

A Note on Performance Result of Portfolio Strategy With Market Participants' View

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Abstract

The market participants' view is often quite useful for model based portfolio strategy. This article proposes how to make use of the view in constructing portfolio strategy. The strategy is to invest money in the market when the reliability of the view derived based on Logit model and Probit model exceeds the pre-determined level. Our strategy is quite effective in the equity and the FX market, while miserable in the bond market. The reason of the unsatisfactory result of the bond market is that the market participants' view is extremely strong market follower and it cannot predict large sells-off in the market. And the performance result of the portfolio strategy is well justified by our previous research on the view.

1. Introduction

Researches on predictability of the profitability of individual company and the direction of the market are quite popular in U.S. markets. For example, Stickel (1992), Sjaquillat and Grandin (1994), Womack (1996), Jaffe and Mahoney (1999) analyzed the predictability of security analysts and investment letters, while Hartzmark (1987,1991), Hafer et.al (1992), Leuthold et.al (1994), Graham and Harvey (1996) examined the traders' and Newsletters' predictability of the direction of markets. However, there is no proposal how to utilize the market view in the portfolio strategy and no empirical performance analysis of the strategy.

In this article, we provide the portfolio strategy adopting the market participants' view as information of the market and examine the performance of it. First, we describe the data. Second, we briefly grasp the information value of the market participants' view in Japan based on the significance test for a mean. Third, we propose the portfolio strategy and show its performance and the reason of it. Last, we add the summary and concluding remarks.

2. Data

Regarding data on market participants' view, we adopt "Bulls and Bears in this week" which appears on Monday Nikkei Financial paper weekly basis as we did in our previous research Miyazaki and Ito (2002). It covers three markets such as the bond, the equity and the FX (\$yen) markets in Japan. And it covers 10 kinds of market participants which consist of "investors" and "security firms & banks" in the bond market and "security firms", "banks", "investors" and "foreigners" in the equity market and "other than banks", "domestic banks" and "international banks" in the FX market. Each category of the market participant has several numbers of market participants. In detail, the number of participants in "investors" and "security firms & banks" in the bond market and in "security firms", "banks", "investors" and "foreigners" in the equity market and in "other than banks", "domestic banks" and "international banks" in the FX market is 7, 18, 4, 4, 10, 3, 7, 11 and 7 in order. Regarding the view, it adopts three kinds of views such as "Bulls", "Neutral"¹ and "Bears". As a market data, we adopt "Closing JGB 10-year constant maturity bond equivalent yield"², "Closing Nikkei 225 Average Price"³ and "Closing \$Yen rate in Tokyo time" in the bond, equity and

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1 There is no exact definition of "Neutral" and it just means the prediction of the quite narrow range market.

2 There is an opinion that "10-year JGB futures price" should be chosen instead of JGB 10-year yield considering the liquidity. However, we hate the idiosyncratic behavior of futures in the case of squeeze, which is no relation with the whole market direction.

3 Even though the "TOPIX" is more accurate market indicator than "Nikkei 225 Average Price", but we emphasize more on the familiar of the latter among the equity market participants.

FX market respectively. We cover the data period between 4/7/1997 and 11/20/2000. And we use the Friday closing data or Thursday closing data when Friday falls on holiday because the market participants' view appears on Monday. Thus, we evaluate weekly market participants' view based on weekly market data. We show the history of "Closing JGB 10-year constant maturity bond equivalent yield", "Closing Nikkei 225 Average Price" and "Closing \$/Yen rate in Tokyo time" in Fig1, Fig2 and Fig3 respectively. The descriptive statistics of these data are summarized in Table1.

Table1 Descriptive Statistics of Each Market

	Bond			Equity			Yen		
	All	Forme	Latte	All	Forme	Latte	All	Forme r	Latte r
Average	-0.36	-0.22	-0.48	-19	-35	-2	-0.07	-0.09	-0.05
Median	-0.94	-1.46	-0.46	-24	-85	29	0.15	0.14	0.16
S.T.D.	9.69	10.21	9.20	501	509	496	2.74	3.34	1.96
Variance	93.96	104.32	84.56	251219	258820	245724	7.48	11.19	3.86
Kurtosis	4.90	5.25	4.45	2	1	3	12.06	10.42	0.87
Skewness	0.41	1.05	-0.48	0	0	-1	-1.99	-2.19	-0.05
Range	83.47	80.49	71.12	3821	3022	3080	27.44	27.44	11.55
Minimum	-36.93	-33.95	-36.93	-2182	-1383	-2182	-18.70	-18.70	-4.87
Maximum	46.54	46.54	34.19	1639	1639	898	8.74	8.74	6.88
Tota	-67.82	-21.25	-46.57	-3545	-3361	-1184	-13.43	-8.28	-5.15
# of Elem	190.00	95.00	95.00	190	95	95	190.00	95.00	95.00
25%	-4.47	-5.28	-4.23	-341	-372	-284	-1.38	-1.36	-1.38
75%	4.34	4.02	4.70	328	295	347	1.39	1.72	1.18

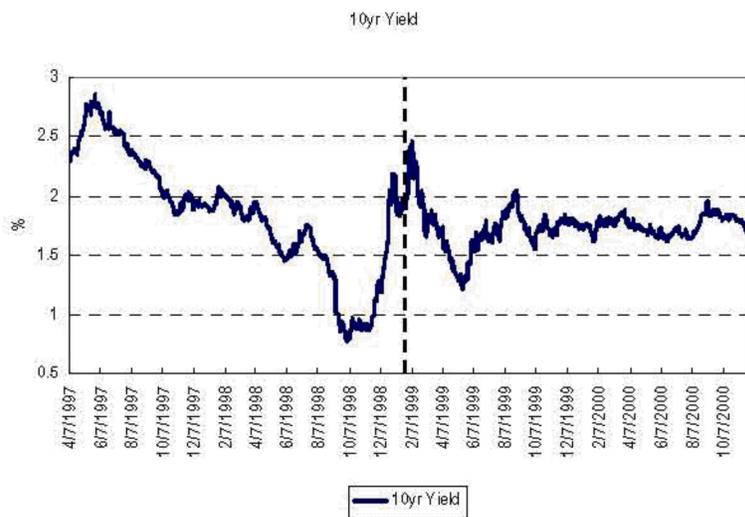


Fig1 10 Year Yield

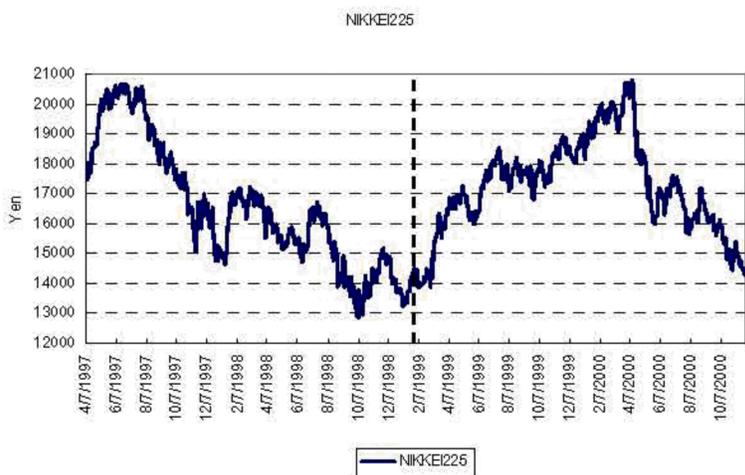


Fig2 Nikkei 225 Index

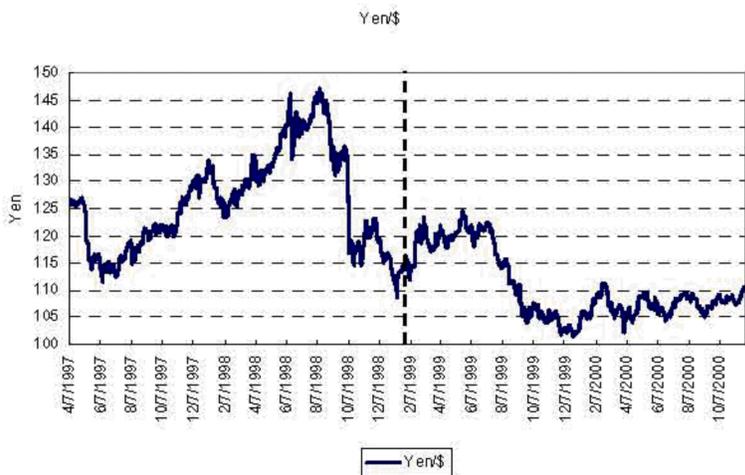


Fig3 \$/Yen FX Rate

3. Information value of the market participants' view in Japan

In order to grasp the information value of the market participants' view in Japan, we historically compare the probability of the correct view in 3 months period with probability 0.5. We define the view as # of "Bullish" minus # of "Bearish" ignoring # of "Neutral". When the view is zero, we recognize that there is no view in the week. In the original data we have # of "Bullish", "Neutral" and "Bearish" categorized by the kinds of both markets and participants. In this analysis we only use the view of each market by summing the view of each market participants of these markets. We judge the correctness of the view based on the market data described in the previous section on the weekly basis. Fig4 shows the time series probability of the correct view in each market. The Z-value in Fig4 indicates the α -level that the probability of the correct view deviates from probability 0.5. Fig4 teaches us that the probability of the correct view and α -level often goes beyond 0.8 and 1.5 respectively in the bond and the equity market. Therefore, we can recognize some information value of the market participants' view in Japan.

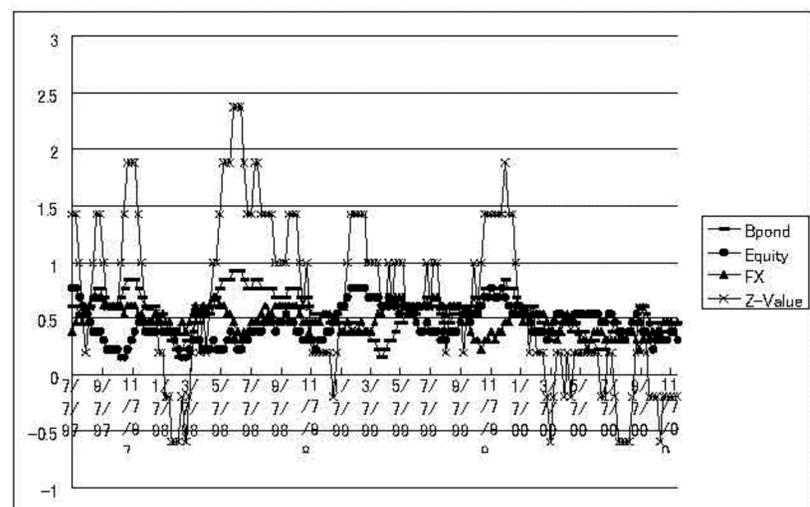


Fig4 Probability of the Correct View

4. Portfolio Strategy and Its Performance

A. Portfolio Strategy

Our portfolio strategy is to invest money based on the view when the reliability of the view exceeds the pre-determined reliability level (95%,90%,85%,80%,75%,70%,65%). As a model to derive the reliability of the view, we adopt 6-variable Logit model and Probit model. In running the strategy we use MLE (Most Likelihood Estimation) technique to estimate the parameters of the model based on the past 3months weekly data, then, apply them to the model to derive the reliability of the strategy in the following 1month.

B. The Model

$$Y_i = \begin{cases} 1 & Y_i^* > 0 \\ 0 & Y_i^* \leq 0 \end{cases}$$

where Y_i is 1 when the view is correct and otherwise 0. Y_i^* is the factor to determine whether Y_i takes 0 or 1 and can be expressed as following.

$$Y_i^* = \beta_0 + \sum_{i=1}^6 \beta_i X_i + \varepsilon_i$$

where X_1 is 0-1binary to indicate the bond market, X_2 is the

bond market view, X_3 is 0-1binary to indicate the equity market, X_4 is the equity market view, X_5 is 0-1binary to indicate the FX market and X_6 is the FX market view. If we denote the cumulative distribution function (it is standard normal distribution and logistic distribution in the case of Probit model and Logit model, respectively) of $-\varepsilon_i$ as F , the probability of $Y_i=1$ is given by

$$F(\beta_0 + \beta_1 X_{1i} + \dots + \beta_6 X_{6i}).$$

Therefore, the likelihood function that we have to maximize is

$$L(\beta_0, \dots, \beta_6) = \prod_{Y_i=0} F(\beta_0 + \beta_1 X_{1i} + \dots + \beta_6 X_{6i}) \times \prod_{Y_i=1} [1 - F(\beta_0 + \beta_1 X_{1i} + \dots + \beta_6 X_{6i})].$$

C. Performance

We summarized the estimated parameter value and the maximized log-likelihood at the beginning of each month in Table2. Because the reliability of the view varies phase by phase in the market as we discussed before, the maximized log-likelihood of both models fluctuates between -30 and -10 and the parameter values largely vary. Table3 shows how many times we invest money in each market with

Table2 Result of Parameter Estimation

Date	Logit Model								Probit Model							
	MLE	B0	B1	B2	B3	B4	B5	B6	MLE	B0	B1	B2	B3	B4	B5	B6
6/30/97	-17.72	-1.13	-0.06	0.11	-2.05	0.32	1.17	0.02	-17.76	-1.91	0.01	0.17	-3.70	0.56	1.98	0.02
7/28/97	-24.22	-0.28	-0.22	0.02	-0.01	0.03	0.15	0.01	-24.22	-0.42	-0.38	0.03	-0.04	0.04	0.20	0.01
8/25/97	-20.54	-0.54	-0.94	0.05	0.65	0.09	-0.05	0.03	-20.51	-0.87	-1.68	0.09	1.08	0.16	-0.07	0.04
9/29/97	-13.90	6.91	-5.83	-0.15	20.38	3.90	-7.44	-0.21	-15.97	15.65	-13.68	-0.27	45.45	8.73	-15.92	-0.18
10/27/97	-15.38	1.03	2.47	-0.54	0.11	0.28	-1.34	-0.01	-15.95	1.79	4.27	-0.94	0.14	0.47	-2.42	-0.04
11/17/97	-16.82	1.01	2.48	-0.53	-0.19	0.21	-1.09	-0.04	-17.40	1.71	4.34	-0.92	-0.41	0.35	-2.02	-0.08
12/29/97	-20.53	0.18	-0.22	-0.05	0.94	0.40	-0.34	-0.02	-20.55	0.34	-0.37	-0.08	1.51	0.68	-0.60	-0.03
1/26/98	-20.74	0.16	0.39	-0.03	0.16	0.06	-0.19	-0.01	-20.73	0.29	0.58	-0.05	0.24	0.10	-0.34	-0.02
2/23/98	-21.59	0.15	0.18	0.01	0.46	0.00	-0.28	0.04	-21.59	0.27	0.25	0.01	0.71	0.00	-0.49	0.06
3/30/98	-20.97	0.05	-0.41	0.01	1.15	-0.09	-0.48	0.02	-20.99	0.11	-0.69	0.01	1.81	-0.14	-0.81	0.03
4/27/98	-20.13	-0.26	-0.45	-0.01	0.91	0.01	-0.52	-0.06	-20.16	-0.39	-0.77	-0.02	1.45	0.01	-0.86	-0.08
5/25/98	-16.76	-3.54	-10.69	-1.50	4.06	0.00	3.29	-0.04	-16.77	-9.78	-29.61	-4.13	10.62	-0.01	9.41	-0.07
6/29/98	-15.99	-19.27	-57.76	-9.04	19.68	-0.06	19.01	-0.07	-16.02	-59.94	-179.91	-28.20	60.59	-0.09	59.56	-0.11
7/27/98	-16.51	-0.34	-1.23	-0.19	1.40	-0.22	-0.30	-0.15	-16.66	-0.57	-2.15	-0.33	2.24	-0.34	-0.45	-0.24
8/31/98	-21.27	-0.27	-0.36	-0.05	0.25	0.07	0.05	-0.09	-21.32	-0.41	-0.64	-0.09	0.39	0.12	0.04	-0.15
9/28/98	-20.06	-0.17	-0.25	-0.05	0.34	0.17	-0.06	-0.04	-20.05	-0.24	-0.45	-0.08	0.56	0.28	-0.15	-0.07
10/26/98	-18.25	0.51	0.43	-0.18	0.63	0.63	-0.35	-0.03	-18.37	0.87	0.59	-0.28	1.08	1.06	-0.61	-0.05
11/30/98	-22.99	-0.17	-0.04	0.03	-0.11	0.05	0.18	-0.02	-23.00	-0.25	-0.09	0.04	-0.21	0.08	0.25	-0.03
12/28/98	-18.66	-0.20	0.05	0.20	-0.62	0.09	0.57	-0.05	-18.77	-0.29	0.08	0.32	-1.06	0.14	0.90	-0.08
1/25/99	-13.76	-0.22	0.43	0.27	-1.18	-0.06	0.72	-0.08	-13.86	-0.35	0.78	0.46	-2.09	-0.10	1.15	-0.13
2/22/99	-17.99	0.03	0.95	0.20	-0.94	0.03	0.22	-0.02	-18.03	0.08	1.52	0.32	-1.58	0.06	0.34	-0.04
3/29/99	-20.73	-0.02	0.54	0.00	-0.02	-0.12	-0.34	-0.02	-20.73	0.01	0.85	0.01	-0.06	-0.20	-0.58	-0.03
4/26/99	-23.73	-0.10	0.01	-0.02	0.63	-0.13	-0.54	-0.06	-23.78	-0.13	-0.01	-0.03	0.94	-0.21	-0.86	-0.10
5/31/99	-25.80	-0.05	-0.16	0.00	0.82	-0.17	-0.51	-0.04	-25.83	-0.06	-0.29	0.00	1.26	-0.28	-0.82	-0.06
6/28/99	-23.03	-0.19	-0.09	0.00	0.87	-0.15	-0.77	-0.14	-23.10	-0.29	-0.17	-0.01	1.36	-0.24	-1.29	-0.23
7/26/99	-23.85	0.18	-0.05	-0.01	0.92	-0.32	-0.49	-0.01	-23.89	0.32	-0.12	-0.02	1.45	-0.52	-0.81	-0.02
8/30/99	-24.70	-0.09	-0.13	0.00	0.47	-0.14	-0.22	0.04	-24.70	-0.11	-0.24	-0.01	0.71	-0.24	-0.38	0.06
9/27/99	-23.29	-0.32	-0.35	0.00	-0.19	0.10	0.43	0.06	-23.25	-0.49	-0.59	-0.01	-0.35	0.16	0.66	0.11
10/25/99	-16.28	-0.59	-0.40	-0.04	-1.88	0.74	1.89	-0.10	-16.32	-1.02	-0.65	-0.09	-3.28	1.28	3.10	-0.17
11/29/99	-22.12	-0.51	-0.51	0.00	-0.21	0.11	0.41	0.03	-22.13	-0.80	-0.90	0.00	-0.36	0.18	0.66	0.05
12/27/99	-24.91	-0.19	0.22	0.07	-0.24	0.06	0.02	-0.01	-24.93	-0.28	0.32	0.12	-0.40	0.09	0.01	-0.01
1/31/00	-24.79	-0.16	0.04	0.05	0.47	-0.09	-0.47	0.07	-24.79	-0.24	0.03	0.08	0.72	-0.14	-0.79	0.11
2/28/00	-21.68	0.14	0.34	0.04	-0.06	-0.03	0.06	-0.07	-21.68	0.25	0.52	0.06	-0.14	-0.05	0.07	-0.11
3/27/00	-22.54	-0.15	0.19	0.05	-0.09	-0.06	-0.05	0.02	-22.54	-0.22	0.27	0.08	-0.18	-0.09	-0.11	0.04
4/24/00	-23.63	0.08	0.14	0.00	-0.20	0.01	0.34	-0.06	-23.63	0.15	0.19	0.01	-0.35	0.01	0.50	-0.10
5/29/00	-23.92	-0.01	0.48	0.03	-0.53	0.08	0.25	0.02	-23.92	0.02	0.74	0.05	-0.88	0.14	0.36	0.03
6/26/00	-22.90	-0.18	0.61	-0.05	-1.18	0.19	0.60	-0.04	-22.95	-0.25	0.94	-0.08	-1.90	0.31	0.91	-0.06
7/31/00	-23.55	0.28	0.05	0.09	-0.14	0.03	0.58	-0.11	-23.63	0.48	0.05	0.15	-0.25	0.04	0.88	-0.17
8/28/00	-22.74	0.15	-0.31	0.16	-0.09	0.01	0.75	-0.12	-22.77	0.26	-0.58	0.26	-0.17	0.01	1.20	-0.19
9/25/00	-22.58	0.27	-0.15	0.06	0.53	-0.01	0.09	-0.11	-22.59	0.45	-0.29	0.09	0.84	-0.01	0.10	-0.17

respect to the reliability level and the model. The difference of the frequency between Probit model and Logit model is almost nothing and the difference only appears in the 90% reliability level of the equity market. Thus, we easily guess that the performances of portfolio strategies based on both models are also quite similar. The interesting part of Table3 is the investment frequency market by market. In the bond market we observe 7 frequencies even in the 95% reliability level but it increases by only 3 in 75% reliability level. In the equity market, we see 12 frequencies even in the 95% reliability level and the frequency reasonably increases to 59 in the 65% reliability level. In the FX market, the frequency stays only 4 until the 80% reliability level and it rapidly increases to 13 in the 75% reliability level. We can imagine that the performance of each market differs due to the difference of the frequencies.

Table3 Frequency of Investments

Probit Model	95%	90%	85%	80%	75%	70%	65%
All	19	25	31	34	54	82	114
Bond	7	7	9	9	10	16	26
Equity	12	15	19	21	31	44	59
FX	0	3	3	4	13	22	29

Logit Model	95%	90%	85%	80%	75%	70%	65%
All	19	23	30	34	54	82	112
Bond	7	7	8	9	10	16	25
Equity	12	13	19	21	31	46	58
FX	0	3	3	4	13	20	29

The performance of the portfolio strategy in each reliability level is summarized market by market in Fig5 through Fig8. As we expected, the performances of portfolio strategy based on both models are quite similar and the difference only appears in the 90% reliability level of the equity market. In all the market the performance of the portfolio strategy increases from 16% to 25% when the reliability level decreases from 95% to 85%, but the performance becomes negative 10% if we further decrease the reliability level to 70%. Considering that the total markets performance was negative 29% in the period, we can judge the performance of the portfolio strategy is outstanding. In the bond market the performance of the portfolio strategy is negative above the 75% reliability level and it becomes slightly positive in the 70%, 65% reliability level. The performance of the bond market itself in this period reached 13% and the performance of the strategy was concluded to be miserable. In the equity market the performance of the strategy is 21% in the 85% reliability level and it becomes negative in less than the 75% reliability level. The performance of the equity market itself in this period was negative 32% and the performance of the strategy was quite excellent. In the FX market the performance of the strategy was 7% in the 75% reliability

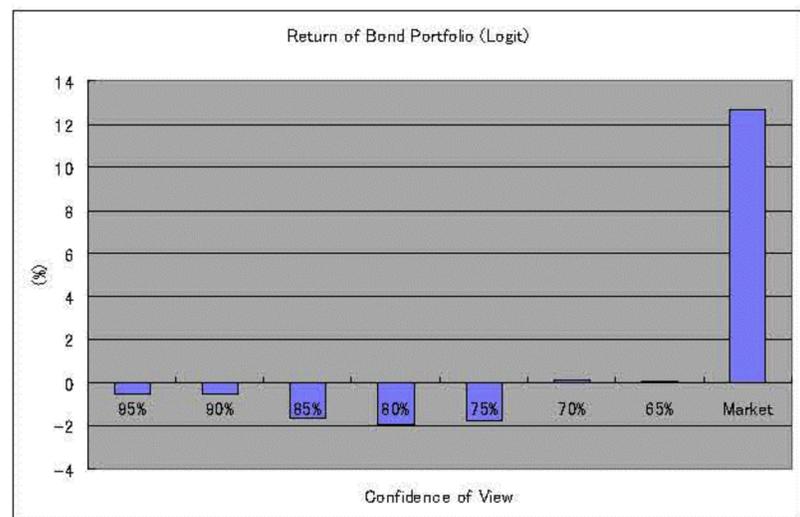
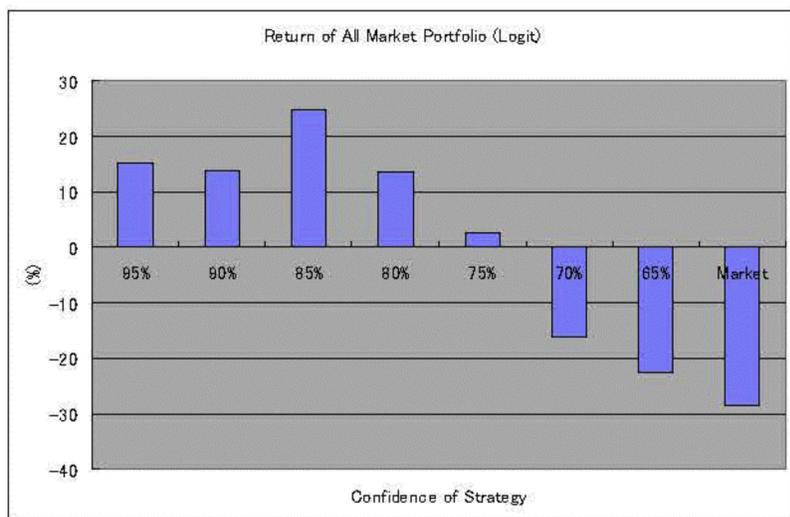
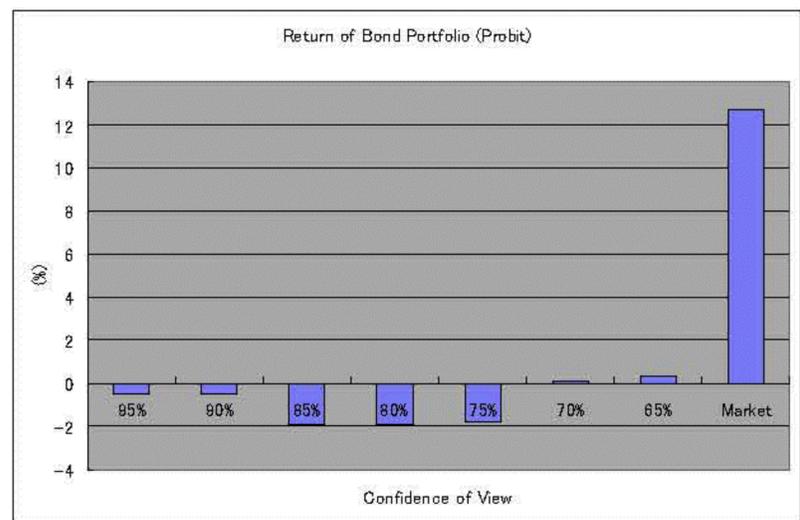
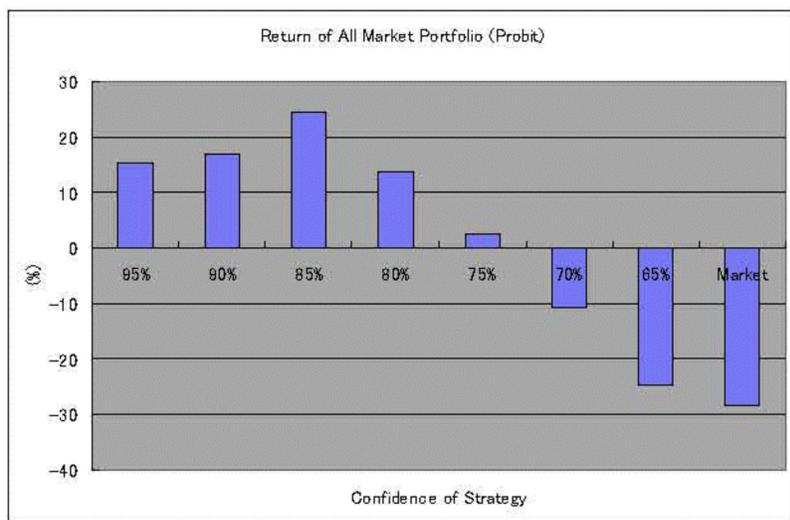


Fig5 Performance of the Portfolio Strategy in All the Markets

Fig6 Performance of the Portfolio Strategy in the Bond Markets

level and it becomes slightly negative in the 65% reliability level. The performance of the FX market itself in this period was negative 7% and the performance of the strategy was satisfactory.

D. Background of the Performance Result

In our previous research Miyazaki and Ito (2002) investigated the nature of the market participants' view in Japan based on (1) non-parametric regression and (2) test of independence. The research clarifies the following tendency of the view. And the tendency well justifies the performance result of the strategy.

The Bond Market

- (1) The direction of the view is generally correct when the view is above 0 and less than 15, while the market sells-off a lot in the extremely strong view such as 16, 17. This indicates that the portfolio strategy recommends, with high probability, long position and loses severely in the view such as 16, 17. This is the reason that the performance is miserable in the high reliability level.
- (2) The chi-square test of independence hypothesis of the market and the market participants' view is rejected with 5% confidence level and the bond market itself tends to

move to the same direction as it moved previous week. The tendency appears more strongly in the market participants' views than in the market. The hypothesis is rejected with 1% confidence level regarding to all the market participants, "investors" and "security firms & banks" and the bond market participants' view tends to be the same direction as the market moved in the previous week. Therefore, the view tends to become strong in the rally and hardly foretells the reversal of the market.

The Equity Market

- (1) The view above 5 is generally incorrect and the strong view doesn't strongly indicate the long position. Thus, the probability of the huge loss in the extremely strong view is quite limited. While, the view less than 3 captures not only the direction of the market but also the magnitude of the market change. This is the background of excellent performance of the strategy.
- (2) The hypothesis of the market and the market participants' view is rejected with 5% confidence level. However, the hypothesis that the present market movement is independent from the previous market movement is not rejected and the possibility of the

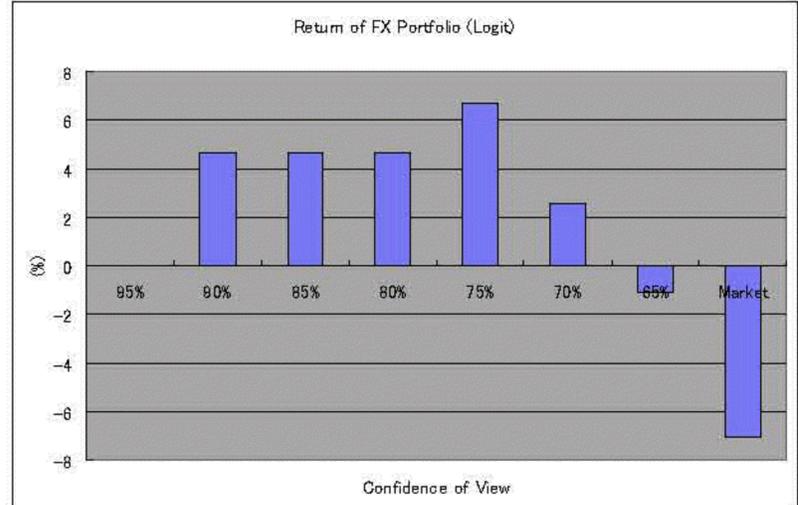
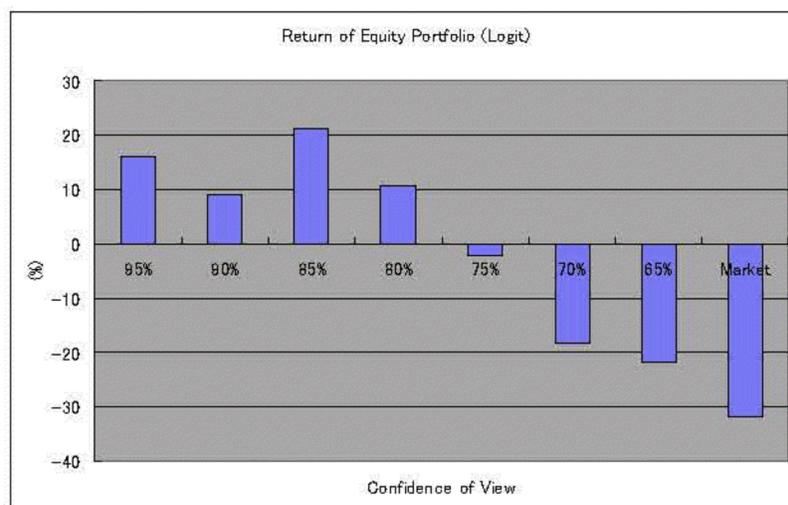
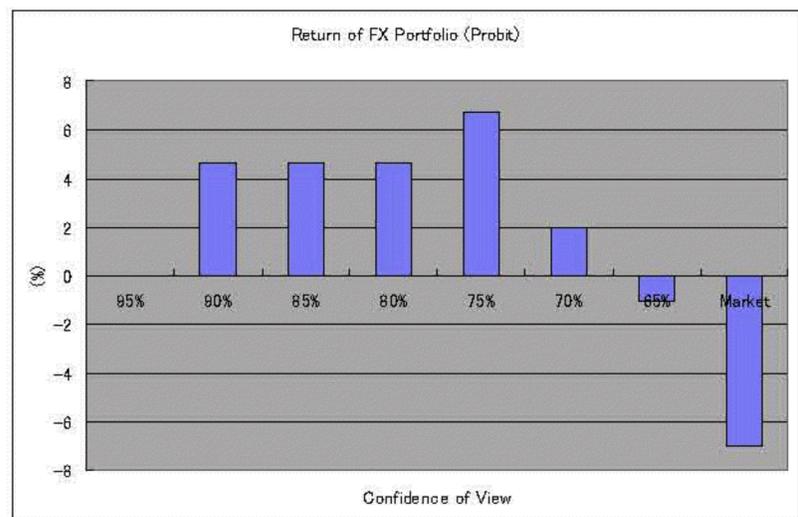
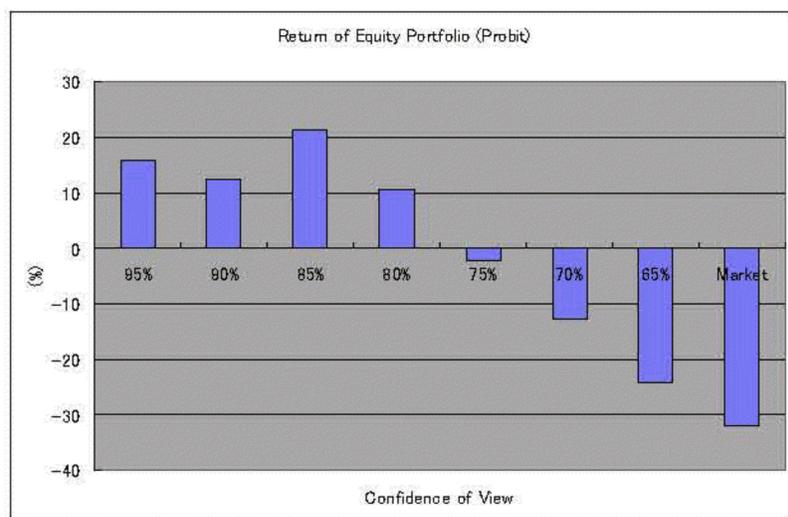


Fig7 Performance of the Portfolio Strategy in the Equity Markets

Fig8 Performance of the Portfolio Strategy in the FX Markets

extremely strong view influenced by the previous market movement is quite limited.

The FX Market

- (1) In the wide range such as above -13 below -8, the view is incorrect and, as is same as the equity market, the strong view doesn't strongly indicate the long position. The probability of correct view is generally lower than that of the bond and the equity market. This is the reason of low frequencies of the positioning in the high reliability level. However, the extremely bearish view correctly captures the large sells-off in the market and this contributes to the high performance in the 70% or above reliability level.
- (2) The hypothesis of the market and the market participants' view is rejected with 1% confidence level. However, contrary to the bond market, the FX market tends to move opposite to the direction of the previous week. The independence of the view is also rejected, but the view tends to foretell the same direction as the market moved in the previous week. Therefore, the probability of the correct view is lower than that of the other markets.

5. Summary

The probability of the correct view and α -level often goes beyond 0.8 and 1.5 respectively and we can recognize the information value of the market participants' view in Japan. Adopting Logit model and Probit model, we proposed the portfolio strategy based on the reliability of the view and also examined its performance and the reason of it. The portfolio strategy in the 85% reliability level substantially outperformed the market return. However, the performance of the strategy in the bond market was miserable. According to the results of the non-parametric regression and the test of independence in Miyazaki and Ito (2002), the view in the bond market follows the market and cannot predict the huge sells-off in the market.

Our empirical analysis only covers around 3.5 years and we need to verify the effectiveness of the portfolio strategy in the longer period. For future research, it is also important to investigate the performance result based on the risk return analysis adopting, for example, VaR as the risk measure. And also we'd better propose the investment strategy to decide the investment amount rather than the 0-1 investment strategy presented in this note.

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