On the Rationality of the General Public

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July 2005 Discussion paper no. 2005-13

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Publisher: Department of Economics
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CH-9000 St. Gallen
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Electronic Publication: http://www.vwa.unisg.ch

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Abstract

Using Allensbach survey data about how people look forward to the coming year, we construct true ex post-forecasts and compare them with the forecasts produced by the German Council of Economic Experts and by the Economic Research Institutes. Then, we perform rationality tests for these forecast series. The Allensbach forecasts outperform the professional forecasts in many respects. Finally, we ask whether information included in short-term interest rates is reflected in the different forecasts. We show that the Allensbach forecasts seem to fully take into account this information, while the professional forecasts do not. Thus, when making expectations, the German general public seems to consider more information than the professional forecasters.

Keywords

Rational Expectations, Economic Forecasts

JEL Classification

C53

1 Introduction

Quite recently, J. SUROWIECKI (2004) published a book with the title "*The Wisdom of Crowds: Why the many are smarter than the few and how collective wisdom shapes business, economies, societies, and nations*". He starts with the description of experiments where many people were asked to make estimates of a specific variable (like the number of balls in a bowl or the weight of an ox). It turned out that these individual estimates, if they are made independently and, therefore, no herding behaviour can occur, are nearly normally distributed around the true mean: the averages of these estimates are extremely accurate estimators of the true mean. And this observation extends to rather more difficult decision situations. Thus, counterintuitive to what is often assumed, even uninformed people (or at least people with rather limited information) seem to be collectively able to make quite sensible decisions.

Since 1949, the Institute for Opinion Research (Institut für Demoskopie), Allensbach, is carrying out a similar experiment at the end of each year. In December, a representative sample of the German population is asked about their expectation for the coming year, whether they await it with hope, with apprehension, sceptically, or whether they do not have any opinion on this. K. STEINBUCH (1980) was the first who recognised that there is a high correlation between those who await the new year with hope and next year's real growth rate of GNP.[1)] Thus, though the intention of the Allensbach Institute is not to produce GDP or GNP forecasts, its figures might nevertheless be used for constructing a valuable predictor of future economic development.

A simple correlation might be a good indicator for the existence of a relation, but it might not be sufficient to produce reliable forecasts. Correspondingly, G. KIRCHGÄSSNER (1982) took up the idea, used the Allensbach data and performed rolling regression to construct true ex post-forecasts for the period from 1969 to 1981. He compared them not only with the realised values but also with the forecasts of the Association of German Economic Research Institutes (Arbeitsgemeinschaft deutscher wirtschaftswissenschaftlicher Forschungsinstitute e.V.)[2)] published in October and those of the Council of Economic Experts published at the end of November. It turned out that the forecasts based on the Allensbach data did not only pass several tests for weak and strong rationality, but that they also outperformed the official forecasts both of the research institutes and of the economic experts. Of course, these forecasts were already publicly known when Allensbach performed its polls in December, but it is nevertheless astonishing that the general public should treat this information so efficiently.

The main problem with this early study is that there were only 13 observations available to compare the quality of the different forecasts. Thus, the observation reported in this paper might seem to be interesting at first glance, but it might become apparent that it is a statistical

1. See also E. NOELLE-NEUMANN (1980) as well as – for a somewhat more recent time period –. E. HELMSTÄDTER (1991)

2. The Association consists of the German Institute of Economic Research, Berlin, the Hamburg Institute of International Economics, Hamburg, the Ifo Institute for Economic Research, Munich, the Kiel Institute of World Economics, Kiel, the Rhine-Westphalia Institute for Economic Research, Essen and since 1993 the IWH Institute for Economic Research, Halle. Since the end of the sixties, this association publishes forecasts of the German economic development every April and October.

artefact once the sample increases. Today, including the year 2003, we have 35 observations, which should provide more reliable results. But there was a major structural break, the German Unification in 1990. Correspondingly, since 1990, Allensbach conductes its polls not only in West but also in East Germany. Thus the question arises whether such a relation, even if it had been stable in the old Federal Republic, still exists in the united Germany.

In the following, using the Allensbach data, we first construct true ex post-forecasts and compare them with the forecasts produced by the Council of Economic Experts (CEE) and by the Economic Research Institutes in autumn and spring (ERI_{autumn} and ERI_{sping})[3] (*Section 2*). Then, we perform rationality tests for these four forecast series (*Section 3*). It is shown that in many respects the Allensbach forecasts outperform the professional forecasts produced in autumn. Finally, we ask whether information included in short-term interest rates is reflected in the different forecasts (*Section 4*). The results show that the Allensbach forecasts seem to fully take into account this information, while the professional forecasts do not. Thus, when making expectations, the German general public seems to consider more information than the professional forecasters do.

2 The Allensbach Forecasts

We produce forecasts for real GNP growth rates in the following way:[4] We estimated the following regression for the periods from 1956 to 1968, 1956 to 1969 and from 1956 to 1970 onwards for 15 year periods until the 1988 to 2002 period,

$$g_t = \alpha + \beta s_{hope} + u_t, \tag{1}$$

where s_{hope} is the share of those who (in the Allensbach survey) await the new year with hope. Using this equation and the actual value of s_{hope} we produced one step predictions. The data for the GNP growth rate g have been calculated from the report of the CEE of the corresponding year.[5] Thus, we used exactly the information which was available at the time when the Allensbach forecasts could have been made. This is important for a fair comparison with the other forecasts which were based on exactly this information. Together with the realised values, which are taken from the CEE reports of the year after the next year, the results are given in the second column of *Table 1* and in *Figure 1*. This figure gives a first impression that the Allensbach forecasts might behave quite well.

3. While the other ones are for the following year, the spring forecasts of the Economic Research Institutes are for the current year. Thus, all forecasts relate to the same year.

4. As German GNP and GDP growth rates are highly correlated, we would get quite similar results for GDP. However, the Economic Research Institutes did not produce GDP forecasts for the whole period. Thus, to make comparisons possible, we used GNP growth rates.

5. Due to later revisions of the data there are considerable differences between the data published in these reports and the official data which are available today. – The inclusion of the lagged GNP growth rate into the forecast equation (1) does neither provide significant coefficients nor improve the forecasts.

Table 1: Actual and Predicted Values of Real GNP Growth Rates, 1969 – 2003

Year	Realised Values	Forecasts of			
		Institute for Opinion Research Allensbach	Council of Economic Experts	Economic Research Institutes (Autumn)	Economic Research Institutes (Spring)
1969	8.04	6.62	4.51	3.50	5.31
1970	5.39	6.46	4.45	4.10	4.80
1971	2.81	4.62	4.15	4.17	3.55
1972	3.00	2.49	1.07	1.01	2.64
1973	5.28	5.61	5.42	5.00	6.18
1974	0.44	-0.36	2.29	3.00	2.52
1975	-3.19	2.55	1.93	2.33	0.54
1976	5.66	3.45	4.36	3.77	5.34
1977	2.60	3.99	4.69	5.40	4.71
1978	3.52	3.92	3.46	2.84	2.66
1979	4.54	5.14	3.70	3.81	3.79
1980	1.81	3.09	2.69	2.40	2.51
1981	-0.19	-0.55	0.72	0.11	-1.39
1982	-1.15	-1.02	0.67	0.84	0.67
1983	1.30	-0.10	0.96	0.04	0.47
1984	2.74	2.03	2.66	2.06	3.23
1985	2.49	3.58	3.13	2.04	2.33
1986	2.45	4.21	3.03	2.84	3.43
1987	1.77	3.67	2.19	2.80	2.17
1988	3.65	3.03	1.58	1.92	2.00
1989	3.85	3.15	2.47	1.88	2.75
1990	4.49	4.34	3.08	3.02	3.75
1991	3.58	3.09	3.05	2.56	2.56
1992	1.01	2.70	1.99	1.76	1.02
1993	-1.73	0.72	0.62	0.94	-1.25
1994	2.40	0.84	0.11	0.82	1.11
1995	1.79	3.10	3.51	2.90	2.79
1996	1.02	1.98	1.65	2.37	0.56
1997	2.29	1.36	2.30	2.38	2.03
1998	1.81	1.79	2.62	2.64	2.62
1999	1.44	2.85	1.98	2.31	1.76
2000	3.27	2.48	2.69	2.77	2.79
2001	0.25	2.72	2.71	2.58	2.10
2002	0.50	0.48	0.70	1.44	0.91
2003	0.13	-1.48	1.11	1.56	0.53
		Test Statistics			
Mean Error		-0.386	-0.262	-0.195	-0.127
Mean Absolute Error		1.203	1.250	1.456	0.972
Root Mean Squared Error		1.578	1.631	1.843	1.243
R^2		0.537	0.467	0.300	0.684
Theil's U		0.501	0.518	0.586	0.395

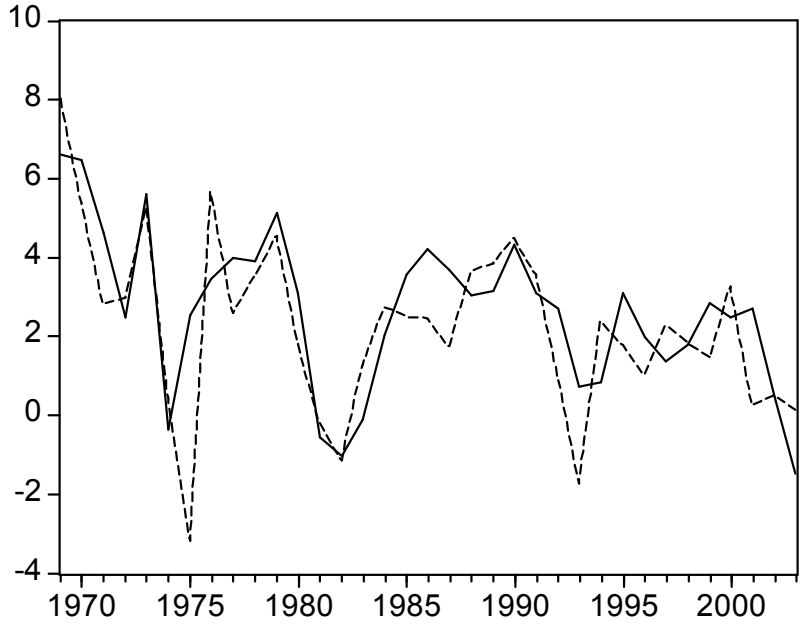

Figure 1: Actual (- - - -) and predicted (———) values (based on the Allensbach data) of real GNP growth rates

We compared these forecasts with those of the Council of Economic Experts and with the forecasts published by the Economic Research Institutes in autumn and spring, which are also given in *Table 1*.[6)] The Allensbach forecasts have a larger mean error, but by using all other criteria, they outperform the professional forecasts produced in autumn. Only the forecasts published by the Economic Research Institutes in spring are doing better. This is a first hint that the general public might use information which is not taken into account when the professional forecasters make their predictions.

These results (as well as the ones presented below) indicate that the quality of the forecasts is generally the better the later a forecast is made. This is hardly astonishing but should be expected. Nevertheless, despite being produced later it is astonishing when the Allensbach forecasts outperform forecasts produced in autumn by professional forecast institutions.

3 Tests for Weak Rationality

Are these forecasts rational in the sense of J. MUTH (1961)? Weak rationality implies that the forecasts are unbiased and that the forecast errors of k step-ahead forecasts exhibit only (positive) autocorrelation up to order k-1. As the realised values of the current year are not yet known but have to be estimated when the forecasts for the coming year are produced, these

6. The forecasts of growth rates published by the CEE and the ERI are rounded. However, because the Allensbach forecasts are not rounded and to eliminate the effect of rounding errors we calculated the growth rates using GNP level data produced by these institutions.

forecasts can be seen as 2 step forecasts which might exhibit first order autocorrelation.[7)] To test this, the following test equation has been estimated

$$u_t = \mu + \frac{\varepsilon_t}{1 - \rho L}, \tag{2}$$

where u is the forecast error. The results are given in *Table 2*. The forecasts of the research institutes and of the council pass this test; they do not violate the conditions for weak rationality. The Allensbach forecasts, however, do not only show a significant negative mean but also negative first order autocorrelation.[8)] Thus, these forecasts are too positive, but there is also some overreaction (overshooting) of the general public when forming expectations. In this respect, the professional forecasts seem to be superior to the Allensbach forecasts.

Table 2: Mean and Autocorrelation of Forecast Errors

Forecasts by	$\hat{\mu}$	$\hat{\rho}$	$\bar{R}^2$	SER	SC
Economic Research Institutes (Autumn)	-0.336 (1.12)	0.010 (0.06)	-0.031	1.718	4.066
Council of Economic Experts	-0.368 (1.45)	-0.047 (0.29)	-0.029	1.538	3.846
Institute for Opinion Research Allensbach	-0.440* (2.36)	-0.352* (2.12)	0.096	1.543	3.752
Economic Research Institutes (Spring)	-0.213 (1.01)	0.027 (0.16)	-0.030	1.188	3.328

The numbers in parentheses are the absolute values of the estimated t-statistics. '(*)', '*' '**', or '***' indicate that the corresponding null hypothesis can be rejected at the 10, 5, 1, or 0.1 percent significance level, respectively. SER is the standard error of the regression, SC the Schwarz criterion.

A further usual test for weak rationality is the consistence test as proposed by J. MINCER and V. ZARNOWITZ (1969), where the realised values are regressed on the forecasts,

$$g_t = \alpha + \beta P_i(g_t) + u_t, \tag{3}$$

where $P_i(g_t)$ is the forecast for g_t produced by the institution i. For rational forecasts the null hypothesis H_0: $\alpha = 0 \wedge \beta = 1$ should hold. The results of this test are given in *Table 3*. Neither the combined null hypothesis nor the single hypotheses can be rejected for any of the four forecast series. Thus, all four series pass this test. On the other hand, with respect to the multiple correlation coefficient, the standard error of regression and the Schwarz criterion (SC), the Allensbach forecasts outperform the other two ones published in autumn. This is analo-

7. Despite of corrections taking place even later, in our estimations we take the values given in the CEE reports two years later as realised values.

8. As the Q-statistics show, there is no higher order autocorrelation in either of the four forecasts series.

gous to the results of the test statistics in *Table 1* and indicates again that the people base their expectations on information which is not taken into account by professional forecasters.

Table 3: Tests for Consistency

Forecasts by	$\hat{\alpha}$	$\hat{\beta}$	$\bar{R}^2$	$\hat{F}$	SER	SC
Economic Research Institutes (Autumn)	-0.181 (0.25)	0.994*** (3.77)	0.300	0.187	1.887	4.252
Council of Economic Experts	-0.624 (1.03)	1.143*** (5.38)	0.451	0.671	1.647	3.980
Institute for Opinion Research Allensbach	0.086 (0.20)	0.822*** (6.19)	0.523	2.009	1.534	3.839
Economic Research Institutes (Spring)	-0.280 (0.75)	1.064*** (8.44)	0.674	0.304	1.270	3.459

The numbers in parentheses are the absolute values of the estimated t-statistics. '(*)', '*' '**', or '***' indicate that the corresponding null hypothesis can be rejected at the 10, 5, 1, or 0.1 percent significance level, respectively. SER is the standard error of the regression, SC the Schwarz criterion.

4 Tests for Strong Rationality

Whether this is really the case can be checked with an efficiency test. There the test equation is

(4) $$g_t = \alpha + \beta_1 P_i(g_t) + \beta_2 P_{Alb}(g_t) + u_t,, \quad i = CEE, ERI_{autumn}, ERI_{spring},$$

i.e. we include the Allensbach forecasts besides those of the professional forecasters. If the Allensbach forecasts contain no additional information, H_0: $\beta_2 = 0$ should hold, whereas if the professional forecasts contain no additional information, H_0: $\beta_1 = 0$ should hold.

The results presented in *Table 4* indicate that the professional forecasts published in autumn do not contain any information which is not also embedded in the Allensbach forecasts. On the other hand, the forecasts published by the research institutes in spring seem to contain all the information of the Allensbach forecasts. These results as well as the multiple correlation coefficients given in *Table 3* are consistent with a situation where, following the time schedule when the forecasts are produced (published), the Council of Economic Experts learns from the Economic Research Institutes, both have an impact on the expectation of the general public, and the research institutes take also into account the development which influenced the general public but which was neglected by the predictions published in autumn by the professional forecasters.

Table 4: Tests for Efficiency (I)

Forecasts by	$\hat{\alpha}$	$\hat{\beta}_1$	$\hat{\beta}_2$	$\bar{R}^2$	SER	SC
Economic Research Institutes (Autumn)	0.094 (0.16)	-0.007 (0.02)	0.824*** (4.05)	0.508	1.558	3.940
Council of Economic Experts	-0.350 (0.62)	0.412 (1.18)	0.594* (2.54)	0.529	1.525	3.897
Economic Research Institutes (Spring)	-0.396 (1.06)	0.847*** (4.18)	0.240 (1.36)	0.682	1.253	3.504

The numbers in parentheses are the absolute values of the estimated t-statistics. '(*)', '*' '**', or '***' indicate that the corresponding null hypothesis can be rejected at the 10, 5, 1, or 0.1 percent significance level, respectively. SER is the standard error of the regression, SC the Schwarz criterion.

5 The Role of Monetary Developments

We still have no idea what kind of information is neglected by the professional forecasters but taken into account by the general public. One possibility is that monetary developments as represented, e.g., by interest rate movements, are not fully taken into account. The reason for this conjecture is, firstly, that such information is easily available to the general public and, secondly, that G. KIRCHGÄSSNER and M. SAVIOZ (2001) have shown that the bi-annual GNP forecasts of the research institutes . hardly take into account the information contained in short-run interest rates.

To check this, analogous to the Allensbach forecasts, we first constructed forecasts using the average value of the third quarter of the daily money market rate in Frankfurt (gsr_{t-1}) as the explanatory variable. Thus, similar to relation (1) and for the same observation periods, we estimated the model

$$(1') \qquad g_t = \alpha + \beta\, gsr_{t-1} + u_t.$$

Again, we used this equation to produce one step predictions. Then, similar to the tests presented in *Table 4*, we included these interest rate based forecasts (P_{int}) as a second explanatory variable into the test equation:

$$(6) \qquad g_t = \alpha + \beta_1 P_i(g_t) + \beta_2 P_{int}(g_t) + u_t, \quad i = \text{IOR, CEE, ERI}_{autumn}, \text{ERI}_{spring}.$$

The results are given in *Table 5*. The interest rate based forecasts contain information which is not only missing in the professional forecasts published in autumn, but also in spring forecasts of the research institutes: The corresponding coefficient is at the 10 percent level significantly different from zero. This is the more astonishing as the information contained in the interest rate based forecasts is already half a year old when the spring forecasts of the research institutes are published. On the other hand, the Allensbach forecasts seem to fully take into account the monetary development.

Table 5: Tests for Efficiency (II)

Forecasts by	$\hat{\alpha}$	$\hat{\beta}_1$	$\hat{\beta}_2$	$\bar{R}^2$	SER	SC
Economic Research Institutes (Autumn)	-0.363 (0.55)	0.628* (2.33)	0.478** (2.91)	0.411	1.703	4.118
Council of Economic Experts	-0.696 (1.22)	0.856** (3.60)	0.352* (2.24)	0.511	1.555	3.935
Institute for Opinion Research Allensbach	-0.013 (0.03)	0.679*** (3.84)	0.211 (1.21)	0.530	1.524	3.896
Economic Research Institutes (Spring)	-0.452 (1.23)	0.923*** (6.49)	0.224(*) (1.89)	0.697	1.222	3.454

The numbers in parentheses are the absolute values of the estimated t-statistics. '(*)', '*' '**', or '***' indicate that the corresponding null hypothesis can be rejected at the 10, 5, 1, or 0.1 percent significance level, respectively. SER is the standard error of the regression, SC the Schwarz criterion.

6 Concluding Remarks

The survey conducted by Allensbach at the end of a year concerning the expectations of the general public with respect to the coming year contains information about the economic development in this year which seems not be taken into account by the Economic Research Institutes or the Council of Economic Experts. This fact, which was detected by K. STEINBUCH (1980) and has first been systematically investigated by G. KIRCHGÄSSNER (1982), does still hold, despite the fact that the German Unification in 1990 represented a major structural break in the German economy. Having now 35 observations, it can hardly be argued that this is a pure statistical artefact. Thus, it might be considered as a further example of the "*Wisdom of Crowds*" as described in S.J. SUROWIECKI (2004).

The expectations pass the consistence test, but they do not seem to be weakly rational: The forecasts based on the Allensbach data are, firstly, somewhat too optimistic and, secondly, there seems to be some overshooting. Nevertheless, they seem to process the information of the monetary development as reflected in the movement of short-run interest rates much better than the professional forecasts. Insofar, they are more efficient than the latter ones. This is not the first time that it is shown that professional German forecasters seem to give too little attention to the monetary development, but remains an open question why this is the case.

Aside from the fact that the general public seems to process (at least some) economic information quite well, it is definitely too early to draw far-reaching conclusions from our results. Given the abundance of surveys which are performed nowadays every year, it would be interesting to see whether there exist other survey results as well which could be used for constructing (economic) forecasts. At the moment, however, this also remains an open question.

Sources of the Data

The complete Allensbach data are available from the Institut für Demoskopie Allenbach, Radolfzeller Straße 8, D-78472 Allensbach. They are regularly published in the New Year greeting cards of this institute. The GNP data are taken from the annual reports of the Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung since 1968. This is also the source of their forecasts. The forecasts of the Economic Research Institutes are taken from their bi-annual reports "*Die Lage der Weltwirtschaft und der (west-)deutschen Wirtschaft*", published every spring and autumn since October 1968. The interest rate data are taken from the data base of the Deutsche Bundesbank. They can be downloaded from http://www.bundesbank.de/statistik/statistik_zeitreihen.en.php.

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