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THE DISTRIBUTION OF STOCK RETURNS: TEST OF STABILITY

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ABSTRACT

Over the period of four decades, the stability of return distributions has been extensively tested for the developed capital markets like U.S.A, Australia and Europe. However, there has been a very little testing of this assumption in a developing capital market like India. The main objective of the present paper is to test the stability of return distribution on Indian stocks. In the present study, the tests of stability of return on 50 companies stocks from specified and unspecified group, listed on Bombay stock exchange, for the period of seven years are carried out. The hypothesis of no difference between yearly means is tested by a one-way analysis of variance. The hypothesis of stability of returns will be rejected only if the calculated F-value exceeds the critical F-value, which is 2.124 at 5 per cent level of significance. The study found that forty-two out of fifty sample stocks have stable yearly means during the study period and also BSE-100 has stable yearly means because calculated F-value does not exceed critical F-value.

Key Words: Average Return, Variance, F-value.

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Introduction

Over the period of four decades, the normality of return distributions has been extensively tested for the developed capital markets like U.S.A, Australia and Europe. However, there has been a very little testing of this assumption in a developing capital market like India. This assumption is also important to find out the evidence in support of market model and capital asset pricing model. So, the test of this assumption for the Indian stock market is deemed essential because the modern market theory, which assumes normality, is gaining wide acceptance.

The main objective of the present paper is to test the stability of return distribution on Indian stocks.

In India obaidulla (1991) tested the normality of stock market returns. He used Sensex data from April 1979 to August 1991 and Natex data from April 1984 to November 1991. The daily returns were computed as percentage price changes and the monthly returns were computed both as percentage price changes and logarithmic price changes. He found that daily returns of both indexes differed significantly from normality, whereas monthly Sensex returns were not significantly different from a normal distribution. The monthly returns were positively skewed and leptokurtic but not statistically significant. He also found that the deviations were not statistically significant and were less when returns were measured as logarithmic price differences as against the percentage price changes.

In another study, Sehgal (1994) used data of the Natex and 80 individual securities over the period from April 1984 to March 1993 and used logarithmic price changes. Testing for the significance of skewness and kurtoisis, he found that for Natex skewness is not significant but kurtosis is significant. For individual securities a vast majority had significantly positive kurtosis. Further, each of the randomly formed portfolios of eight securities were also found to significantly deviate from normality. However, the sample period includes the security scam period of February 1992 to May 1992 during which period there were extreme variations in the indices and stock prices. Therefore, he clearly rejected the normal distribution as a description of the log distribution of returns of Indian stocks.

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Gali (1995) tested the normality of the returns of Sensex, ET index and Natex during May 1987 to June 1994. He constructed daily, weekly, settlement period-wise and monthly returns. Monthly and settlement period wise returns were normal for all the indices.

Data

In the present study, the tests of stability of return on 50 companies stocks from specified and unspecified group, listed on Bombay stock exchange, are carried out. The study covers a period of seven years from 1st January 1995 to 31st December 2001. Weekend prices of 50 sample companies have been adjusted for bonus issue, right issue, stock split, and stock merger. After that, weekly holding period percentage returns are calculated for further computation. The data for weekly stock prices are obtained from Prowess Database provided by the Center for Monitoring of Indian Economy, BSE website and Business Newspaper like Economic Times, Business Standard, Business Line, etc. The sample of companies is selected keeping in mind that the equity price for the company concerned is available across the time period under consideration. The sample securities, which have been considered, are given in Table 1 with their industry group and symbol. The present paper covers a big chunk of and post liberalization period. The test of stability is also done on BSE-National Index over the same time period as on individual stocks.

Methodology

To test the stability of return on sample securities, the weekly percentage returns during the study period, are divided on yearly basis. The hypothesis of no difference between yearly means is tested by a one-way analysis of variance. The F-value is tested for significance at 5 per cent level.

Results

First the stability of yearly means of individual series is tested. In table below, we have the mean of weekly percentage return of sample securities and BSE-100 for total period. The hypothesis of no difference between yearly means is tested by a one-way analysis of variance. The hypothesis

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of stability of returns will be rejected only if the calculated F-value exceeds the critical F-value, which is 2.124 at 5 per cent level of significance.

Table: 2 Yearly Average Weekly Percentage Return and F-value

Symbol / Years	I	II	III	IV	V	VI	VII	F-value
BSE-100	-0.49	-0.04	0.33	-0.28	1.44	-0.35	-0.44	1.533
S1	-1.03	0.15	-1.55	0.41	2.73	-1.34	1.38	2.0275
S2	0.12	0.47	0.25	-0.16	-0.67	-0.54	1.18	0.7966
S3	-0.26	0.19	2.78	0.65	1.55	-0.27	0.97	1.4410
S4	-0.98	-0.14	1.39	-2.43	0.96	1.22	-0.73	1.3656
S5	-0.94	-1.08	2.22	-0.17	0.07	-1.18	-0.79	1.1825
S6	0.08	1.04	0.04	-1.00	2.26	-1.45	-0.73	1.7822
S7	0.20	0.90	0.81	0.54	0.26	-2.13	0.78	1.3280
S8	-0.63	-0.45	0.52	-0.45	2.30	-0.46	0.07	1.0540
S9	-0.17	-0.10	0.39	0.15	2.01	-1.09	0.58	1.3834
S10	-0.24	-0.05	-0.96	0.07	1.30	-0.37	-0.22	0.7471
S11	-0.30	-1.36	-0.84	1.33	3.04	0.41	0.06	1.1037
S12	-0.46	-0.68	1.67	5.23	2.61	-0.17	-2.74	2.0827
S13	-0.29	-2.81	0.05	6.31	2.28	-1.82	-0.65	4.2066
S14	-0.12	1.34	2.46	1.96	4.88	-0.91	-0.05	2.7174
S15	-0.25	0.75	2.24	1.78	2.66	-0.79	-2.69	2.4675
S16	-1.24	-0.86	1.13	3.49	4.43	-0.64	-0.66	2.4838
S17	-0.49	0.01	3.43	3.21	4.19	0.23	0.22	1.8278
S18	-1.15	-0.50	1.70	3.21	4.78	-1.58	-1.70	2.3895
S19	-0.49	-0.11	1.12	2.42	3.97	-1.67	-0.42	1.6217

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S20	-0.40	0.00	3.51	1.66	0.45	-2.07	-0.15	1.8795
S21	0.37	-0.31	3.28	2.74	4.54	1.00	0.18	1.5000
S22	-1.10	-0.56	-0.27	-0.43	0.55	-0.39	-0.13	0.2581
S23	-0.70	-1.56	0.00	-0.62	1.47	-0.23	0.09	0.5603
S24	-1.37	-0.59	0.91	-0.23	1.66	-0.58	0.39	0.9912
S25	0.40	-0.22	0.71	0.50	0.61	-1.43	-0.32	0.7036
S26	-1.56	-0.17	-0.88	0.35	2.67	-0.48	0.64	1.0428
S27	0.09	-0.21	0.02	-0.38	2.92	-1.63	0.18	2.4844
S28	-0.58	-0.38	1.23	1.13	2.53	-0.80	-0.09	0.0816
S29	-0.59	-0.42	1.03	0.94	2.38	-0.90	-0.12	2.2049
S30	-0.25	0.87	-0.23	0.40	-0.96	0.32	-0.33	0.5079
S31	0.17	-1.42	0.01	-0.10	0.47	-1.18	-1.40	0.6182
S32	0.88	0.09	-2.75	0.37	-0.22	-0.98	1.32	1.3220
S33	-1.28	1.86	1.14	-0.28	0.10	-0.07	-0.08	1.0276
S34	-0.44	1.94	-0.25	-1.48	2.25	-0.75	-0.61	1.3818
S35	0.36	-1.02	-2.16	1.74	0.98	-0.71	-0.35	1.1840
S36	-0.05	0.29	-0.24	-0.73	1.30	1.77	-2.36	0.6729
S37	0.61	0.05	1.45	-1.05	0.36	-0.98	0.29	0.7881
S38	-2.14	-1.16	2.85	1.21	2.21	-0.68	-1.56	2.0545
S39	-2.01	0.22	-0.82	1.19	1.91	0.70	-0.08	0.4499
S40	-1.84	-1.26	0.08	-0.29	4.16	-1.26	-0.78	1.2975
S41	-0.91	0.10	-0.25	-0.38	2.36	-0.71	-1.33	0.7793
S42	-1.43	-0.99	0.37	1.11	4.27	1.13	-0.19	1.6924
S43	-1.47	-1.34	0.09	1.92	0.10	0.17	0.77	0.8935
S44	-0.12	-0.28	-1.23	0.63	2.25	-0.86	-0.69	1.5947
S45	-0.93	-0.20	0.26	1.35	3.94	-1.34	-0.38	2.1502

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S46	-1.43	-0.92	-0.04	1.74	1.43	-0.07	-1.04	0.8644
S47	-1.46	-0.11	0.35	0.01	0.48	-1.23	-0.89	0.4402
S48	-1.80	1.02	-0.02	-1.98	1.66	-0.01	-0.36	1.0317
S49	-0.74	-1.00	0.26	1.73	2.22	-0.25	0.94	0.7583
S50	0.47	1.49	1.26	0.07	0.65	-1.08	-0.34	1.3750

It can be inferred from the table that eight out of fifty sample stocks have significant F-values at 5 per cent level, during the study period. So, forty-two stocks have stable yearly means during the study period. Table exhibits that BSE-100 also has stable yearly means because calculated F-value does not exceed critical F-value.

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Appendix

Table : Sample Securities with Symbols and their Industry Group

Symbols	Name of the Company	Industry
S1	Ashok Leland Ltd.	Automobile Industry
S2	Bajaj Auto Ltd.	Automobile Industry
S3	Hero Honda Motors Ltd.	Automobile Industry
S4	Kinetic Motor Co. Ltd.	Automobile Industry
S5	L M L Ltd.	Automobile Industry
S6	Mahindra & Mahindra Ltd.	Automobile Industry
S7	T V S Motor Co. Ltd.	Automobile Industry
S8	Associated Cement Cos. Ltd.	Cement Industry
S9	Gujarat Ambuja Cements Ltd.	Cement Industry
S10	Madras Cements Ltd.	Cement Industry

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S11	Shree Cement Ltd.	Cement Industry
S12	D S Q Software Ltd.	Computer Industry
S13	H C L Infosystems Ltd.	Computer Industry
S14	Infosys Technologies Ltd.	Computer Industry
S15	N I I T Ltd.	Computer Industry
S16	Rolta India Ltd.	Computer Industry
S17	Satyam Computer Services Ltd.	Computer Industry
S18	Silverline Technologies Ltd.	Computer Industry
S19	Tata Elxsi Ltd.	Computer Industry
S20	Tata Infotech Ltd.	Computer Industry
S21	Wipro Ltd.	Computer Industry
S22	Bombay Burmah Trdg. Corpn. Ltd.	Diversified Industry
S23	Century Textiles & Inds. Ltd.	Diversified Industry
S24	E I D-Parry (India) Ltd.	Diversified Industry
S25	I C I India Ltd.	Diversified Industry
S26	Kesoram Industries Ltd.	Diversified Industry
S27	Larsen & Toubro Ltd.	Diversified Industry
S28	Tata Chemicals Ltd.	Diversified Industry
S29	Voltas Ltd.	Diversified Industry
S30	Asea Brown Boveri Ltd.	Electrical Industry
S31	Asian Electronics Ltd.	Electrical Industry
S32	Bharat Bijlee Ltd.	Electrical Industry
S33	Bharat Heavy Electricals Ltd.	Electrical Industry
S34	Birla Yamaha Ltd.	Electrical Industry
S35	Crompton Greaves Ltd.	Electrical Industry
S36	Emco Ltd.	Electrical Industry

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S37	Honda Siel Power Products Ltd.	Electrical Industry
S38	B P L Ltd.	Electronic Industry
S39	B S T Ltd.	Electronic Industry
S40	J C T Electronics Ltd.	Electronic Industry
S41	Kalyani Sharp India Ltd.	Electronic Industry
S42	Mirc Electronics Ltd.	Electronic Industry
S43	Philips India Ltd.	Electronic Industry
S44	Siemens Ltd.	Electronic Industry
S45	Tata Honeywell Ltd.	Electronic Industry
S46	Videocon International Ltd.	Electronic Industry
S47	Avery India Ltd.	Engineering Industry
S48	Bharat Earth Movers Ltd.	Engineering Industry
S49	Manugraph India Ltd.	Engineering Industry
S50	Swaraj Engines Ltd.	Engineering Industry