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Is prediction from professional institution more rational? -based on “LangRun Prediction” professional survey data

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ABSTRACT

The paper selected Peking University “LangRun Prediction” survey data and investigated predictions for future economic changes from more than ten Chinese professional institutions according to Rational Expectation Hypothesis. The result indicated that professional institutions have private information, so predictive ability and level are not consistent and prediction is sub-rational. The paper analyzed heterogeneous features of all the professional institutions prediction from the aspect of time and section, thus enriching the research for the field in some essence.

KEYWORDS

Expert prediction; Rational expectation; Heterogeneity; Panel.



INTRODUCTION

Emerging sticky expectations think that people's expectation is sticky and uncertain because all the information cannot be processed^[1]. Mankiw & Reis, introducers of sticky information, thought that there are public expectation and expert expectation in the market^[2]. Experts have more advantages in cost of information access, historical experience and information processing capability than the public. However, is expert expectation more rational? If expert expectation is irrational, what features will be shown? With doubt, the paper selected to analyze predicted data of professional institution, Peking University "LangRun Prediction", and hoped to reveal features of professional institution prediction.

THEORETICAL REVIEWS

In 1961, introduction of rational expectation to some extent changed analytical procedure and theory structure of Modern Western Economics, but it was too "rational" to reasonably explain all the economic fluctuation. Emerging sticky expectations think that expectation is sticky, uncertain and heterogeneous, so attention to individual difference makes an in-depth research on expectation theory. Research on professional institution expectation was earlier in the foreign countries. America Livingston research and SPF professional predictor research focused on the experts or the experts' institutions. Bjerring, Lakonishok and Vermelen (1983) observed that the stocks recommended by securities institutions had significant abnormal earnings in that month and in the following month^[3]. Womack (1996) studied what influence investment advice from America FirstCall data system had on stock price and turnover and found that securities institutions recommendation had influence on stock price in the following 3-4 days^[4]. The above indicated that professional institution prediction was rational and influential. Mankiw, Reis and Wolfers (2003) compared Michigan survey data that represents public prediction with Livingston survey data that represents expert prediction (and professional predictor SPF research) and found that there was significant difference between expert prediction and public prediction and that the difference will change with economic change^[5]. Gerberding (2006) studied features of inflation expectation in Europe, like UK, France and German, and most of survey data passed unbiasedness and validity test. There was universal predicted difference between experts and the public and expert prediction is more precise^[6]. In China, Xiang Lin (2000) used the stocks recommended by securities institutions in 1998-1999 *China Securities Journal* to analyze price and turnover change of the recommended stocks and demonstrated that Chinese professional institutions had certain private information that can predict stock price^[7]. Feng Gao and Fengming Song (2003) performed rational test on short-term prediction of professional institution through daily survey data of more than ten institutions from "CCTV Kanpan" in CCTV website. They found that prediction of the institutions didn't conform to Rational Expectation Hypothesis and that there was no significant difference between predictions from various institutions. In the long term, the prediction level was consistent with real market^[8]. Cuibiao Liu (2003) studied prediction of Chinese institutional investors based on rational prediction and learned that prediction of Chinese institutional investors was in "to-be-rational" prediction phase. Prediction from professional institution was more irrational in fickle market conditions^[9].

The paper used Peking University CMRC "LangRun Prediction" quarterly data to establish measurement model and directly analyzed predictions of more than ten professional institutions, investigating their prediction ability, rational features and heterogeneous tendency. Part one is theoretical review; part two is introduction of basic model of rational test; part three is to explain data source and features; part four is empirical test of expectation's pertinence, unbiasedness, effectiveness and especially its heterogeneity; part five is conclusion.

MEASUREMENT MODEL

In 1961, American economist Muth introduced rational expectation that was considered major revolution of economics research history. Rational expectation thought economic man made full use of

all the information available to form prediction without an unsystematic error. The actual value will be equal to predicted value with a random error term. That is:

$$\chi_t = \beta_0 + \beta_1 \chi_t^e + \varepsilon_t \tag{1}$$

Thereinto: χ_t^e is predicted value, χ_t is actual value, ε_t is random error term of white noise with mean value 0, β_0 and β_1 are respectively coefficient of intercept term and predicted value. Muth (1961) thought that to test unbiasedness was to test whether $\beta_0 = 0, \beta_1 = 1$. Validity usually refers to that there is orthogonality relation between expected cognitive bias and past information set of greater range. According to Keane and Runkle (1990)’s method^[10], a new variable ω_t is introduced based on equation (1). ω_t is a random variable of information. To predict validity is to test whether $\beta_0 = 0, \beta_1 = 1, \beta_2 = 0$.

$$\chi_t = \beta_0 + \beta_1 \chi_t^e + \beta_2 \omega_t + \varepsilon_t \tag{2}$$

Statistic analysis method was used to test rational feature of professional institution prediction. If the test result is irrational, we can also understand degree and feature of non-rationality of professional institution.

DATA SELECTION

Since July 2005, Peking University CCER CMRC has started “LangRun Prediction” project and invited professional institutions to predict key indicator of Chinese macro-economy operation. These indicator projects include GDP, CPI, export and exchange rate. The institutions taking part in “LangRun Prediction” project include more than twenty academic units, domestic security companies and international financial institutions, besides Peking University CCER. The paper focuses on the prediction data of 8 institutions thereinto, including: Peking University CMRC, Hong Kong and Shanghai Banking Corporation, Merrill Lynch, Institute of Quantitative & Technical Economics of Chinese Academy of Social Sciences, Shenyin & Wanguo, China International Capital Corporation limited, China Securities Co., Ltd., and Citic Securities. Time span was from the third quarter of 2008 to the third quarter of 2013.

EMPIRICAL TEST

Cognitive processing errors test

See TABLE 1 for result of zero-mean Hypothesis of all the institutions predictive errors. We can see from TABLE 1 that most of predictive errors all meet statistical test with mean 0. which indicated that prediction of institution was rational in the long term, neither overvaluation nor undervaluation.

TABLE 1 : Result of zero-mean Hypothesis of all the institutions predictive errors

Institution	GDP	CPI	Industry	Investment	Retail	Export	Import	Interest rate	Exchange rate
01	0.05	0.63	0.04	0.87	0.96	0.98	0.72	0.48	0.40
02	0.96	0.26	0.45	0.20	0.61	0.33	0.98	0.27	0.28
03	0.14	0.97	0.17	0.51	0.52	0.95	0.59	0.72	0.06
04	0.31	0.90	0.16	0.57	0.53	0.63	0.95	0.43	0.24
05	0.36	0.86	0.39	0.68	0.56	0.95	0.73	0.61	0.11
06	0.85	0.44	0.35	0.65	0.41	0.71	0.56	0.23	0.02
07	0.58	0.45	0.09	0.43	0.21	0.38	0.07	0.31	0.26
08	0.21	0.83	0.08	0.55	0.51	0.92	0.81	0.34	0.12

With comparison with predictive errors without mean 0, we find that the errors were all about prediction on industrial added value and exchange rate, and predictive error of exchange rate $e_t > 0$, predictive error of industry $e_t < 0$. What makes professional institutions significantly undervalue industrial added value and overvalue exchange rate? A preliminary interpretation was that slowdown of economic growth made professional institute undervalue industrial added value in Post Financial Crisis Era; exchange rate fluctuation was affected by international situation, and the rising of RMB exchange rate made professional institution overvalue exchange rate.

Autocorrelation test

TABLE 2 is result of autocorrelation test of predictive errors. Predictive errors of all the professional institutions on the 9 economy projects were autocorrelation. Thereinto, autocorrelation of institution 03 predictive error was the most serious with predictive error on five projects, like industrial added value. The second serious one was institution 06. Autocorrelation of predictive error meant that professional institutions errors were caused by uncertain factors of economy and they made the same mistake in the next prediction. There were a little autocorrelation with CPI, exchange rate and investment of all the institutions predictive error, especially CPI. The reason may be the institution attention and information mastering on CPI.

TABLE 2 : Result of autocorrelation test of all the institutions predictive errors

Institution	GDP	CPI	Industry	Investment	Retail	Export	Import	Interest rate	Exchange rate
01	Y	N	N	N	N	N	N	N	N
02	Y	N	Y	N	N	N	N	N	N
03	N	N	Y	N	Y	Y	Y	Y	N
04	Y	N	N	N	N	Y	Y	N	N
05	N	N	Y	N	N	N	N	N	N
06	N	N	N	Y	Y	Y	Y	N	N
07	N	N	N	N	N	N	N	N	Y
08	N	N	N	N	N	N	Y	Y	N

Notes: Y="Yes", N="No".

Unbiasedness test

See TABLE 3 for result of unbiasedness test of all the institution prediction. Under 10% precision, the test result showed that predicted value was biased universally. In the specific prediction projects, unbiasedness of professional institutions prediction on CPI and import prediction was best while prediction on investment was worst. Unbiasedness of professional institutions prediction on CPI significantly indicated that they correctively predicted CPI vibration. Unbiasedness of prediction on investment and export was worst. Moreover, if β_0 is over zero, prediction on the economic project will be underestimated.

TABLE 3 : Result of unbiasedness test of all the institution prediction

Institution	GDP	CPI	Industry	Investment	Retail	Export	Import	Interest rate	Exchange rate
01	0.07	0.74	0.06	0.04	0.99	0.99	0.65	0.24	0.46
02	0.84	0.51	0.75	0.16	0.21	0.06	0.44	0.13	0.27
03	0.30	0.97	0.39	0.05	0.78	0.37	0.77	0.13	0.14
04	0.42	0.98	0.35	0.09	0.58	0.23	0.89	0.01	0.46
05	0.67	0.92	0.70	0.00	0.54	0.91	0.79	0.09	0.27
06	0.89	0.68	0.65	0.03	0.57	0.09	0.43	0.19	0.06
07	0.86	0.73	0.24	0.12	0.03	0.15	0.14	0.18	0.47
08	0.46	0.84	0.23	0.01	0.80	0.19	0.19	0.23	0.30

Validity test

Based on model (2), the paper selected hysteretic data of economic actual value χ_{t-1} to test validity of prediction, see TABLE 4. The prediction validity on GDP and CPI was best while investment and interest rate was worst. Better prediction validity on GDP and CPI indicated that the institutions made full use of existing information to predict these projects and obviously the institutions paid more attention to these economic variables. Worst prediction validity on investment may be because Chinese investment was affected by the government.

In the rational expectation test of professional institutions, measurement data indicated that professional institutions prediction did not meet unbiasedness and validity and that prediction error was autocorrelation and non-zero-mean. Obviously, professional institutions expectation is "sub-rational". Since professional institutions prediction was not rational, there should be differences and we should establish panel data model to further analyze the heterogeneous features.

TABLE 4 : Result of validity test of all the institutions prediction

Institution	GDP	CPI	Industry	Investment	Retail	Export	Import	Interest rate	Exchange rate
01	0.29	0.84	0.23	0.01	0.38	0.68	0.88	0.16	0.43
02	0.25	0.49	0.18	0.02	0.14	0.06	0.70	0.28	0.55
03	0.26	0.40	0.22	0.07	0.66	0.32	0.37	0.01	0.21
04	0.33	0.88	0.25	0.03	0.01	0.17	0.04	0.01	0.91
05	0.44	0.93	0.33	0.01	0.37	0.88	0.94	0.01	0.46
06	0.40	0.96	0.46	0.09	0.18	0.02	0.14	0.04	0.17
07	0.69	0.86	0.64	0.07	0.00	0.29	0.35	0.16	0.72
08	0.40	0.54	0.47	0.00	0.42	0.37	0.23	0.05	0.62

Heterogeneity analysis

Economic men were different in information processing, analysis techniques, study and psychology, so the predictions were different. In order to further observe heterogeneity of institutions prediction, we should soften homogeneity assumption on prediction. In this way, all the institutions prediction on CPI was the most rational with the best result in unbiasedness, validity, and autocorrelation and zero-mean. Panel data technique can analyze features and difference of data from the aspect of time and section, and it has been widely used in many fields of economic analysis. Common panel data models include variable intercept model, dynamic variable intercept model and variable coefficient model. This paper will use panel data technique to analyze prediction heterogeneous features of all the institutions. Variable coefficient model (3) of fixed effect was established to further analyze and describe difference of all the institutions prediction, see TABLE 5.

$$\text{CPI}^e = 0.331 + \delta + \beta * \text{CPI} \quad (3)$$

$$T[5.53] R^2=0.93$$

TABLE 5 : Variable coefficient model of fixed effect of all the institutions prediction

Institution	β	T value	δ	Institution	β	T value	δ
01	0.96	16.04	-0.32	05	0.95	16.17	-0.18
02	0.87	14.77	0.21	06	0.95	16.11	-0.08
03	0.96	16.23	-0.21	07	0.88	14.94	0.12
04	0.87	14.81	0.04	08	0.90	15.30	-0.09

We can see from TABLE 5 that the eight professional institutions prediction on CPI was different and average expected tendency of the institutions was also different significantly. Thereinto, the maximum influence coefficient of institution 01 prediction on CPI was 0.96. The minimum influence coefficient of institution 02 prediction on CPI was 0.87. The above analysis indicated that the professional institution prediction on CPI was significantly different.

CONCLUSIONS

The paper used Peking University CMRC “LangRun Prediction” survey data to directly test prediction of professional institutions. The results indicated that there was no sufficient proof to support that prediction of the professional institutions can meet Rational Expectation Hypothesis. Some interesting phenomenon was also observed in the analysis.

The conclusions as below can be obtained from measurement analysis: I. prediction from professional institutions was not entirely rational, and prediction from some institutions was rational while some was not. This is related to information amount, utilization level and prediction belief of the institutions. Validity test indicated that the investigated professional institutions ability to process information was not good enough and they did not make full use of all the information, including hysteretic information. The differences between all the institutions was not large. In the long term, average level of institution prediction was consistent with actual economic change. Although the prediction was not entirely rational, it was still with much reliability. Error probability in the prediction was small and probability of continuous error was smaller. II. Different projects have significant influence on prediction of institutions. The professional institutions will take more energy on the economic project with more attention (such as CPI), so the prediction is more rational than the other projects. The professional institutions will put less energy on the economic project with less attention, so the prediction on interest rate that is almost not governed by the government, is not rational, either. III. Panel data measurement was used to reveal heterogeneous features of professional institution prediction. The difference is stable in average basic predicted value and predicted tendency. Irrational prediction must have heterogeneity. Significant difference of prediction from professional institutions is mainly because of the information they mastered, the information utilization level and predictors’ belief (such as good or bad strategy and conservative or radical strategy on market future tendency).

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