Audretsch, David B.; Stadtmann, Georg

Working Paper

Biases in FX-Forecasts: Evidence from Panel Data

Research notes working paper series, No. 19

Provided in cooperation with:
Deutsche Bank Research

Economics

Research Notes

Deutsche Bank Research

March 31, 2005

No. 19

Research Notes

Working Paper Series

Biases in FX-Forecasts: Evidence from Panel Data

In this paper, we use the Wall Street Journal poll of FX forecasts to analyze how the group of forecasters form their expectations. One focus is whether forecasters build rational expectations. Furthermore, we analyze whether the group of forecasters can be regarded as homogeneous or heterogeneous. The results from our regressions strongly suggest that some forecasters combine different models of exchange rate forecasting, while others rely solely on one model.

We also find evidence that some forecasters underly a bias, while others do not. Overall, our regression results indicate a high degree of heterogeneity. In conclusion, we show that the expectation formation process is not the same among all economists polled. Our findings carry importance for macroeconomic modelling: The assumption of rational agents forming homogeneous expectations is not supported by our results.

David B. Audretsch, Indiana University, Bloomington

Georg Stadtmann, WHU Koblenz (stadtman@whu.edu)

www.dbresearch.com

Deutsche Bank Research
Frankfurt am Main
Germany
Internet: www.dbresearch.com
E-mail: marketing.dbr@db.com
Fax: +49 69 910-31877

Managing Director
Norbert Walter

Biases in FX-Forecasts: Evidence from Panel Data

David B. Audretsch[a] and Georg Stadtmann[b]

March 2005

Abstract

In this paper, we use the Wall Street Journal poll of FX forecasts to analyze how the group of forecasters form their expectations. One focus is whether forecasters build rational expectations. Furthermore, we analyze whether the group of forecasters can be regarded as homogeneous or heterogeneous. The results from our regressions strongly suggest that some forecasters combine different models of exchange rate forecasting, while others rely solely on one model. We also find evidence that some forecasters underly a bias, while others do not. Overall, our regression results indicate a high degree of heterogeneity. In conclusion, we show that the expectation formation process is not the same among all economists polled. Our findings carry importance for macroeconomic modelling: The assumption of rational agents forming homogeneous expectations is not supported by our results.

JEL classification: F31, D84, C33
Keywords: Foreign exchange market, forecast bias, random walk

Addresses:

[a] David B. Audretsch, Institute for Developing Strategies, Indiana University, Bloomington (USA) and Max Planck Institute for Research into Economic Systems, Jena (Germany).

[b] **Corresponding Author:** Georg Stadtmann, WHU Koblenz, Otto Beisheim Graduate School of Management, Burgplatz 2, 56179 Vallendar, Germany, Tel: +49/261/6509–273, Fax: +49/261/6509–279
e–Mail: stadtman@whu.edu

We would like to thank the participants of the Macroeconometrics Workshop in Halle as well as an anonymous referee for helpful comments. Part of this paper was written during a research visit of Georg Stadtmann at the Institute for Development Strategies (IDS) at Indiana University. The hospitality of the IDS is gratefully acknowledged. The usual disclaimer applies.

1 Introduction

Macroeconomic models for the open economy do not perform well to predict or even explain short term exchange rate fluctuations (Meese/Rogoff 1983, Neely/Sarno 2002, Kilian/Taylor 2003). Nevertheless, this does not imply that these economic models could be falsified based on these results. Instead of this, a researcher always is in the dilemma that such a test implies a joint hypothesis: More specifically, the researcher can not distinguish whether the underlying macroeconomic model is false or financial agents do not build rational expectations.

Another characteristic of the traditional macroeconomic models is that the agents are always modelled as a homogeneous group. However, this view is in sharp contrast to the empirical findings of several surveys conducted among foreign exchange rate traders (e.g., Allen/Taylor 1990 and Menkhoff 1997).[1] Survey studies on the behavior of foreign exchange traders examine the relative importance traders attach to technical analyses[2] versus fundamental analyses over different forecasting horizons. The outcome of all these studies is that many foreign exchange traders rely on technical analyses or technical instruments when forming their expectations for short horizons. By contrast, they rely more on macroeconomic fundamentals when forming their expectations for longer horizons.

Since the beginning of the 1990s, researchers have departed from the representative agent model, implementing different groups of financial agents which form heterogeneous expectations. For example, DeGrauwe et al.

[1]See also the work of Taylor/Allen (1992) and Frankel/Froot (1988, 1990). For recent empirical evidence, see Menkhoff (1998, 2001), Cheung/Wong (2000), and Cheung/Chinn (2001).

[2]Neely (1997) uses the label *'technical trading'* for both chartism and mechanical trading rules.

(1993) experiment with fundamentalist and chartists, DeLong et al. (1990) incorporate rational agents, informed traders as well as positive feedback traders in their so called *noise trader models*. This noise trader framework was recently used by Jeanne/Rose (2002) in a macroeconomic setting.

In this paper, we use the Wall Street Journal (WSJ) poll to shed light on the question whether financial agents indeed built rational expectations or whether biases exist that deter the expectation formation process. Furthermore, we investigate whether the group of forecasters can be characterized as a homogeneous or heterogeneous group. The main advantage of the data set under consideration is that we can observe exchange rate expectations of a large number of individual forecasters and not only the mean or median of a group of forecasters. This feature allows us to analyze not only the time series characteristics but also the cross-sectional characteristics of the data set. Hence, we can apply panel econometric methods. The observability of individual expectations distinguishes the WSJ data set from e.g. the Reuters data set, used by Leitner/Schmidt/Bofinger (2003). Furthermore, the WSJ data set has been existing over a relatively long time period (1989 – 2003). For example, the study of Ito (1990) – who also operates with individual data – covers only the time period May 1985 – June 1987. Hence, the time dimension in Ito (1990) is limited to a two year horizon.[3]

The remainder of the paper is structured as follows. In the next section we characterize the WSJ data set. In Section 3 we test whether exchange rate expectations are consistent with the rational expectation hypothesis. Furthermore, we check whether forecasters are able to beat a naive random

[3]The data set of Ito (1990) is updated by Elliott/Ito (1999) and covers the period May 1985 – May 1996. They test whether FX forecasts can be used as a trading rule. Excess profits generated by this rule are on average larger than the profits of a random walk forecast. However, profits that could have been earned are highly variable. This aspect underlines that there is a significant risk in using these strategies.

walk forecast on average. In Section 4 we test for an exchange rate expectation formation process which is in line with the extrapolative, adaptive, or regressive expectations hypothesis. Section 5 summarizes and concludes.

2 Data Description

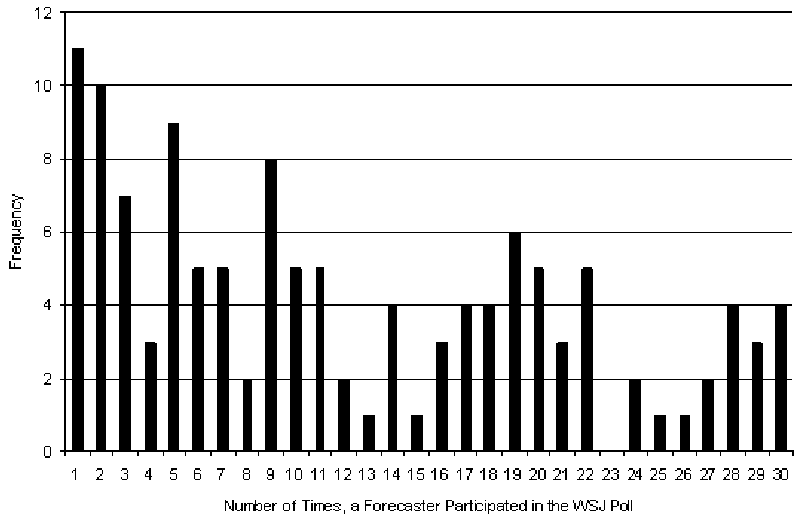
The forecasters analyzed in this study participated in the semi-annual survey of the WSJ. Most of the participants are economists and do not influence exchange rate trading directly (see Cho/Hersch (1998) for an in depth analyzis of the forecasters characteristics.)[4] In the beginning of 1981 the focus of this survey was on expected development of short and long term interest rates. While the number of the participants was limited in the beginning (12 participants), it increased to a maximum of 64 participants in Jan. 1996 and was stable in the past seven years (55 participants). Over time, not only the number of participants increased but also the economic variables covered:

- In Jan. 1989 the 6-month Yen/USD exchange rate forecast was added.
- Since the Jan. 1995 poll, survey participants have been also requested to forecast real GDP growth rates and inflations rates (measured by CPI).
- Since July 1999 the survey has also included the 6-month forecast for the EUR/USD exchange rate.

The WSJ data set has already been used in a number of studies: Greer (2003) concentrates on the one-year forecast of the 30 year U.S. Treasury bond. He examines whether economists are able to predict the direction

[4]This feature implies, that we can not argue that the believes of the economists polled reflect the expectations of exchange rate traders on a one-to-one basis. However, if economists support the fx-traders by their expertise and fx-traders consider the believes of their economists, the expectations of the economists are a good substitute for the expectations of the fx-traders.

Figure 1: Description of the Wall Street Journal Data Set



of change correctly and finds some evidence that this is indeed the case. Cho/Hersch (1998) analyze whether forecaster characteristics contribute to explain forecast accuracy (seize of error) and forecast bias (direction of error). While no characteristic seems to explain forecast accuracy, some characteristics especially the professional experience with the Federal Reserve System, explain forecast direction error. Kolb/Streckler (1996) test whether there exists a consensus among WSJ forecasters. This is also the focus of Gulko (2004), although limited to the interest rate variables of the WSJ poll. Eisenbeis/Waggoner/Zha (2002) question the methodology used by the WSJ to construct their overall ranking of the economists. Since the WSJ ranks the forecasts on the sum of the weighted absolute percentage deviation from the actual realized value of each series, this methodology neglects the correlations among the variables being forecast.

As this study focuses on expectation formation process of FX-rates, the study covers the semi-annual surveys July 1989 – July 2003 (30 periods). During this time span, 125 economists participated in the WSJ survey. The data set under consideration is an unbalanced panel. Figure 1 gives an impression of how many of the 125 participants took part in x polls. For example, while 11 economist participated in only one poll, four economist participated in all polls.

To extract the time series characteristics of the expectation formation process, we can only include those forecasters, who participated in a minimum number of surveys. Hence, we consider only those forecasters in the empirical analysis that participated at least 15 times in the WSJ poll.

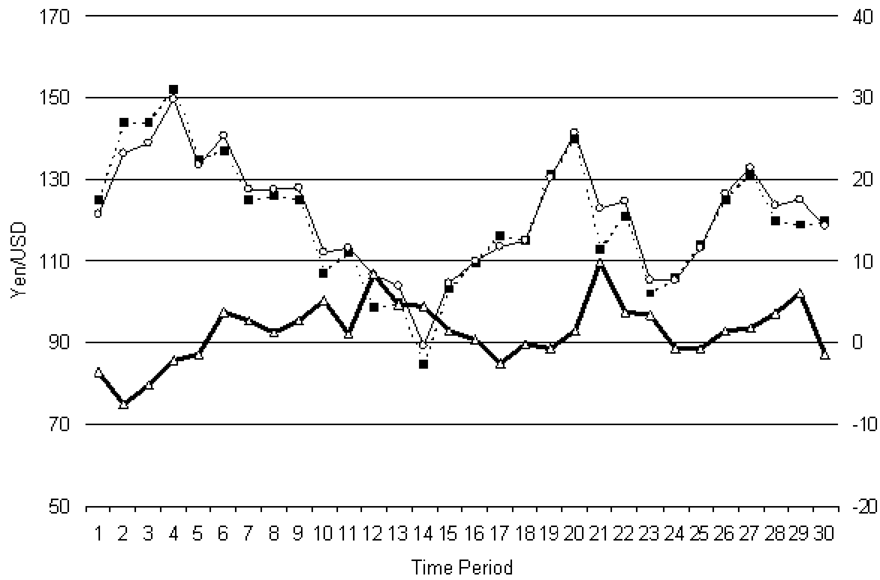
3 Rational Expectations

Figure 2 presents first evidence on the expectation formation process. While the dashed line covers the exchange rate development over time, the solid line shows the *mean* of the 6-month exchange rate forecast at time t. As can be seen, the mean forecast follows – more or less – the actual exchange rate. Nevertheless, there also exist some substantial deviations over time (bold solid line, right scale). An 'eyeball test' of Figure 2 already indicates that, on average, participants expected more often a depreciation of the yen than an appreciation.

3.1 Regression Analysis

In a first step, we check whether the economists polled formed rational expectations. Rationality implies that exchange rate forecasts are an unbiased predictor of the future exchange rate. Due to the non-stationarity characteristics of the time series under consideration, we check whether the gap between the current expectations and the current exchange rate level is an

Figure 2: Exchange Rate and Exchange Rate Expectations over Time



Dashed line: Exchange rate at time t (left scale).
Solid line: Mean of the 6-month exchange rate forecast at time t (left scale).
Bold solid line: Difference between mean forecast and actual exchange rate level (right scale).

unbiased predictor of future exchange rate changes. To take the panel characteristics into account, we run the following regression:

$$s_{t+1} - s_t = \alpha_i + \beta(E_{i,t}[s_{t+1}] - s_t) + u_{i,t}, \tag{1}$$

where s is the natural log of the exchange rate, t denotes the time index, different forecasters are covered by the index i, E denotes the expectation operator, and u is an error term. Unbiasedness and therefore rationality imply $\alpha = 0$ and $\beta = 1$.

We estimate equation (1) by applying a fixed effects model. Regression results – given in Table 1 – indicate that the estimated β-coefficient is close to zero. Under consideration of the standard deviation (given in

Table 1: Rational Expectations

	Specification I Fixed Effects	Specification II Pooled OLS	Specification III OLS on Average
Intercept (α)	.00059 (.0034)	.00045 (.0033)	.0015 (.0204)
$E_{i,t}[s_{t+1}] - s_t$ (β)	-.04145 (.06284)	-.0301 (.0536)	-.2713 (.6641)
Model Fit	$R^2 within = 0.0005$ $R^2 between = 0.0008$ $R^2 overall = 0.0003$	$R^2 = 0.0003$	$R^2 = 0.0061$
Various Test-Stat.	F(46, 958) = 0.12 $Prob > F = 1.00$	–	–
No. of obs	1,006	1,006	29
No. of groups	47	–	–

parenthesis), one is able to reject the rational expectation hypothesis, implying that $\beta = 1$. This implies that the difference between the exchange rate expectations and the exchange rate is not an unbiased predictor of the exchange rate change in the future. Hence, forecasters do not form rational expectations.

As the F-test on $u_i = 0$ shows, the assumption of an individual constant for each forecasters is not supported by the data. Hence, we also estimated equation (1) with a constant intercept for all forecasters. However, the results do not change with respect to the slope coefficient (Specification II).

One may argue that the pooled regression methodology is inappropriate in our setting. Due to the fact that the left hand side of equation (1) covers the change in exchange rates, the dependent variable is not person specific and contains therefore, no person specific variability. Hence, we compute the mean exchange rate forecast among all forecasters at a single point in time ($\bar{E}_t[s_{t+1}]$) and estimate the following equation via OLS:

$$s_{t+1} - s_t = \alpha + \beta(\bar{E}_t[s_{t+1}] - s_t) + u_t \qquad (2)$$

Table 2: Accuracy of Forecast

	Naive Random Walk Forecast	Experts	t-test on the difference
Mean Error	-0.003 (11.63)	-1.674 (14.13)	3.46 (0.001)
Mean Squared Error	135.10 (166.6)	202.22 (291.7)	7.58 (0.000)
Mean Absolute Error	9.24 (7.05)	11.39 (8.52)	7.35 (0.000)

Note: Columns II and III: mean error, standard deviation in parenthesis. Column IV: t-value, p-value in parenthesis.

However, the results do not change in favor of the rational expectation hypothesis: The estimated β-coefficient is also statistically different from 1 on a 90 % confidence level. Therefore, we can reject the hypothesis that exchange rate forecasts are – on average – in line with the rational expectation hypothesis.

3.2 Expectations versus Random Walk

In the next step, we analyze whether the *accuracy* of the forecasted exchange rate levels can compete with a naive random walk forecast. We compute the mean error, mean squared error as well as mean absolute error for the naive forecast as well as for the WSJ forecasters. The mean error is larger for professional forecasters, indicating that a weaker yen was expected on average. This is also in line with Figure 2 where data points of expectations are located above the actual exchange rate level.

The mean squared error as well as the mean absolute error is larger for the experts compared to a random walk forecast. To test whether means are statistically different for the two series under consideration, t-tests are performed. The results of the t-tests – given in the last column of Table 2 – indicate that the difference is indeed statistically different from zero.

This means that there exists a better model – namely the random walk – to predict future exchange rate levels. In other words: Participants of the WSJ poll use an inferior exchange rate model and act therefore not rational. This finding implies that the 'experts' either do not use all available information or use too much information[5] to predict future FX levels so that that their expectations may be biased. A further explanation could be, that FX forecasters use the right information set but apply the wrong macroeconomic model. These alternatives will be examined in the subsequent sections.

In this section, we have demonstrated that forecasters deviate from a naive random walk forecast to predict future exchange rate levels. However, this expectation formation process of the 'experts' is inferior compared to the naive random walk benchmark. Therefore, we continue in the next section by examining which kind of biases deter the expectation formation process of the experts.

4 Biases in the Expectation Formation Process

4.1 Extrapolative Expectations

How do *past* exchange rate changes influence current (relative) exchange rate expectations? To answer this question, we estimate:

$$E_{i,t}[s_{t+1}] - s_t = \alpha_i + \beta(s_t - s_{t-1}) + u_{i,t} \tag{3}$$

If $\beta < 0$, it is expected that a recent change in the exchange rate will lead to a reverse movement in the future. Thus, a current appreciation of the yen should be followed by a future depreciation and vice versa. This scenario

[5] For example Black (1986 p. 531) argues with respect to irrelevant information in the trading decision: *"Noise trading is trading on noise as if it were information. People who trade on noise are willing to trade even though from an objective point of view they would be better off not trading. Perhaps they think the noise they are trading on is information."*

Table 3: Extrapolative versus Adaptive Expectations

	Extrapolative Expectations			Adaptive Expectations
	Specification I Fixed Effects	Specification II Random Effects	Specification III Hildreth-Houck	Specification IV Fixed Effects
Intercept (α)	.01050 (.0016)	.0096 (.0042)	.01003 (.0045)	.0087 (.0016)
β	-.1634 (.0154)	-.1636 (.0154)	-.1609 (.02467)	.8124 (.0133)
Model Fit	$R^2 within = 0.1021$ $R^2 between = 0.0116$ $R^2 overall = 0.0796$	$R^2 within = 0.1021$ $R^2 between = 0.0116$ $R^2 overall = 0.0796$	–	$R^2 within = 0.8031$ $R^2 between = 0.0820$ $R^2 overall = 0.7536$
Various Test-Stat.	F(46, 986) = 7.51 $Prob > F = 0.000$	Hausman $Prob > chi2 = 0.7228$	Swamy $Prob > chi2 = 0.000$	F(46, 917) = 5.12 $Prob > F = 0.000$
No. of obs	1,034	1,034	1,034	965
No. of groups	47	47	47	47

may be called *stabilizing expectations* (Leitner/Schmidt/Bofinger 2003). However, if $\beta = 0$ exchange rate forecasts are not influenced by past changes in the exchange rate. Due to the random walk characteristics of exchange rates, this finding would be in line with the rational expectation hypothesis.

We first estimate equation (3) with a fixed effects model (Specification I). As can be seen, the estimated β coefficient has a value of -0.16 and is significantly different from zero. If the exchange rate rises by 10 %, exchange rate expectations are only adjusted by 8.4 %. This finding implies that foreign exchange rate participants expect a mean reverting process for the foreign exchange rate.

A different interpretation of the extrapolative expectation hypothesis can be derived by adding s_t on both sides of equation (3). Dropping the error term as well as the index i for the moment, we get:

$$E_t[s_{t+1}] = \alpha + (1+\beta)s_t - \beta s_{t-1} \tag{4}$$

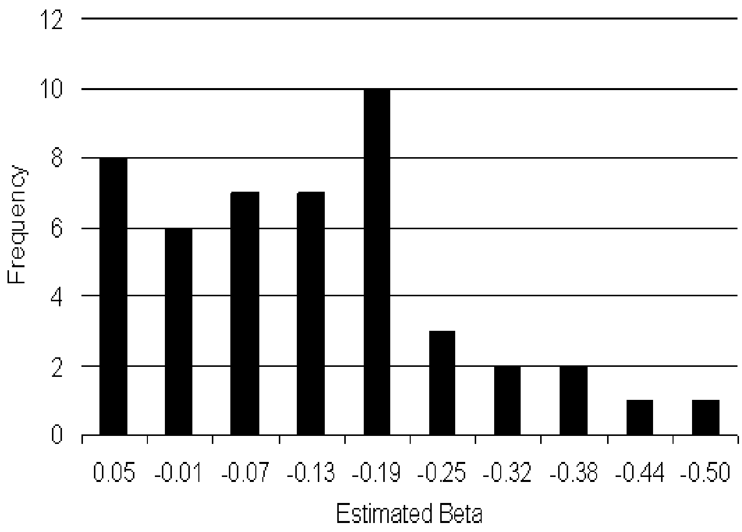
Hence, it becomes clear that the current exchange rate forecast for period $t+1$ is a weighted average of the current exchange rate level as well as the exchange rate level of the former period. In the case under consideration, weights take a value of 84 % for the current and 16 % for the former exchange rate level.

The F-test clearly indicates that individual (forecaster specific) constants exist in this case (see Greene 2000, p. 562). Nevertheless, one may question whether a fixed effect or random effect model is the right specification. Therefore, we also estimate equation (3) with a random effects model (Specification II). All estimated coefficients are in line with Specification I. This is also picked up by the insignificant test statistic of the Hausman test which indicates that the random effects model is more appropriate (see Greene 2000, p. 577).

So far, regressions have only controlled for heterogeneity among forecasters by including a person specific constant. One may wonder, whether slope coefficients also vary for different forecasters. To test this, we estimate a Hildreth/Houck (1968) random coefficient model and test for individual effects. As the Swamy (1971) test statistic indicates, the $H0$ of constant coefficients among all forecasters can be rejected.

Hence, we estimate equation (3) for each forecaster individually, by using OLS. Of the 47 forecasters, 51 % of the slope coefficients are significantly different from zero on a 90 % confidence interval. Furthermore, the histogram of the estimated slope coefficients clearly shows a bi-modal distribution of the slope coefficients (see Figure 3). This evidence suggests a rejection of the hypothesis that forecasters can be regarded as a homogeneous group.

Figure 3: Heterogeneity of Exchange Rate Forecasters



4.2 Adaptive Expectations

A theory competing with the extrapolative expectation hypothesis is the hypothesis of an adaptive expectation formation process. This hypothesis states that the expectation error influences the change in expectations:

$$E_t[s_{t+1}] - E_{t-1}[s_t] = \alpha + \beta(s_t - E_{t-1}[s_t]) \quad (5)$$

Subtracting $E_{t-1}[s_t]$ on both sides of equation (5) leads to:

$$E_t[s_{t+1}] = \alpha + \beta s_t + (1-\beta)E_{t-1}[s_t] \quad (6)$$

Lagging the time index of equation (6) by one period, the $E_{t-1}[s_t]$ expression of equation (6) can be substituted. Hence we arrive at:

$$E_t[s_{t+1}] = \alpha + \alpha(1-\beta) + \beta s_t + (1-\beta)\beta s_{t-1} + (1-\beta)^2 E_{t-2}[s_{t-1}] \quad (7)$$

Performing this substitution n times, letting n approach infinity, and applying the usual transversality condition it follows:

$$E_t[s_{t+1}] = \frac{\alpha}{\beta} + \sum_{n=0}^{\infty-1}(1-\beta)^n s_{t-n} \quad (8)$$

This equation implies that the current exchange rate expectations are influenced by the complete historical exchange rate process. However, the closer β is to one, the smaller is the influence of past exchange rate levels. If $\beta = 1$ and $\alpha = 0$, the current forecast just depends on the prevailing exchange rate level and would be in line with a naive random walk forecast.

However, if the current exchange rate level carries a higher weight, the extrapolative and the adaptive expectation formation process are just like the two different sides of the same coin. This can be easily seen with reference to equation (7): If the current exchange rate level influences current FX expectations by about 84 %, the exchange rate level of period $t-1$ has a weight of 13 % and the expression $E_{t-2}[s_{t-1}]$ – representing the whole remaining exchange rate process of the past – has a weight of only 3 %.

In analogy to the procedure of the extrapolative expectation hypothesis, we estimated the following equation with a fixed effects specification:

$$E_{i,t}[s_{t+1}] - E_{i,t-1}[s_t] = \alpha_i + \beta(s_t - E_{i,t-1}[s_t]) + u_{i,t} \tag{9}$$

As can be inferred from Specification IV of Table 3, the estimated β-coefficient takes the value of roughly 0.81 which is in line with the results from the extrapolative regressions.

The only difference between the two approaches exists with respect to the number of degrees of freedom: When estimating the adaptive expectation specification of equation (9) one degree of freedom is lost when generating 'the first' expectation error to initialize the explanatory variable. Since the differences between the extrapolative approach and the adaptive approach are only minor in our case, we use the extrapolative expectation specification as our basis scenario. This seems to be the most appropriate way, especially when considering the relative low number of observations in the individual regressions (minimum 15, maximum 30 periods).

4.3 Regressive Expectations

The regressive expectation formation hypothesis states that forecasters believe that the exchange rates move back to an equilibrium level. To test this hypothesis, an equilibrium exchange rate level has to be specified. One exchange rate level that could be regarded as an implicit equilibrium exchange rate level is the 125 yen/U.S. dollar level. As Ito (2002) shows for the 1990s, all central bank interventions to weaken the yen took place when the exchange rate was below the 125 yen/U.S. dollar level while all interventions to strengthen the yen took place when the exchange rate level was above this level. Hence, we test the hypothesis that the 125 yen/U.S. dollar was also considered as an equilibrium level by some forecasters.[6] We analyze whether and how this factor also influenced the expectation formation process. To be more specific, we estimated the following equation:

$$E_{i,t}[s_{t+1}] - s_t = \alpha_i + \beta_1(s_t - s_{t-1}) + \beta_2(s_t - \bar{s}_{125}) + u_{i,t} \tag{10}$$

All estimates – presented in Table 4 – point into the direction that the past exchange rate development (extrapolative expectations) *as well as* the 125 yen /U.S. dollar level (regressive expectations) played some role in the overall expectation formation process.

[6] At this point one may question how central bank interventions influence exchange rate expectations of rational agents. To answer this question, one has to make an assumption on the effectiveness of central bank intervention. If central bank intervention does not change the exchange rate level, the intervention activity should not influence the exchange rate expectations of rational agents. By incorporating the exchange rate target of the central bank as an explanatory variable, we check, whether agents also regarded this exchange rate level as an equilibrium exchange rate level. However, we can not shed light on the question, whether economists believe whether central bank interventions themselves or other market forces are responsible for this mean reverting effect.

Table 4: Extrapolative and Regressive Expectations

	Specification I Fixed Effects	Specification II Random Effects	Specification III Hildreth-Houck
Intercept (α)	.0050 (.0018)	.0038 (.0042)	.0049 (.0051)
$s_t - s_{t-1}$ (β_1)	-.1230 (.0163)	-.1232 (.0163)	-.1233 (.0277)
$s_t - \bar{s}_{125}$ (β_2)	-.0863 (.0131)	-.0865 (.0131)	-.0826 (.0226)
Model Fit	$R^2 within = 0.1398$ $R^2 between = 0.0354$ $R^2 overall = 0.1092$	$R^2 within = 0.1398$ $R^2 between = 0.0354$ $R^2 overall = 0.1092$	–
Various Test-Stat.	F(46, 985) = 7.80 $Prob > F = 0.000$	Hausman $Prob > chi2 = 0.6136$	Swamy-Test $Prob > chi2 = 0.000$
No. of obs	1,034	1,034	965
No. of groups	47	47	47

However, until now, we are not able to discriminate whether this overall result is due to the fact that some economist apply both models while others apply none of the models or some of the economist apply one model while others apply the other model. To shed light on this issue, we run a regression for all forecasters individually. The results of the 47 regressions are sorted by the following criteria: We check whether

- only β_1 is significantly different from zero while β_2 is not,
- β_1 as well as β_2 are significantly different from zero,
- only β_2 is significantly different from zero while β_1 is not,
- neither β_1 nor β_2 are significantly different from zero.

We condense this information in Table 5:

- 13 (28%) forecasters relied solely on the extrapolative model,
- 11 (23%) forecasters relied solely on the regressive model,

Table 5: Heterogeneity Among Forecasters' Model

		Regressive Model (β_2)		Total
		insignificant	significant	
Extrapolative Model (β_1)	insignificant	16	11	27
	significant	13	7	20
Total		29	18	47

- 7 (15%) forecasters relied on both models, and
- 16 (34%) forecasters did not rely on one of these models.

Summing up, we can conclude that about 2/3 of all forecasters do not rely on a naive random walk forecast but rely on different models in their expectation formation process. The finding that β_1 and β_2 are significant in the pooled regression is due to the fact that

- some of the economist apply one model while others apply the other model AND
- some economist apply both models while others do not apply any of the models.

As a matter of fact, we can not discriminate between both hypotheses. However, we were able to separate four different groups of forecasters. Therefore, the group of forecasters has to be classified as heterogeneous.

5 Conclusion

In this paper we use the Wall Street Journal poll among economists to examine whether economists forecast exchange rate rationally. Furthermore, we investigate whether the group of forecasters is homogeneous or rather heterogeneous. Overall, our regression results indicate a high degree of heterogeneity: The fixed effects model with individual constants for each group is superior to a pooled OLS model with a common constant. Additionally, the Hildreth/Houck specifications clearly show that the assumption of a constant slope coefficient among all forecasters has to be rejected.

Therefore, we run individual regressions for each forecaster over time. The results from these regressions strongly suggest that some forecasters combine different models of exchange rate forecasting, while others rely solely on one model. These findings carry importance for macroeconomic modelling: The assumption of rational agents forming homogeneous expectations is not supported by our results.

References

Allen, H. and Taylor, M. P. (1990), Charts, Noise and Fundamentals in the London Foreign Exchange Market, Economic Journal, Supplement 100, pp. 49 – 59.

Benassy-Quere, Agnes; Larribeau, Sophie; MacDonald, Ronald (2003): Models of Exchange Rate Expectations: How Much Heterogeneity?; Journal of International Financial Markets, Institutions and Money, Vol. 13(2), pp. 113 – 136.

Black, F. (1986): Noise, in: Journal of Finance, Vol. 41, pp. 529 – 543.

Cheung, Y.-W. and Chinn, M.D. (2001): Currency traders and exchange rate dynamics: a survey of the US market, Journal of International Money and Finance, Vol. 20, pp. 439 – 471.

Cheung Y.-W. and Wong, C. Y.-P. (2000): A survey of market practitioners' views on exchange rate dynamics, Journal of International Economics, Vol. 51(2), pp. 401 – 419.

Cho, Dong W. (1996): Forecast Accuracy: Are Some Business Economists Consistently Better Than Others?, Business Economics, Vol. 31(4), pp. 45 – 49.

Cho, Dong W.; Hersch, Philip L. (1998): Forecaster Characteristics and Forecast Outcomes, Journal of Economics and Business, Vol. 50(1), pp. 39 – 48.

De Grauwe, P., H. Dewachter and M. Embrechts (1993): Exchange Rate Theory – Chaotic Models of Foreign Exchange Markets; Blackwell Publishers; Oxford.

DeLong, J.B.; Shleifer, A.; Summers, L.H.; Waldmann, R.J. (1990): Positive Feedback Investment Strategies and Destabilizing Rational Speculation, Journal of Finance, Vol. 45(2), pp . 379 - 395.

Eisenbeis, Robert; Waggoner, Daniel; Zha, Tao (2002): Evaluating Wall Street Journal Survey Forecasters: A Multivariate Approach, Business Economics, Vol. 37(3), pp. 11 – 21.

Elliott, Graham; Ito, Takatoshi (1999): Heterogeneous Expectations and Tests of Efficiency in the Yen/Dollar Forward Exchange Rate Market, Journal of Monetary Economics, Vol. 43(2), pp. 435 – 456.

Frankel, J. and K. Froot (1990): Chartists, Fundamentalists and Trading in Foreign Exchange Markets, American Economic Review, Papers and Proceedings, pp. 181 – 85.

Greene, W.H. (2000): Econometric Analysis, 4. Edition, New Jersey: Prentice Hall.

Greer, Mark (2003): Directional Accuracy Tests of Long-Term Interest Rate Forecasts, International Journal of Forecasting, Vol. 19(2), pp. 291 – 298.

Greer, Mark R. (1999): Assessing the Soothsayers: An Examination of the Track Record of Macroeconomic Forecasting, Journal of Economic Issues, Vol. 33(1), pp. 77 – 94.

Gulko, Les (2004): Efficient Irrational Markets, Working Paper presented at the 11th Annual Global Finance Conference, Las Vegas 2004.

Hildreth, C. and C. Houck (1968): Some estimators for a linear model with random coefficients, Journal of the American Statistical Association, Vol. 63, pp. 584 – 595.

Ito, Takatoshi (1990): Foreign Exchange Rate Expectations: Micro Survey Data; American Economic Review, Vol. 80(3), pp. 434 – 449.

Ito, Takatoshi (2002): Is Foreign Exchange Intervention Effective?: The Japanese Experiences in the 1990s (NBER Working Paper 8914).

Jeanne, Olivier and Rose, Andrew (2002): Noise Trading and Exchange Rate Regimes, The Quarterly Journal of Economics, Vol. 117(2), pp. 537 – 569.

Kilian, Lutz; Taylor, Mark P. (2003): Why Is It So Difficult to Beat the Random Walk Forecast of Exchange Rates? Journal of International Economics, Vol. 60(1), pp. 85 – 107.

Kolb, R. A.; Stekler, H. O. (1996): Is There a Consensus among Financial Forecasters?, International Journal of Forecasting, December 1996, Vol. 12(4), pp. 455 – 564.

Leitner, Johannes; Schmidt, Robert; Bofinger, Peter (2003): Biases of professional exchange rate forecasts: psychological explanations and an experimentally based comparison to novices Würzburg Economic Papers #39.

Liu, Olin (2000): Malaysia fashions own path to recovery, looks to strengthen growth, IMF Survey, International Monetary Fund 29(17), August 28, 2000, pp. 282 – 284.

Meese, Richard A.; Rogoff, Kenneth (1983): Empirical Exchange Rate Models of the Seventies: Do They Fit Out of Sample?; Journal of International Economics, Vol. 14(1-2), pp. 3 – 24.

Menkhoff, L. (1997): Examining the Use of Technical Currency Analysis, International Journal of Finance and Economics, Vol. 2(4), pp. 307 – 318.

Menkhoff, L. (1998): The Noise Trading Approach – Questionnaire Evidence from Foreign Exchange, Journal of International Money and Finance, Vol. 17(3), pp. 547 – 564.

Menkhoff, L. (2001): Short-Term Horizons in Foreign Exchange? Survey Evidence from Dealers and Fund Managers, Kyklos, Vol. 54(1), pp. 27 – 47.

Neely, C.J. (1997): Technical Analysis in the Foreign Exchange Market: A Layman's Guide, Federal Reserve Bank of St. Louis Review, Vol. 79(5), pp. 23 – 38.

Neely, Christopher J.; Sarno, Lucio (2002): How Well Do Monetary Fundamentals Forecast Exchange Rates?; Federal Reserve Bank of St. Louis Review, Vol. 84(5), pp. 51 – 74.

Schirm, David C. (2003): A Comparative Analysis of the Rationality of Consensus Forecasts of U.S. Economic Indicators, Journal of Business, Vol. 76(4), pp. 547 – 561.

Taylor, M. P. and Allen, H. (1992): The Use of Technical Analysis in the Foreign Exchange Market, Journal of International Money and Finance, Vol. 11(3), pp. 304 – 314.

Printed by: HST Offsetdruck Schadt & Tetzlaff GbR, Dieburg

ISSN Print: 1610-1502 / ISSN Internet: 1610-1499 / ISSN e-mail: 1610-1480