5. \quad (5)$$

$$P(v_{t+k} > E_{i,t}[v_{t+k}] | E_{i,t}[v_{t+k}] < E_{C,t}[v_{t+k}]) > 0.5. \quad (6)$$

The test statistic, S , is defined as the average of the sample estimates of the conditional probabilities used in Equations (3) – (6). Bernhardt et al. (2006) show that the test statistic, S , has an asymptotic normal distribution and is robust to various problems arising in the case of, e.g. correlated forecast errors, market-wide shocks, and optimism or pessimism among forecasters. It is the averaging that makes the test robust under the null hypothesis. For example, swings may give rise to a preponderance

of unexpected market-wide shocks such as the German reunification in the early 1990's (Fritsche and Kuzin 2004). Such shocks raise (lower) the probability that the subsequently actual value exceeds (falls short of) forecasts, given any conditioning information, but leave the average of the conditional probabilities unaffected under the null hypothesis. Market-wide shocks and the resulting positive cross-correlation of forecast errors do not bias the mean of the S statistic, but only increase its variance below the one obtained in the case of zero cross-correlation of forecast errors. This alleviates the standard error and increases also the size of the confidence intervals. As a consequence the null hypothesis of no anti-herding is only rejected in very severe cases of anti-herding. In other words, the test statistic S is conservative because positive unexpected shocks make it more difficult to reject the null hypothesis of unbiasedness when we should do so (Type II error). This also applies if some forecasters perform consistently worse than others. As long as the forecast forecast error is uncorrelated to the council's forecast, the test statistic indicates no (anti-)herding.

Finally, it is relevant for our analysis to note that outliers and large disruptive events like the financial crisis 2008/2009 and considerable swings in the business cycle (Hüfner and Schröder 2002, Carstensen et al. 2011) have a minor effect on the conditional probabilities (i.e., empirical frequencies of events). The test statistic, S , is robust to such events. A potential drawback of the test statistic is that it assumes that forecasters have a symmetric loss function while empirical evidence point to the possibility of asymmetric loss functions (Döpke et al., 2010). Bernhardt et al. (2006) provide a detailed description of the test and its characteristics.

4 Empirical Results

Table 2 (panel A) summarizes the results of the herding test for the current year and next year forecasts. We find evidence of an anti-herding behavior of private sector forecasters concerning the growth rate (current year forecasts), the unemployment rate and the fiscal deficit. For instance, for the current year growth forecast, we estimate a test statistic of $S = 0.67$. With the standard deviation of 0.02, the test statistic significantly exceeds its unbiased forecast value of 0.5. Compared to this, the results for the inflation rate, change in consumption and change in investment do not show any (anti-)herding behavior. Hence, concerning these forecasts the private sector does not strategically place their forecasts away or towards the council's projection.

To analyze the robustness of our results, we analyze the temporal stability of the test statistic, S , by means of rolling-window estimates of four years. To this end, we start with the estimation window 1989 – 1992. We then rolled the estimation window one year forward, and dropped (added) the forecasts for 1989 (1993). We continued this process of dropping and adding forecasts until we reached the end of the sample period. Figure 2 summarizes the results for the current year forecasts for the real growth rate, the inflation rate and the unemployment rate. It is interesting to observe that the anti-herding behavior of unemployment forecasts is particularly pronounced in the early 1990'ies. Especially in this period the council has a better forecast performance compared to the private sector which again mirrors the relationship between strategic forecasting and relative forecasting performance. While the extent of anti-herding of unemployment (inflation) forecasts has decreased (increased) over time, the anti-herding behavior of growth forecasts is relatively stable.

To provide an additional robustness tests, we differentiate the herding behavior between optimists and pessimists. To identify both groups we define for every survey the optimists (pessimists) as those forecaster who predicted a higher (lower) growth rate than the mean forecast. Panel B (C) of Table 2 shows the results of the herding test for optimists (pessimists). Interestingly, both groups show anti-herding for the unemployment rate and the fiscal deficit (current year forecasts) while the optimists also exhibit anti-herding behavior for the next year forecasts for the fiscal deficit, the real change in consumption and investment. Hence, optimists have a stronger tendency to intentionally deviate from the council's projections compared to pessimists. A reason for this result might be that optimists tend to provide forecasts more strategically compared to their colleagues.

Since the participants of the survey work with different kinds of institutions, aggregating the diverse forecasters might neglect different (anti-)herding strategies. Hence, we split the sample in three different groups, namely banks, research institutes and consultancies. The list including the survey participants and the classification of the groups is available on the journal's webpage. Table 3 reports the results and supports the general finding of anti-herding. Interestingly, the anti-herding behavior is more pronounced for banks and less pronounced for research institutes which might reflect that banks have a higher incentive to stand out of the crowd at the expense of forecast accuracy compared to research institutes. For the unemployment forecasts Table 3 reports a consistent anti-herding among all groups.

To rule out the possibility that the anti-herding behavior is a mere statistical artifact, we also used a set of German research institutes, e.g., the ifo institute and the joint forecast (Gemeinschaftsdiagnose) as an anchor. Applying the same procedure as for the council, e.g. using the November

forecast of the ifo institute as a benchmark and the private sector forecasts published in December show remarkable differences between the council and other institutions. Hence, the results reported for the council are related to the councils forecasts and not a general result.

Insert Tables 2, 3 and Figure 2 about here.

5 Conclusions

In this paper, we contrast more than 6,000 private sector forecasts for Germany published in the Consensus Economics forecast poll to almost simultaneously published projections of the German council of economic experts. We find that the council's real economy forecasts, i.e. their growth, unemployment and fiscal forecasts have a higher forecast accuracy compared to the private sector forecasters. We also document that for these variables private sector forecasters deliberately place their forecasts away from the council's projection which is defined as an anti-herding behavior. This result is robust over time but is more pronounced for banks than for research institutes.

The strategic forecasting behavior of the real economy variables explains why the private sector forecasters perform worse than the council. This supports the view of a rational bias in forecasting (Laster et al. 1999, Peterson 2001) showing that forecast accuracy is not the only ingredient in the loss function of private sector forecasters. Forecasters which are not only interested in unbiased forecasts but also aim to increase attention deliver extreme forecasts at the expense of forecast accuracy.

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Table 1: Summary Statistics

Year	Real growth rate (in %)		Inflation rate (in %)		Unemployment rate (in % of labor force)		Change in consumption (in %)		Change in investment (in %)		Fiscal deficit (in bn. €)	
	current	next	current	next	current	next	current	next	current	next	current	next
Mean												
Council	1.51	1.76	2.07	2.24	9.51	8.91	1.00	1.36	1.41	3.22	-54.0	-51.7
Private sector	1.46	1.68	2.11	2.10	9.58	9.65	1.00	1.36	0.76	3.23	-56.1	-51.8
Actual	1.54	1.52	2.09	2.05	9.33	9.44	1.43	1.34	1.47	1.47	-53.6	-53.8
Observations												
Council	21	21	21	21	21	21	21	21	21	21	19	19
Private sector	575	574	576	578	570	570	577	577	492	517	397	369
RMSE												
Council	0.29*	1.57	0.46	0.72	0.43*	0.81*	0.92	1.14	3.09	6.84	17.0*	28.2*
Private sector	0.39	1.53	0.33	0.65	0.65	1.00	0.91	1.21	2.65	7.16	35.2	41.2
Banks	0.39	1.46	0.34	0.65	0.66	0.99	0.90	1.15	2.45	7.02	43.5	40.9
Research	0.33	1.72	0.33	0.65	0.33	0.96	0.89	1.23	2.88	7.53	24.7	45.8
Consultancies	0.39	1.85	0.27	0.69	0.59	1.07	0.91	1.24	2.59	7.13	21.3	39.3
MAE												
Council	0.18*	1.14	0.29	0.52	0.26*	0.63*	0.67	0.92	2.44	5.24	11.9*	21.4*
Private sector	0.28	1.12	0.22	0.51	0.31	0.78	0.71	1.00	1.96	5.25	18.7	28.7

Note: This table shows the mean of the private sector forecasts, the council's forecast, and the actual value; RMSE (MAE) refers to the root mean squared error (mean absolute error); * indicates that the council's forecast error is different to the mean forecast error of the private sector forecasters on a 5 percent significance level.

Table 2: Test for Herding

Panel A: Full Sample

Variable	Growth		Inflation		Unemployment		Consumption		Investment		Fiscal deficit	
	current	next	current	next	current	next	current	next	current	next	current	next
S-statistic	0.67	0.50	0.50	0.55	0.75	0.67	0.52	0.55	0.46	0.55	0.64	0.56
Stand. Dev.	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03
Lower 99 %	0.61	0.44	0.44	0.48	0.69	0.61	0.47	0.49	0.41	0.49	0.57	0.50
Upper 99 %	0.72	0.55	0.56	0.61	0.81	0.73	0.58	0.60	0.52	0.60	0.71	0.63
Obs.	575	574	576	578	570	570	577	577	492	517	397	369

Panel B: Optimists

Variable	Growth		Inflation		Unemployment		Consumption		Investment		Fiscal deficit	
	current	next	current	next	current	next	current	next	current	next	current	next
S-statistic	0.67	0.48	0.47	0.54	0.75	0.68	0.54	0.62	0.54	0.58	0.64	0.60
Stand. Dev.	0.03	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04
Lower 99 %	0.58	0.40	0.38	0.44	0.66	0.59	0.47	0.55	0.46	0.50	0.54	0.51
Upper 99 %	0.75	0.56	0.55	0.64	0.84	0.76	0.62	0.70	0.62	0.66	0.74	0.70
Obs.	281	277	280	282	277	277	343	345	283	285	192	192

Panel C: Pessimists

Variable	Growth		Inflation		Unemployment		Consumption		Investment		Fiscal deficit	
	current	next	current	next	current	next	current	next	current	next	current	next
S-statistic	0.58	0.50	0.53	0.55	0.76	0.67	0.51	0.54	0.55	0.53	0.64	0.51
Stand. Dev.	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04
Lower 99 %	0.49	0.42	0.45	0.46	0.68	0.59	0.43	0.46	0.46	0.45	0.55	0.41
Upper 99 %	0.67	0.58	0.62	0.65	0.84	0.74	0.59	0.61	0.64	0.62	0.73	0.60
Obs.	297	297	296	296	293	293	294	294	227	228	205	205

Note: The test statistic, S , is defined as the average of the sample estimates of the conditional probabilities given in Equations (3) - (6). If forecasters do not herd or anti-herd (null hypothesis), the test statistic assumes the value $S = 0.5$. If forecasters herd, the test statistic assumes a value $S < 0.5$. If forecasters anti-herd, the test statistic assumes value a $S > 0.5$. The test statistic, S , has an asymptotic normal distribution.

Table 3: (Anti-)Herding of Different Groups

Panel A: Banks

Variable	Growth		Inflation		Unemployment		Consumption		Investment		Fiscal deficit	
	current	next	current	next	current	next	current	next	current	next	current	next
S-statistic	0.77	0.61	0.47	0.58	0.76	0.72	0.60	0.60	0.46	0.57	0.63	0.58
Stand. Dev.	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.03	0.03	0.03	0.03
Lower 99 %	0.71	0.55	0.41	0.51	0.70	0.65	0.54	0.54	0.39	0.50	0.55	0.50
Upper 99 %	0.84	0.68	0.54	0.66	0.83	0.78	0.66	0.66	0.53	0.64	0.71	0.65
Obs.	437	437	439	439	436	435	440	440	372	393	319	318

Panel B: Research Institutes

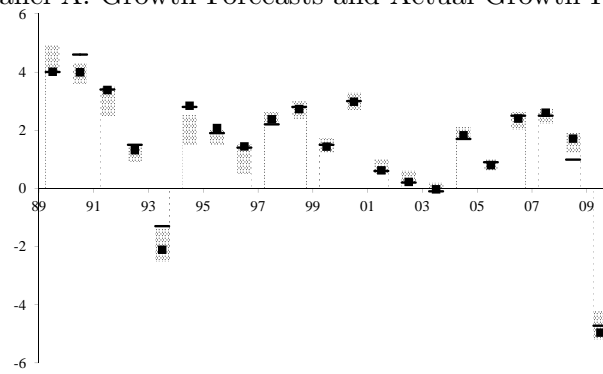
Variable	Growth		Inflation		Unemployment		Consumption		Investment		Fiscal deficit	
	current	next	current	next	current	next	current	next	current	next	current	next
S-statistic	0.72	0.51	0.55	0.53	0.72	0.71	0.54	0.64	0.37	0.61	0.70	0.42
Stand. Dev.	0.07	0.08	0.08	0.09	0.07	0.07	0.07	0.08	0.08	0.08	0.10	0.09
Lower 99 %	0.53	0.31	0.34	0.29	0.53	0.52	0.35	0.43	0.16	0.40	0.45	0.17
Upper 99 %	0.90	0.71	0.76	0.76	0.91	0.90	0.72	0.85	0.58	0.83	0.95	0.67
Obs.	49	49	50	50	48	48	50	50	39	40	30	29

Panel C: Consultancies

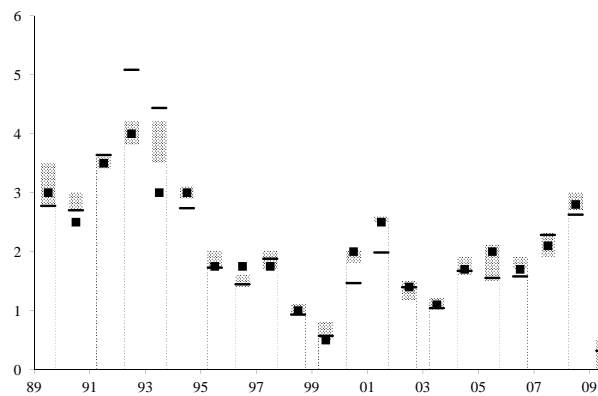
Variable	Growth		Inflation		Unemployment		Consumption		Investment		Fiscal deficit	
	current	next	current	next	current	next	current	next	current	next	current	next
S-statistic	0.77	0.69	0.55	0.57	0.78	0.82	0.60	0.50	0.53	0.51	0.55	0.53
Stand. Dev.	0.05	0.05	0.06	0.07	0.06	0.06	0.06	0.05	0.06	0.06	0.07	0.07
Lower 99 %	0.63	0.55	0.40	0.39	0.63	0.67	0.46	0.36	0.38	0.35	0.36	0.33
Upper 99 %	0.91	0.83	0.69	0.74	0.94	0.97	0.75	0.64	0.68	0.66	0.75	0.73
Obs.	91	90	89	89	88	88	91	91	83	85	46	47

Note: The test statistic, S , is defined as the average of the sample estimates of the conditional probabilities given in Equations (3) - (6). If forecasters do not herd or anti-herd (null hypothesis), the test statistic assumes the value $S = 0.5$. If forecasters herd, the test statistic assumes a value $S < 0.5$. If forecasters anti-herd, the test statistic assumes value a $S > 0.5$. The test statistic, S , has an asymptotic normal distribution.

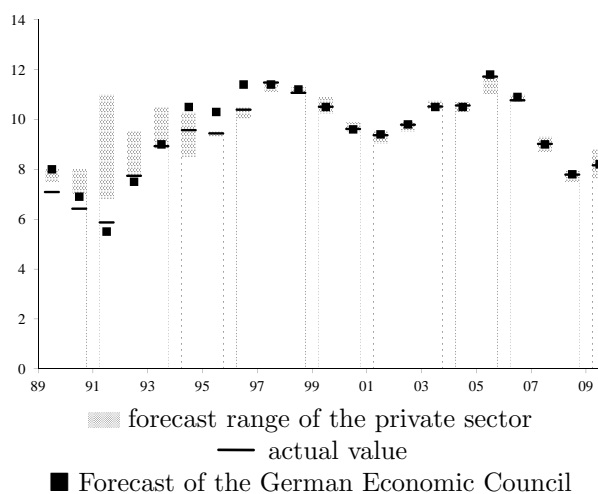
Figure 1: The German Council of Economic Experts vs. the Private Sector
 Panel A: Growth Forecasts and Actual Growth Rate



Panel B: Inflation Forecasts and Actual Inflation Rate

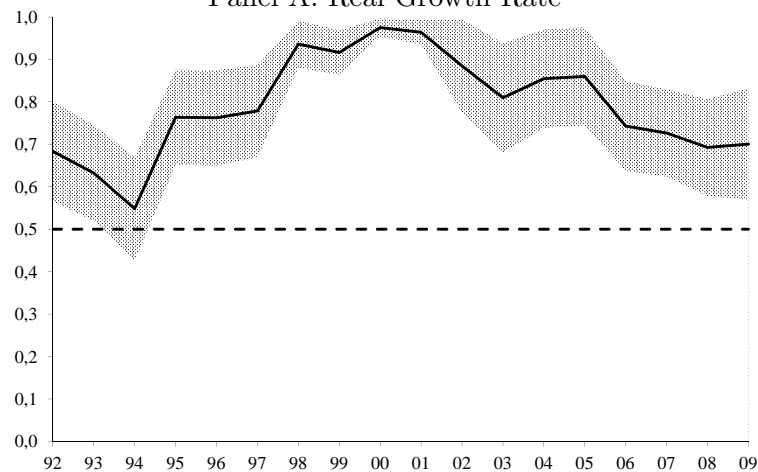


Panel C: Unemployment Rate Forecasts and Actual Unemployment Rate



Note: This figure shows the cross-sectional forecast range of the Consensus Economics current year forecasts (shaded area), current year forecasts of the German council of economic experts (black squares), and the actual values (solid line). The actual values are taken from the German statistical office (Statistisches Bundesamt).

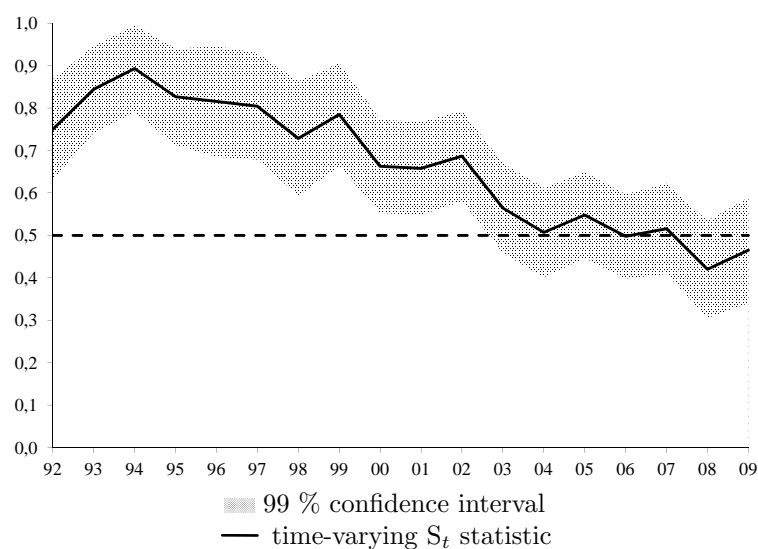
Figure 2: Time-Variance of Herding Behavior
 Panel A: Real Growth Rate



Panel B: Inflation Rate



Panel C: Unemployment Rate



Note: This figure shows the time-varying S_t statistic (solid line) and the 99 % confidence interval (shaded area) for the private sector forecasts concerning the growth rate, inflation rate and unemployment rate. The results are obtained by a rolling window of four years. The dotted line represents the case of no (anti-)herding.