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Do exchange-rate forecasters herd? A note on the zloty/dollar and yen/dollar exchange rate

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Abstract

We used the foreign-exchange rate forecasts of the Consensus Economics Inc. poll to analyze whether exchange-rate forecasters herd or anti-herd. Forecasters herd (anti-herd) if their forecasts are biased towards (away from) the consensus. Upon implementing a robust empirical test developed by Bernhardt, Campello, Kutsoati (2006), we found that forecasters anti-herd.

Keywords: exchange rates, forecasting, herding

JEL: F31, D84

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1. Introduction

Exchange rate expectations play a prominent role in monetary models of exchange rate determination. Since the seminal work of Allen and Taylor (1990) and Ito (1990), survey data of FX--market participants are used to shed light on the question of how exchange rate expectations are built. One important stylized fact of the literature is that – in contrast to the prevailing assumption of the rational representative agent – real world forecasters are heterogeneous in a number of aspects. This finding has also gained attention in other strands of the literature: For instance, Elliot, Komunjer, Timmermann (2008) recently examine heterogeneity in output projections while Mankiw, Reis, Wolfers (2003) and Capistran and Timmermann (2009) investigate expectation heterogeneity with respect to inflation forecasts. MacDonald and Marsh (1996), Elliot and Ito (1999), Bénassy-Quéré, Larribeau, MacDonald (2003) as well as Dreger and Stadtmann (2008) all find evidence in favour of foreign exchange forecasters' heterogeneity (see Reitz, Slopek 2009 for oil prices). Investigating the determinants of forecast dispersion, Menkhoff, Rebitzky, Schroder (2009) find strong support for the chartist and fundamentalist approach pioneered by Frankel and Froot (1990). The authors show that recent exchange rate changes as well as the degree of misalignment explain the dispersion of forecasts.[1]

- Based on the findings of forecaster heterogeneity, several authors try to answer the question about the sources of heterogeneity:
- One factor that might influence foreign exchange rate forecasts is the central bank intervention behaviour (Beine, Bénassy-Quéré, MacDonald 2007; Reitz, Stadtmann, Taylor 2010).
- Batchelor and Dua (1990) regard the heterogeneity of forecasts as the outcome of active product differentiation among the group of forecasters.

Based on a theoretical model of Scharfstein and Stein (1990), several empirical papers (for example, Lamont 2002; Mitchel, Pearce 2007) link the heterogeneity of forecasts to the age of the forecaster. One line of argumentation goes into the direction that younger forecasters have an incentive to herd since they are uncertain about their forecasting skills and try to hide behind the mass. Contrary to this line of argumentation, other researchers argue that especially young forecasters do not have too much to lose and, therefore, differentiate their forecasts from the crowd. Instead, older and more experienced forecasters with a higher salary and reputation have a larger incentive to herd, because they do not want to risk the reputation earned in the past.

Another source of heterogeneity could stem from a strategic behaviour of forecasters if they actively differentiate their forecasts from each other. Using the foreign-exchange rate forecasts of the Consensus Economics Inc. poll for the zloty/dollar and yen/dollar exchange rate, we analyzed whether forecasters herd or anti-herd. Herding arises if forecasts are biased towards the consensus forecast. Researchers often have conjectured that herding of market participants may help to explain large swings in exchange rates. This raises the question whether exchange-rate forecasts reflect herding of forecasters. Our results suggest that they do not. We report, in fact, strong evidence of anti-herding of forecasters. Anti-herding implies that forecasts are biased

[1] From a policy marker's perspective it is important to understand that market heterogeneity seems to be a major source of exchange rate volatility (Evans 2002), constituting an additional channel by which central bank intervention may calm disorderly markets (Dominguez, Frankel 1993). In addition, the relationship between exchange rate misalignment and forecast heterogeneity is also important for the so-called coordination channel of intervention (Reitz, Taylor 2008).

away from the consensus forecast. We analyzed forecasters' (anti-)herding by means of a new empirical test developed by Bernhardt, Campello, Kutsoati (2006), which is robust to various sources of misspecification. Our evidence of anti-herding of exchange-rate forecasters is in line with mounting evidence of anti-herding of security analysts in their earning forecasts (Bernhardt, Campello, Kutsoati 2006; Naujoks et al. 2009). The underlying methodology was also used by Mensah and Yang (2008) to examine whether the Regulation Fair Disclosure act had an impact on the degree of anti-herding among security forecasters. Pierdzioch, Rulke, Stadtmann (2010) find also an anti-herding behaviour among oil price forecasters.

We lay out the empirical test in Section 2. We describe the data set and our results in Section 3. We summarize our key results in Section 4 and also provide an explanation for our findings.

2. The test

How can we test whether forecasters herd or anti-herd? As a starting point, we assume that each forecaster uses all available data, the best econometric models, and own experience to forecast the exchange rate as accurately as possible. On this basis, the forecaster derives a private (unpublished) forecast. Furthermore, the forecaster can also gain some information from the forecast of other forecasters. Hence, each forecaster can compute an average of all forecasts in the forecasting arena – the so called consensus.

Each forecaster can use the consensus to adjust the private forecast. If the private forecast is larger than the consensus, the forecaster could adjust the private forecast in a way that brings the individual forecast closer to the consensus (herding) or further away from the consensus (anti-herding) – compared to the private forecast.

Figure 1 can be used to structure the setting: The forecaster uses all information to come up with a private unpublished forecast $(\tilde{f}_{i,t+1})$ for the exchange rate in period $(t+1)$. This private forecast should be – on average – equal to the subsequently realized exchange rate. In other words:

$$\tilde{f}_{t+1} = s_{t+1} + u_{t+1} \tag{1}$$

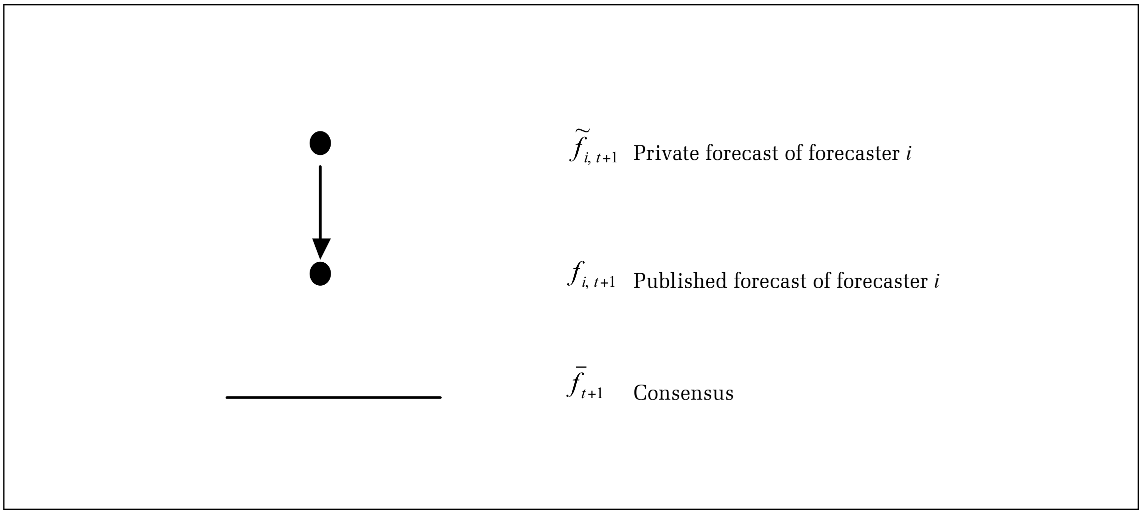
The error term (u) should have an average value of zero and should not show any serial correlation over time. If this condition is not met, there would be some space for an improvement of the private forecast and, hence, the private forecast would not be the best forecast. The probability of an over-shooting of the exchange rate and the probability of an undershooting should be equal to 0.5.

In Figure 1 it was assumed that the private forecast is larger than the consensus. If the forecaster herds, the published forecast of individual i will be between the private forecast and the consensus, $\tilde{f}_{i,t+1} > f_{i,t+1} > \bar{f}_{t+1}$. If one combines the two lines of arguments it follows that – on average – the published forecast will be lower than the realized exchange rate:

$$f_{i,t+1} < s_{t+1} \tag{2}$$

Hence, we get for the conditional probability:

Figure 1
Consequences of herding behaviour



$$P(f_{i,t+1} < s_{t+1} \mid f_{i,t+1} > \bar{f}_{t+1}) < \frac{1}{2} \tag{3}$$

If forecasters herd, the probability that the forecast is larger than the realized exchange rate – conditioned on the fact that the individual forecast is larger than the consensus – should be smaller than 0.5. In contrast to this, the conditional probability should be larger than 0.5 in case that forecasters anti-herd and equal to 0.5 if forecasters neither herd nor anti-herd.

The elements sketched above build the ground for an empirical test for herding or anti--herding behaviour developed by Bernhardt, Campello and Kutsoati (2006). The null hypothesis is that forecasters, given an information set, form unbiased forecasts of the future exchange rate (no herding or anti-herding). The probability, P, that an unbiased forecast issued by forecaster i in period t of the next-period exchange rate, $f_{i,t+1}$, overshoots (undershoots) the future exchange rate, s_{t+1}, should be 0.5, regardless of the consensus (that is, average) forecast, $\bar{f}_{t+1}$. Accordingly, the conditional probability of overshooting in case a forecast exceeds the consensus forecast should be

$$P(s_{t+1} < f_{i,t+1} \mid f_{i,t+1} > \bar{f}_{t+1}, s_{t+1} \neq f_{i,t+1}) = \frac{1}{2} \tag{4}$$

and the conditional probability of undershooting in case a forecast is less than the consensus forecast should be

$$P(s_{t+1} > f_{i,t+1} \mid f_{i,t+1} < \bar{f}_{t+1}, s_{t+1} \neq f_{i,t+1}) = \frac{1}{2} \tag{5}$$

Forecasts may be biased towards the consensus forecast (herding) if forecasters believe that *ex-post* poor forecasts do not damage their reputation in case other forecasters have made the same forecast error. Forecasts may be biased away from the consensus forecast (anti-herding) if, for example, a forecaster tries to signal superior forecasting skills by deliberately deviating from the consensus forecast.

If a forecaster herds, the forecast will be closer to the consensus forecast than in the case of an unbiased forecast. The conditional probabilities should be smaller than 0.5. Anti-herding implies that the forecast will be farther away from the consensus forecast than in the case of an unbiased forecast. The conditional probabilities should be larger than 0.5. The test statistic, S, developed by Bernhardt, Campello, Kutsoati (2006) is defined as the average of the estimates of the two conditional probabilities. Unbiased forecasts imply $S = 0.5$, while herding (anti-herding) implies $S < 0.5$ $(S > 0.5)$.

Bernhardt, Campello, Kutsoati (2006) show that it is the averaging of the conditional probabilities that makes the statistic robust to problems arising due to, for example, correlated forecast errors and market-wide shocks under the null hypothesis. For example, a large swing in the exchange rate may give rise to a sequence of positive unforeseen market-wide shocks. Such shocks raise (lower) the probability that the exchange rate 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, thus, do not bias the mean of the S statistic. They reduce its variance because of the resulting cross-correlation of forecast errors and, thereby, make the test statistic S conservative (it becomes more difficult to reject the null hypothesis of unbiasedness). Similarly, the averaging of the conditional probabilities implies that the test statistic is not biased if forecasters forecast the mean rather than the median in case of an asymmetric distribution over the exchange rate. Finally, because the test statistic is based on estimates of conditional probabilities (that is, relative frequencies of events), disruptive events like sudden reversals of exchange-rate trends have a minor effect on the test statistic.

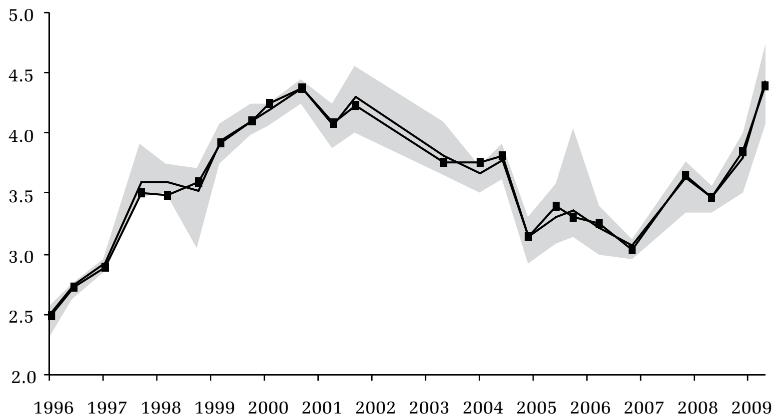
3. Empirical analysis

Our data on exchange rate forecasts are taken from the Consensus Economics Inc. poll. We studied the one-month ahead forecasts of the zloty/dollar and the yen/dollar exchange rate. Figures 2 and 3 give an overview of the exchange rate development as well as the key characteristics of the FX-forecasts. Descriptive statistics are given in Table 1. For the zloty/dollar exchange rate, forecasts are available from January 1996 to May 2009, where 26 different forecasters participated on average 10.2 times (min. 1/max. 23) in the survey. We have access to 24 different surveys over time. The average participation rate was 11 forecasters (min. 9/ max. 14). Hence, the underlying data set is an unbalanced panel. The information in the lower panel refers to the case of the yen/dollar exchange rate forecasts. The main difference between the two currencies can be seen in the fact that the survey frequency is higher and the number of institutions that participate in the survey is higher as well for the yen compared to the zloty.

An interesting feature of the Consensus Economics Inc. data set is that we can observe individual exchange rate expectations of a large number of forecasters. Another interesting feature is that the poll has been conducted for many years. We therefore could analyze both the cross--sectional and the time-series dimension of the data.

Figure 2

Zloty/dollar exchange rate and forecasts

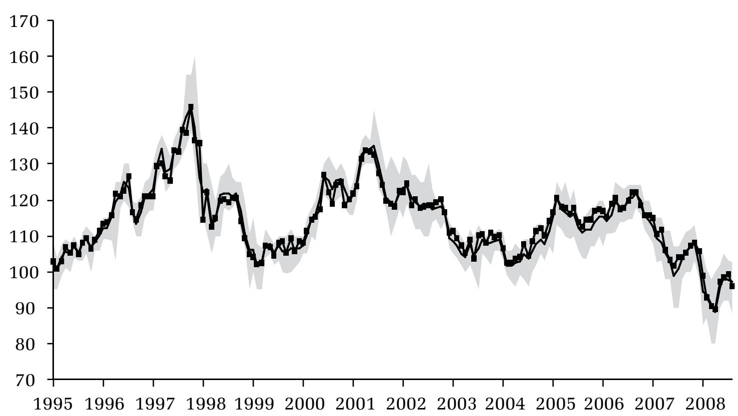


Note: The line with the rectangles denotes the exchange rate, s_t. The solid line denotes the average of exchange rate expectations in period t for the exchange rate in period $t + 1$, $\bar{f}_{t+1}$. The shaded area indicates the range of individual exchange rate forecasts.

Table 2 summarizes the results: For the zloty/dollar exchange rate, the conditional probability of overshooting in case forecasts exceed the consensus forecast is 68.9% and the corresponding conditional probability of undershooting in case forecasts fall short of the consensus forecast is 66.9%, implying that the test statistic takes the value S = 0.6777. The lower (upper) bound of

Figure 3

Yen/dollar exchange rate and forecast



Note: The line with the rectangles denotes the exchange rate, s_t. The solid line denotes the average of exchange rate expectations in period t for the exchange rate in period $t + 1$, $\bar{f}_{t+1}$. The shaded area indicates the range of individual exchange rate forecasts.

Table 1
Descriptive statistics

Zloty/dollar exchange rate	**Jan. 1996 – May 2009**	**Min./Max.**
Number of surveys	24	9/14
Average participation	11.0 institutions	
Number of institutions	26	1/23
Average participation	10.2	
Average forecast	3.61 zloty/USD	2.31/4.75
Yen/dollar exchange rate	**Nov. 1995 – Jun. 2009**	**Min./Max.**
Number of surveys	164	13/23
Average participation	19.3 institutions	
Number of institutions	26	3/160
Average participation	93.1	
Average forecast	114.11 yen/USD	80/160

Note: The following institutions participated in the zloty/dollar poll: ABN AMRO, Bank Austria, Bank of America, Barclays Capital, Calyon, Chase Manhattan Bank, Citigroup, Commerzbank, Credit Agricole, Creditanstalt, CS First Boston, Deutsche Bank Research, Erste Bank, General Motors, Global Insight, HSBC MIDLAND, JP Morgan, Merrill Lynch, Morgan Stanley, Oxford Econ Forecasting, Raiffeisen Zentralbank, Standard Chartered, UBS Economic Research, Unicredit MIB, Vienna Institute – WIIW, Wood & Company.
The following institutions participated in the yen/dollar poll: ABN Amro, Allianz, Bank of America, Bank of Tokyo, Bankers Trust Company, Banque Nationale de Paris, Barclays Bank, Barclays Capital, Barclays de Zoete Wedd, BNP Paribas, Chase Manhattan, Citigroup, Commerzbank, Credit Suisse, Deutsche Bank, Dresdner Kleinwort Wasserstein, General Motors, Global Insight, HSBC, Imperial Chemical Inds, Industrial Bank of Japan, ING Barings, JP Morgan, Merrill Lynch, Morgan Stanley, NatWest Group, Nomura Research Institute, Oxford Econ Forecasting, Royal Bank of Canada, Royal Bank of Scotland, Societe Generale, Standard Chartered Bank, UBS Warburg, Westdeutsche Landes Bank (WestLB).

a 95% confidence band is 0.6174 (0.7381), implying that anti-herding of forecasters of the zloty/dollar exchange rate is significant. The results are pretty robust when the yen/dollar exchange rate forecasts are taken into consideration. The S-statistic takes a value of $S = 0.6889$. Since the number of observations is higher for the yen/dollar exchange rate forecasts the corresponding confidence interval is much smaller compared to the zloty/dollar ratio.

In order to analyze the robustness of our results across extended periods of depreciations and appreciations, Figures 4 and 5 summarize rolling sample estimates of the test statistic S (left axis). For the zloty/dollar exchange rate forecasts, every rolling estimation window comprises six different surveys, which implies a rolling estimation window of about three years.[2] For the yen/dollar exchange rate, each rolling window reflects exactly the surveys of a three-year horizon. While there are fluctuations of the S statistic across rolling estimation windows, we always observe $S > 0.5$.

[2] Since the surveys for the zloty/dollar exchange rate forecasts are irregularly spaced in time, the time span of each rolling window changes slightly over time.

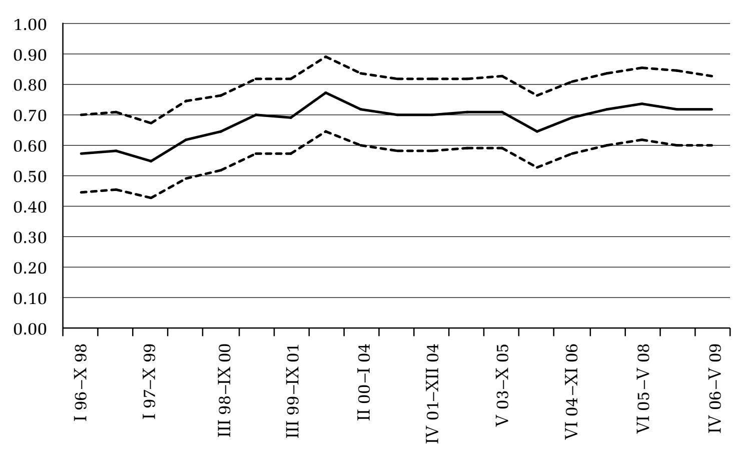
Table 2

Empirical results

Zloty/dollar exchange rate		
	$f_{i,t+1} < \bar{f}_{i,t+1}$	$f_{i,t+1} > \bar{f}_{i,t+1}$
$s_{t+1} < f_{i,t+1}$	42/33.1%	94/68.6%
$s_{t+1} > f_{i,t+1}$	85/66.9%	43/31.4%
Sum	127/100%	137/100%
S-Stat	0.6777	
Stand. dev.	0.0308	
Lower	0.6174	
Upper	0.7381	
Yen/dollar exchange rate		
	$f_{i,t+1} < \bar{f}_{i,t+1}$	$f_{i,t+1} > \bar{f}_{i,t+1}$
$s_{t+1} < f_{i,t+1}$	383/24.8%	1 012/62.5%
$s_{t+1} > f_{i,t+1}$	1 163/75.2%	606/37.5%
Sum	1 546/100%	1 618/100%
S-Stat	0.6889	
Stand. dev.	0.0089	
Lower	0.6714	
Upper	0.7063	

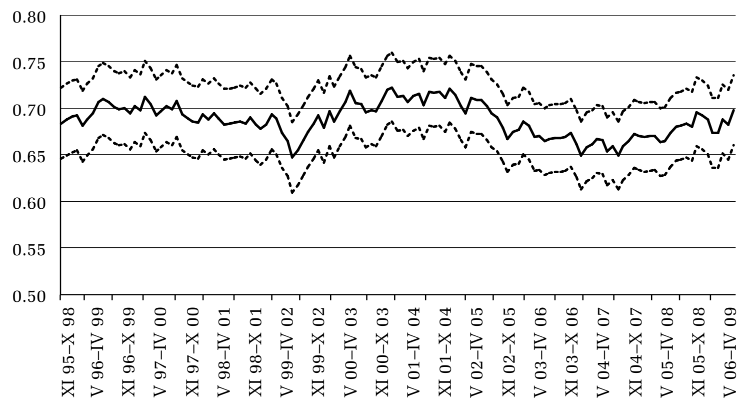
Figure 4

Rolling estimation window: zloty/dollar exchange rate forecasts



Note: The solid line represents the test statistic, S. The dotted lines represent the boundaries of a 95% confidence band. Every rolling estimation window comprises about three years of data (six surveys).

Figure 5
Rolling estimation window: yen/dollar exchange rate forecasts



Note: The solid line represents the test statistic, *S*. The dotted lines represent the boundaries of a 95% confidence band. Every rolling estimation window comprises about three years of data.

4. Conclusions and interpretation of the results

We have presented strong evidence of anti-herding of exchange-rate forecasts. As other researchers (Bernhardt, Campello, Kutsoati 2006; Mensah, Yang 2008; Naujoks et al. 2009; Pierdzioch, Rulke, Stadtmann 2010) also have reported evidence of anti-herding, it becomes an important issue for future research to analyze why forecasters anti-herd and, in particular, which of the available competing theoretical explanations of anti-herding is applicable in the case of exchange-rate forecasts.

So why should forecasters have an incentive to anti-herd? One line of argumentation could depart into the direction of product differentiation (Batchelor, Dua 1990). Forecasters differentiate their forecasts to differentiate themselves from other forecasters in the industry. The motivation behind this behaviour can best be described by a quote of Lamont (2002, p. 268): “If forecasters are paid according to relative ability, they might scatter, since it is hard to win when making a forecast similar to others.”

A different line of argumentation could depart in the direction of the work of Laster, Bennett, Geoum (1999) who argue that the forecasters’ customer base consists of two groups. One group of customers use the forecasts on a regular basis and buy the forecasts regularly. They are interested in a very accurate forecast and choose the forecaster who has provided the most accurate forecast over a longer time period. Irregular customers are only in need of a forecast once in a while. As a consequence, they do not use the forecast accuracy over a long period of time as their decision criterion but pick that forecaster who has provided the best forecast in the recent period.

In a more formal way Laster, Bennett, Geoum (1999) use the following profit function to describe the market:

$$\prod(x_0 \mid x) = \begin{cases} -\alpha \mid x - x_0 \mid + \dfrac{(1-\alpha)P}{n} \text{ if } x = x_0 \\ -\alpha \mid x - x_0 \mid \text{ if } x \neq x_0 \end{cases} \tag{6}$$

where the variable Π symbolizes the profit from forecasting, α the weight for the proportion of regular, and $(1 - \alpha)$ the proportion of irregular customers. $\mid x - x_0 \mid$ represents the absolute difference between the forecast (x) from the realized value (x_0) and hence the accuracy of the forecast. Any difference between these values will create a loss. Furthermore, it is assumed that the irregular customers create an amount of P that is divided up by those forecasters (n) who provide a correct forecast. If the forecast turns out to be incorrect, the forecaster does not receive revenues from this customer base.

Due to the fact that the profit function is influenced by these two components, forecasters have an incentive to depart from the most likely and hence most accurate forecast: the higher the proportion of irregular customers in the market $(1 - \alpha)$ and the higher the revenues stream from irregular customers (P), the higher the incentive to depart from the consensus. This is the case because the forecaster has an incentive to provide a forecast which is not chosen by other forecasters. Of course, one would have a lower probability to get a part of the sum P but in the case of winning, the number of forecasters who have also made the same forecast (n) would be low. As a consequence, the expected profit from departing from the consensus is higher.

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