An Examination of the Relationship between Risk and Return in the Nepalese Stock Market

Chhatkuli KIRAN

Abstract

This paper describes my investigation of the relationship between return and risk on the stocks of the Nepal Stock Exchange Ltd. (NEPSE), applying cross-sectional regression with a new modified version of the conventional two-step method and using eleven years of monthly data with capital adjustment for elements such as dividends, bonus issues and right issues. The empirical finding shows that the CAPM does not provide a significantly positive relationship between common stock risk and return on the NEPSE for the total sample period from 1998 to 2008. Around thirty-two percent of the total months showed a significant relationship between risk and return and the year 2004 showed a significant relationship in the CAPM test. The remaining periods showed no relationship between risk and return. In terms of goodness of fit, R^2 for the total sample period was approximately 0.0039 and provided very weak fitness of the result. The overall finding shows that CAPM fails to predict the relationship between risk and return in the Nepalese stock market.

Keywords : CAPM, Portfolio Beta, Portfolio Return, NEPSE

Introduction :

In 1952 A. D. Harry Markowitz proposed his portfolio theory which is concerned with the selection of an optimal portfolio by a risk-adverse investor. A risk-adverse investor is an investor who selects a portfolio that maximizes expected return for any given level of risk or minimizes risk for any given level of expected returns. A risk-adverse investor will select only efficient portfolios. Portfolio theory can be used to determine the combination of these securities that will create a set of efficient portfolios. The selection of the optimal portfolio depends on the investor's preferences regarding risk and return (Cheney & Moses, n. d : 648).

Portfolio investment refers to an investment that combines several assets the modern portfolio theory explains the relationship between assets risk and return. The theory is founded on the mechanics of measuring the effect of an asset on the risk and return of a portfolio. Portfolio investment assumes that the mean and variance of returns are the only two factors about which the investor cares. Based on this assumption, we can say that rational investor always prefers the

highest possible mean return for a given level of risk or the lowest possible level of risk for a given amount of return. Such a portfolio, technically known as an efficient portfolio, is a superior portfolio. The efficient portfolio is a function of not only the risk and return of the individual assets included, but also the effect of the relationship among the assets on the sum total of the portfolio risk and return. The portfolio return is a weighted average of the variances of return of the individual assets. The portfolio risk is affected by the variance of return as well as the covariance between the return of individual assets included in the portfolio and their respective weights (Pradhan, 1992 : 295).

Markowitz suggests that the investment decisions should be based on the total risk, and price of assets should be determined on the basis of total risk. However, this theory did not cover all the aspects of risk and return of securities. To resolve this problem, William Sharpe developed a simplified variant of the Markowitz model known as the Capital Assets Pricing Model (CAPM). Capital assets are the long-term financial as well as real assets and CAPM is based on the pricing of these assets. The CAPM suggests that any investor can create a portfolio of assets that will eliminate virtually all diversifiable risk ; the only relevant risk is non-diversifiable risk. Therefore, the investment decision and the pricing of capital assets should be based on the un-diversifiable risk. This is the primary importance of selecting assets with the most desired risk and return characteristics. The CAPM further suggests that the price of capital assets should be determined in a way that compensates for the systematic risk.

According to the CAPM (Sharpe 1964), the expected return of a risky asset [(E (R_i)] is equal to the return of a risk-free asset (R_f) plus a risk premium equal to the expected return of the market portfolio in excess of the risk-free rate [E(R_m) − R_f)] multiplied by the relative risk (or beta coefficient) of that asset (β_i).

The equilibrium equation can be written as follows :

$$E(R_i)=R_f+[E(R_m)-R_f]\,\beta_i \qquad (1)$$

where the market portfolio is a portfolio that contains all outstanding assets in proportion to their market value. The beta coefficient of asset i is the risk of that asset relative to the risk of the market portfolio. It is a measure of the "market" or systematic risk of asset i. Risk not related to the market, or unsystematic risk, is assumed to be eliminated through portfolio diversification. It is thus not priced in the market and hence does not appear in the equilibrium pricing equation.

Empirically, Jensen (1968) was the first to show the Sharpe — Linter version of the relation between expected return and market beta and find the positive relationship between beta and the average return, but it is "flat". Other examples of "flat" evidence were shown by Friend and Blume (1970) and Black, Jensen, and Scholes (1972). Fama and MacBeth (1973) tested the relationship between average return and risk for New York Stock Exchange (NYSE) common stocks using two-parameter model and found that there is a positive relationship between risk and return in the NYSE. Other strong evidence presented by Lau, Quay and Ramsey (1974), was that

there is a positive and linear relationship between average portfolio returns and betas, leading Lau, Quay and Ramsey to conclude that the CAPM is applicable to the Tokyo Stock Exchange.

Although a number of researchers have concluded that the Sharpe-Lintner-Black (SLB) model adequately describes the risk-return behavior in capital markets. Schwert (1983) suggests that this evidence provides surprisingly weak support for a risk-return tradeoff. Tinic and West (1984) found the relationship between beta and the returns to vary with months in a year. Another study by Lakonishok and Shapiro (1984, 1986) found an insignificant relationship between beta and return. The tests by Fama and French (1992) showed the relationship between beta and returns to be weaker than the relationship between returns and other variables.

Although substantial criticism was raised in the early years of the CAPM (e. g., Roll 1977) and the Arbitrage Pricing Theory was developed as an alternative equilibrium model, the CAPM has remained popular, possibly because the early empirical tests by Black, Jensen and Scholes (1972) and Fama and MacBeth (1973) showed strong support for the model developed by Black (1972). In the Nepalese context, the Nepalese Stock Market is an emerging market, having only existed for a decade and a half. This market has always been dominated by banking and financial sectors, with a very low level of transactions from the other sectors such as Manufacturing and Processing, Trading, Hotels and others (see Appendix 1). Under these conditions, the CAPM theory of the relationship between risk and return is certainly applicable in the Nepalese stock market, and thus worth analysis in this context.

> "Nepal Stock Exchange Ltd. (NEPSE) opened its trading floor on January 13, 1994 through its newly appointed licensed members and has adopted an "open out-cry" system for transactions involving securities with trading hours from 12 pm to 2 pm. NEPSE currently has 144 listed companies in 8 sectors; there are 23 broker firms and 9 issues managers. The market capitalization is Rs. 512.939 billion at mid July 2009, and trading hours have been extended to 3 pm. On August 24, 2007, NEPSE adopted an Automated Trading System through a Wide Area Network (WAN)".

The general conclusion of the above-mentioned empirical studies is that there is a relationship between risk and return in various stock markets. In Nepal, there has not yet been any formal study related to risk and return using large amounts of data over a long time period. In this study, therefore, my goal was to analyze the relationship of stock returns and risk using the regression model in the context of Nepal.

The remainder of this paper is organized as follows. Section 2 describes the research methodology employed in this study. It includes the selection of enterprises, the nature and sources of data, and the model to be estimated. Section 3 includes the presentation and analysis of the data. Finally, the results are summarized in Section 4.

2. Research Methodology

2.1 Nature and sources of data

This study is based on secondary data only. The necessary data and information have been collected from various sources including the Nepal Stock Exchange Ltd. (NEPSE), Security Board of Nepal and other relevant sources covering a period of 11 years, 1997/98 to 2007/08. There were 138 Nepalese enterprises listed in the NEPSE by the end of FY 2007/08. This study does not cover all the Nepalese enterprises because of data problems for some of them. In the absence of valid and reliable data, the study periods for some of the selected enterprises are not homogeneous in nature. To analyze the relationships between risk and return, we used the cross-section data of 115 enterprises, as shown in Appendix 2.

2.2 Models

In this research, we used a two-step method (Kunimura 2008), which allowed us to examine the CAPM as a predictive model of portfolio returns. Under the predictive model, the CAPM test analyzes the relationship between the beta coefficient over a given period of time and the return of portfolios realized during a subsequent time period. Fama and MacBeth (1973) and Banz (1981) used the three-step method to test the CAPM. We used a two-step method because this method has provided insights into the non-stationary nature of beta between the portfolio formation period and the testing period. However, this two-step method also has some drawbacks such as extreme data of the largest portfolio and smallest portfolio beta. In three-step method, Fama and MacBeth (1973) assumed that the formation of a portfolio on the basis of ranked individual beta caused the grouping of positive and negative sampling errors within the portfolios. At last, they hoped that a large portfolio beta would tend to exaggerate the true beta portfolio and a low beta portfolio would tend to be an underestimate. They expected that the regression phenomenon could be avoided to a large extent by forming portfolios. This was a main drawback of this method, and we therefore used a modified two-step method to examine the risk and return relationship. Under the two-step method, we preceded as follows.

2.2.1 Beta estimation

In this step, we estimated beta for individual stocks, using 1 year of monthly returns (Chhatkuli 2008) because we have very small part of sample data only 115 companies. If we used more than 12 monthly returns like 18 months to 24 months, we found very low number of estimated beta and it was difficult to generalize the result. Therefore we used 1 year of monthly returns. First, we estimated beta by using market returns and individual stock returns from July 1997 to June 1998. Second we estimated beta from August 1997 to July 1998. We repeated this procedure up to June 2008. To estimate beta, we used the following regression, known as the market model (Fama (1976)) :

$$R_{it} = \alpha + \hat{\beta} Rmt + \ell \quad (2)$$

Where

R_{it} = individual stock return at time t
α = constant term
R_{mt} = market return at time t
ℓ = error term

We used two proxies of the market return, a value weighted index (VWI) called the NEPSE Index and an artificial index called the Equally Weighted Index (EWI). We tested the validity of these two indices and finally showed that the NEPSE Index was better than the EWI for measuring market return in the NEPSE. Therefore, we used the VWI as a proxy for the market return in the NEPSE.

2.2.2 Portfolio construction

We formulated portfolios on the basis of estimated beta, with portfolio 1 having the highest estimated beta, portfolio 2 having the next highest estimated beta, and so on, to portfolio 7, with the lowest estimated beta. We calculated the portfolio risk by taking the arithmetic average of the risk of the individual securities that made up each portfolio. The portfolio return was obtained by averaging the next month returns of the individual stocks belonged to each portfolio. For the sample period, the number of securities within each portfolio varied from year to year. For 1997 to 2002, the number of stocks within each portfolio was 7 to 10, and for the later years it ranged from 11 to 14.

We used the following model to estimate portfolio return and beta:

$$R_{p,t} = \gamma_{0,} + \gamma_{1t} \beta_{p,t-1} + \mu_{p,t} \qquad p = 1, \cdots\cdots, N\ ;\ t = 1, \cdots\cdots, T \quad (3)$$

Where γ_0, γ_1, β_p and R_p denote, the constant term, systematic risk premium, beta coefficient of portfolio p and the monthly return on portfolio p, respectively. μ_p denotes an error term of the portfolio at time t. N and T are the number of portfolios and observations, respectively. Equation (3) exhibits the relationship between the portfolio risk and return.

3. Results and findings

Here we describe the major tests of the implications of the market model. The results are summarized for the overall period 1997–2008 and two sub-periods, 1997–2002 and 2003–2008. Empirical results are presented for two different versions of the risk-return regression equation (3): the first version is monthly basis analysis of the CAPM results and the second version is an annual basis analysis. We start by presenting the results of the traditional CAPM test on a monthly basis analysis.

Average beta vs. average realized return

Table 1 shows the CAPM results of the significant month's relationship between risk and return. According to regression equation (3), the table includes the month and year, market return, portfolio return, portfolio beta, t value of γ 1 and p value of γ 1, which exhibit the significant relationship between risk and return, respectively. The total number of months during the sample period is 119 and the CAPM test results for these sample periods are presented in Appendix 3. In Table 1, if the p value of γ 1 is less than 10%, the relation between risk and return is significant. According to the table, the relation between risk and return is positive when the market return is positive and negative when market return is negative except in a few cases. It is interesting to note that the monthly-basis risk-return test results provide some insights into the relationship between risk and return with the market return. Altogether, there are 38 significant months representing 32% of the total number of months. There are 24 positive significant months and 14 negative significant months. The results for the remaining 68% of the months showed that there is no relationship between risk and return in the NEPSE. It proves that beta do not have the power to explain the common stock return in the NEPSE. The maximum number of significant months was 7 and 6 in 2002 and 2007 respectively. We found especially interesting results in 2007, when all most all the significant months were positive significant months. This may have a result of the peace accord between the government and Maoists in 2006. For the 10 years before that, Nepal was involved in a civil war between the government and the Maoists political party. The war affected every sector in Nepal. Positive effects of the peace agreement between the government and the Maoists were felt in the economy as well as the social and political sectors. According to the Central Bureau of Statistics of Nepal, the Nepalese economy recorded greater economic growth in FY 2007/08 than in the seven years prior to 2007/08. The real GDP growth in that year increased by 5.6 percent for the basic prices and by 4.7 percent for the producers' price, while during the previous fiscal year the respective growth rates were only 2.6 percent and 3.2 percent respectively. Similarly, capital markets also showed record growth in 2007. The total transactions of shares in terms of value increased by 172 percent to Rs. 22.82 billion in the FY 2007/08, while it was Rs. 8.36 billion the previous year. The number of transactions increased by 25.1 percent to 15.08 hundred thousand, and it was 12.05 hundred thousand previous year. The number of shares traded during the year increased by 17.2 percent to 136, whereas it was 116 the previous year. Likewise, the number of ordinary shares traded during the review period was 28599.77 million, which is a 57.6 percent increase from the previous year. The daily average turnover recorded in the review year was Rs. 97.11 million ; the turnover was Rs. 78.22 million the previous year. In summary, 2007 was a golden year in Nepalese economic history after the civil war.

Although there were strong positive significant months in 2007, we found a small number of significant months during the rest of year in terms of the relation between risks and returns of portfolios in our developing markets. Hodoshima et al. (2000), found a significant relationship

Table 1：CAPM Test

Monthly Basis Analysis of Significant Month Result from 1998 to 2008

Month/Year	R_m	Portfolio Return R_p	Portfolio Beta β_p	t_{-value} of $\gamma 1$	p_{-value} of $\gamma 1$
10/1998	0.0913	0.0349	0.2039	6.7848	0.0010
4/1999	0.0456	0.0592	0.0850	2.078	0.0922
9/2000	0.0302	0.0885	0.3531	4.1324	0.0090
11/2000	−0.0640	0.0271	0.3234	−2.3520	0.0653
12/2000	−0.1673	0.0041	0.2622	−4.3623	0.0072
2/2001	−0.13064	−0.0186	0.2545	−2.6873	0.043
7/2001	−0.0754	−0.0602	0.3281	−3.1387	0.0257
8/2001	−0.1766	0.0052	0.2764	−3.2324	0.0231
10/2001	0.0673	0.0009	0.1759	3.2077	0.0237
11/2001	−0.0522	−0.0148	0.1840	−1.9099	0.1143
1/2002	−0.0777	−0.0774	0.3290	−2.7629	0.0396
2/2002	−0.1787	0.0265	0.3410	−2.5145	0.05352
3/2002	0.1154	0.0142	0.3099	5.9150	0.0019
4/2002	0.1058	−0.0055	0.3231	9.6061	0.0002
5/2002	−0.0545	0.0250	0.3128	−2.2494	0.0743
10/2002	0.0067	−0.0079	0.3521	3.6524	0.0147
11/2002	−0.0279	−0.0432	0.3923	−3.7249	0.0136
1/2003	0.0623	−0.0039	0.4749	2.5393	0.0519
4/2003	−0.0309	0.0072	0.5498	−2.3183	0.0681
11/2003	−0.0206	0.0089	0.4911	−2.8835	0.0344
1/2004	0.0463	−0.0036	0.3189	2.3603	0.0647
4/2004	0.0155	0.0123	0.5320	4.0639	0.0096
5/2004	0.0429	0.0141	0.4262	2.5769	0.0496
7/2004	0.0876	−0.0005	0.3920	2.9844	0.0306
2/2005	0.0907	0.0181	0.3079	4.6803	0.0054
3/2005	0.0449	0.0222	0.2541	4.7075	0.005
5/2005	−0.0267	0.0114	0.1653	−2.3634	0.0644
9/2005	0.0136	0.0290	0.2167	5.4753	0.0027
12/2005	0.0075	0.0436	0.0910	−2.0903	0.0908
1/2006	0.0402	0.0067	−0.0079	4.9576	0.0042
4/2006	0.1527	0.0322	0.0922	2.2798	0.0715
5/2007	0.1199	0.0835	−0.0048	3.3208	0.0209
6/2007	0.1893	0.0765	−0.0020	3.7072	0.0209

8/2007	0.1574	0.0532	0.1177	3.1095	0.0265
9/2007	0.0542	0.0614	0.0266	3.1644	0.0249
10/2007	0.0627	0.0548	−0.0111	2.0785	0.0922
11/2007	0.1207	0.1562	0.0016	2.8978	0.0338
4/2008	0.0797	0.1189	−0.0779	−3.7872	0.0127

Months with significant t-value of $\gamma 1$ are selected at the 10 percent level.
(Source : My Original Research File in 2009)

between risk and return for all months of the sample period in developed markets such as Japan.

Table 2 presents the summary statistics of the mean and standard deviation of the portfolio return and beta from 1998 to 2008 and for sub-periods from 1998 to 2002 and 2003 to 2008. The table shows the time series average and standard deviation of portfolio betas and portfolio returns. At the time of portfolio formation, every stock was ranked on the estimated beta and divided into 7 portfolios. Portfolio 1 consists the stocks with the highest beta, portfolio 7 the stock with the lowest beta. The highest average portfolio return of 0.0932 occurred in portfolio 3 for the whole period 1998 to 2008. Portfolio 3 `s level of risk as measured by standard deviation was 0.1241 which is the largest number in comparison to standard deviations of returns of other portfolios in the sample period. The minimum average return was obtained by portfolio 4, i. e. 0.0288 and the minimum standard deviation of return was shown by portfolio 2, i. e. 0.0384. There is quite a wide dispersion in the portfolio average returns of the portfolios which ranged from 0.0288 to 0.0932. The average return of the high beta portfolio was about 0.3251 and average return of the low beta portfolio was 0.0462. The sub-periods had similar patterns of average portfolio returns. There is no strong relationship between average return and beta within the sample period. Figure 1 is a scatter diagram obtained from the average portfolio return and average portfolio beta in 7 portfolios during the total sample period indicated in Table 2. The figure shows that there is no relationship between beta and realized returns for the full sample period. The value of R^2 in the cross-sectional regressions is 0.0039. The obtained slope coefficient is not significant at any level of significance. This finding does not follow the SLB model. Finally, these findings show that the relationship between risk and returns does not vary across the sub-periods or the entire sample period.

Table 3 shows the result of relationship between risk and return on an annual basis for the with overall period and sub-periods. For the overall period, the slope coefficient takes a negative value i. e. −0.0019 and it is not significant at any level of significance. The first sub-periods has a positive slope coefficient value i. e. 0.0059. It is also not significant at any level of significance. The second sub-period has a negative slope coefficient value, i. e. −0.4738. It is also not significant at any level of significance. On an annual basis, eight years show a positive slope coefficient and three years show a negative slope coefficient according to regression equation (3). These slope coefficients are always insignificant except in 2004 and 2008. Figure 2 shows a significant relationship be-

Table 2: Summary Statistics of the Portfolios Average Returns and Betas (August 1998-June 2008)

Return	Portfolio						
Average	1	2	3	4	5	6	7
1998-2008	0.03251	0.03501	0.0932	0.0514	0.0288	0.0453	0.0406
1998-2002	0.0250	0.0254	0.1535	0.0741	0.0192	0.0382	0.0200
2003-2008	0.0387	0.0429	0.4300	0.0325	0.0367	0.0512	0.0578
Standard Deviation							
1998-2008	0.0464	0.0384	0.1241	0.0840	0.0490	0.0513	0.0511
1998-2002	0.0449	0.0365	0.1652	0.1222	0.0388	0.0452	0.0298
2003-2008	0.0509	0.0413	0.0479	0.0350	0.0587	0.0594	0.0610
Beta							
Average							
1998-2008	1.4006	0.6826	0.3357	0.1544	−0.0166	−0.2304	−0.843
1998-2002	1.4126	0.7273	0.4061	0.2196	0.0403	−0.1687	−0.7945
2003-2008	1.3907	0.6455	0.2770	0.1001	−0.0642	−0.2819	−0.8835
Standard Deviation							
1998-2008	0.55033	0.2837	0.2246	0.1535	0.1237	0.1712	0.4857
1998-2002	0.493	0.2169	0.1830	0.1321	0.0943	0.1383	0.4901
2003-2008	0.6411	0.3460	0.2549	0.1592	0.1324	0.1906	0.5248

(Source: My Original Research File in 2009)

tween risk and return in 2004. The obtained value of R^2 was 0.54. The R^2 is a summary measure that indicates how well the sample regression line fits the data. In this case it means the change in portfolio beta explains 54% of the variation in average portfolio returns. The estimated slope coefficient shows the positive value of 0.0081 and reflects the positive relationship between risk and return in 2004 at a 5% level of significance. This is the only case that followed by SLB model in our stock market.

Finally, the values of R^2 in Table 3 show that the goodness of fit is very weak in several cases such as 1998, 1999, 2001, 2002, 2003, 2006 and 2007. The obtained R^2 value indicates changes in portfolio beta that explain the very small part of the variation in average portfolio returns. This portion is an irrelevant and shows the very weak relationship between risk and returns for these years in our stock market.

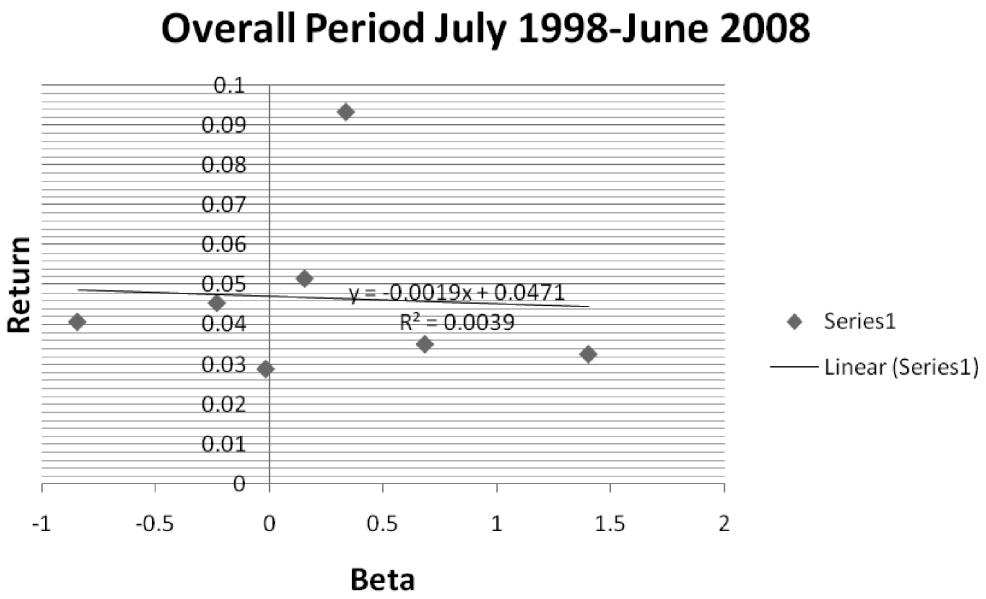

Figure 1 : Relationship between risk and return for the entire sample period.
(Source : My Original Research File in 2009)

Table 3 : Annual Basis Analysis of Risk and Return during the Overall Period and Sub-periods

Period	R^2	Slope Coefficient		t_{-value}	p_{-value}
		Positive	Negative		
1998-2008	0.0039		−0.0019	−0.1392	0.8947
1998-2002	0.007	0.0059		0.1885	0.8578
2003-2008	0.32		−0.4738	−1.55	0.1816
1998	0.0023		−0.0078	−0.1079	0.9182
1999	0.041	0.0024		0.4677	0.6596
2000	0.1315	0.0051		0.8703	0.4239
2001	0.0088	0.0088		0.06668	0.9494
2002	0.1011	0.0045		0.7502	0.4868
2003	0.044		−0.0024	−0.4821	0.65
2004	0.543	0.0081		2.4385	0.0587
2005	0.2534	0.0072		1.3029	0.2493
2006	0.0102	0.0038		0.2277	0.8288
2007	0.0314	0.011		0.4221	0.6904
2008	0.77		−0.0461	−4.1905	0.0085

(Source: My Original Research File in 2009)

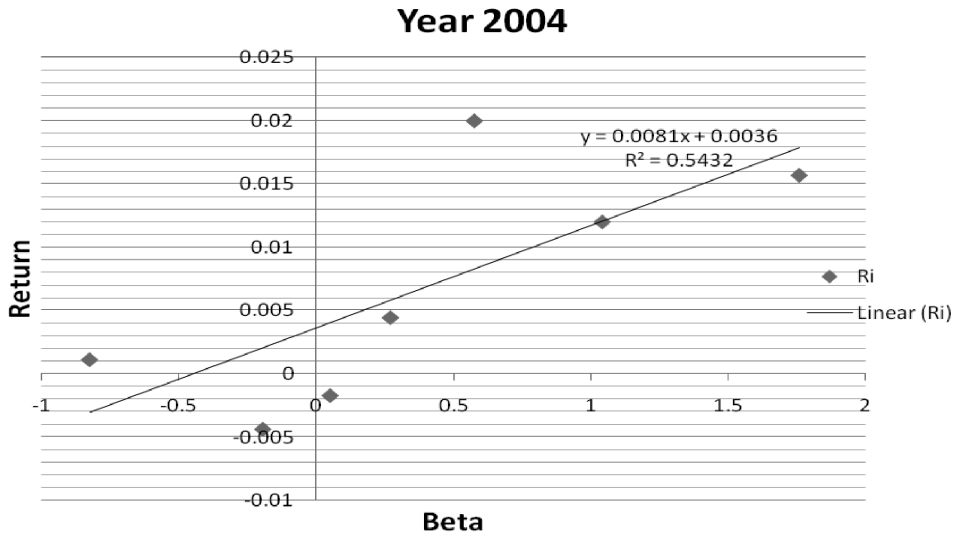

Figure 2: Positive relationship between risk and return in 2004
(Source: My Original Research File in 2009)

4. Conclusions

We analyzed the relationship between average return and risk of portfolios of common stocks traded on the Nepal Stock Exchange. We found that the CAPM does not provide a valid framework to predict common stock returns on the NEPSE for the total sample period of 1998 to 2008. In a monthly basis analysis, we showed a small number of months with a significant relationship between average return and risk, only about 32%. In a yearly basis analysis, there was a significant relationship between risk and return only in the years 2004 and 2008. The remaining 9 years showed no such relationship, indicating that CAPM fails to predict common stock returns in the NEPSE. Similarly, the goodness of fit measure R^2 for the entire sample period is approximately 0.0039, which shows very weak fitness in the findings. This value of R^2 indicates that changes in the portfolio beta explain only a very small part of the variation in average portfolio returns. We conclude that the risk-return relationship in the NEPSE is very weak and that the CAPM does not provide sufficient explanations for the risk-returns behavior in Nepal.

Finally, we can conclude that our results show that the risk-return relationship is very weak in NEPSE and the two-parameter portfolio model does not provide powerful explanations for the risk-returns behavior in NEPSE. Therefore, it is clear that beta and average return are simply not correlated and only beta is not sufficient to explain the relation with average return. The above findings can be taken as evidence that there must be need to applied with modified version of model such as conditional risk-return relationship (penttengill et al. (1995) and three-factor model (Fama and French (1992) in the NEPSE.

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Appendix 1 : The Nepalese Stock Market

Transactions in 2002/2003 by Sector

Sectors	Listed companies	Traded Share Quantity (in`000)	Traded Amount Rs. (in millions)	No. of Transactions	Market Capitalization Rs. (in millions)
Commercial Banks	11	204.98	332.18	2238	21436.72
Finance Groups	35	95.23	128.81	3496	2561.16
Insurance Groups	13	28.35	64.59	1139	2388.54
Manufacturing & Processing	29	0.23	3.82	7	4731.3
Hotel	4	2.58	6.52	27	2550.61
Trading	8	0.56	13.41	31	488.02
Development Banking	4	11.96	25.83	307	1016.77
Other	4	1.65	0.64	31	67.26

Transactions in 2003/2004 by Sector

Sectors	Listed companies	Traded Share Quantity (in`000)	Traded Amount Rs. (in millions)	No. of Transactions	Market Capitalization Rs. (in millions)
Commercial Banks	13	2737.61	863.41	26000	27958.88
Finance Groups	41	1202.2	165.09	47920	2942.273
Insurance Groups	13	256.33	36.86	8689	2549.3
Manufacturing & Processing	29	1978.22	1031.62	163	4472.75
Hotel	4	61.04	2.84	549	1065.86
Trading	8	8.64	11.83	51	603.53
Development Banking	4	212.76	32.33	2073	796.85
Other	4	11.72	0.29	88	65.35

Transactions in 2004/2005 by Sector

Sectors	Listed companies	Traded Share Quantity (in`000)	Traded Amount Rs. (in millions)	No. of Transactions	Market Capitalization Rs. (in millions)
Commercial Banks	14	6416.4	4021.85	64966	38547.1
Finance Groups	44	14443.36	216.37	27576	3471.5
Insurance Groups	14	328.13	67.62	7340	3659.86
Manufacturing & Processing	29	7603.14	114.9	252	4585.66

Hotel	4	98.17	4.48	671	1016.45
Trading	8	10.41	7.99	49	802.04
Development Banking	7	135.62	22.01	4836	1049.07
Other	5	2398.11	52.48	556	4187.73

Transactions in 2005/2006 by Sector

Sectors	Listed companies	Traded Share Quantity (in`000)	Traded Amount Rs. (in millions)	No. of Transactions	Market Capitalization Rs. (in millions)
Commercial Banks	15	5534.9	2696.28	45886	68841.24
Finance Groups	50	1957.68	305.85	28875	4930.634
Insurance Groups	14	575	129.9	6187	4852.19
Manufacturing & Processing	29	59.8	17.19	233	4619.2
Hotel	4	392.18	19.77	510	2393.61
Trading	8	15.22	15.8	66	737.39
Development Banking	8	386.39	82.76	4740	1227.49
Other	6	3301.54	183.88	513	8012.2

Transactions in 2006/2007 by Sector

Sectors	Listed companies	Traded Share Quantity (in`000)	Traded Amount Rs. (in millions)	No. of Transactions	Market Capitalization Rs. (in millions)
Commercial Banks	15	5534.9	2696.28	45886	68841.24
Finance Groups	50	1957.68	305.85	28875	4930.634
Insurance Groups	14	575	129.9	6187	4852.19
Manufacturing & Processing	29	59.8	17.19	233	4619.2
Hotel	4	392.18	19.77	510	2393.61
Trading	8	15.22	15.8	66	737.39
Development Banking	8	386.39	82.76	4740	1227.49
Other	6	3301.54	183.88	513	8012.2

Transactions in 2007/2008 by Sector

Sectors	Listed companies	Traded Share Quantity (in`000)	Traded Amount Rs. (in millions)	No. of Transactions	Market Capitalization Rs. (in millions)
Commercial Banks	17	11241.42	13822.15	54314	218264.19
Finance Groups	55	3094.30	2307.53	30462	27113.59

Insurance Groups	17	433.27	264.86	3332	10897.16
Manufacturing & Processing	18	1655.09	343.44	96	6576.18
Hotel	4	158.07	27.67	911	3484.13
Trading	4	14.97	33.65	108	686.73
Development Banking	23	2534.90	1981.05	53317	15619.36
Other	4	7279.92	3200.23	6468	25881.93

Transactions in 2008/2009 by Sector

Sectors	Listed companies	Traded Share Quantity (in`000)	Traded Amount Rs. (in millions)	No. of Transactions	Market Capitalization Rs. (in millions)
Commercial Banks	28	13301.44	12406.45	68171	192611.17
Finance Groups	53	3552	2615.4	58742	17342.23
Insurance Groups	17	418.51	212.80	8337	8640.23
Manufacturing & Processing	5	95.12	26.08	75	5424.58
Hotel	3	95.89	18.69	505	3346.41
Trading	3	14.66	33.49	83	980.70
Development Banking	28	3631.82	2740.36	64831	16648.39
Other	5	4223.20	1383.94	5838	115119.65

(Source : NEPSE Annual Report)

Appendix 2 :

Selection of Companies, Period of Study, and Number of Observation

S. N.	Company Name	Study period	Observations
	A. Commercial Banks		
1	Bank of Kathmandu Ltd.	1997/98 to 2007/08	132
2	Everest Bank Ltd	1997/98 to 2007/08	132
3	Himalayan Bank Ltd.	1997/98 to 2007 08	132
4	Kumari Bank Ltd	2003/04 to 2007/08	48
5	Laxmi Bank Limited	2003/04 to 2007/08	50
6	Lumbini Bank Ltd.	2004/05 to 2007/08	44
7	Machhachapuchhre Bank Ltd	2003/04 to 2007/08	61
8	Nabil Bank Ltd.	1997/98 to 2007/08	132
9	Nepal Bank Ltd.	1997/98 to 2001/02	76
10	Nepal Bangladesh Bank Ltd.	1997/98 to 2007/08	132
11	Nepal Credit & Com. Bank Ltd.	2005/06 to 2007/08	41
12	Nepal Investment Bank Ltd.	1997/98 to 2007/08	132
13	Nepal Industrial & Co. Bank	2000/01 to 2007/08	97
14	Nepal SBI Bank Ltd.	1997/98 to 2007/08	132

15	Siddhartha Bank Ltd.	2006/07 to 2007/08	29
16	Standard Chartered Bank Ltd.	1997/98 to 2007/08	132
	B. Development Banks		
17	Business Devevelopment Bank Ltd	2006/07 to 2007/08	22
18	Chhimek Vikash Bank Ltd.	2005/06 to 2007/08	42
19	Development Credit Bank Ltd.	2002/03 to 2007/08	73
20	Diprox Development Bank	2005/06 to 2007/08	38
21	Gandaki Dev. Fin. Inst.	2006/07 to 2007/08	25
22	Nepal Development Bank	2002/03 to 2007/08	78
23	Nirdhan Utthan Bank Ltd.	2003/04 to 2007/08	62
24	Paschimanchal Bikash Bank	2005/06 to 2007/08	42
25	Sanima Vikash Bank Ltd.	2006/07 to 2007/08	12
	C. Finance Companies		
26	Ace Finance Co. Ltd	1997/98 to 2007/08	121
27	Alpic Everest Finance Co. Ltd.	2001/02 to 2007/08	81
28	Annapurna Finance Co. Ltd.	1997/98 to 2007/08	131
29	Bhajuratna Fin. & Sav. Co. Ltd.	2006/07 to 2007/08	20
30	Butwal Finance Ltd.	2004/05 to 2007/08	54
31	Birgunj Finance Ltd.	2005/06 to 2007/08	39
32	Central Finance Co. Ltd.	2003/04 to 2007/08	64
33	Citizen Investment Trust	1997/98 to 2007/08	132
34	Capital Mer. Bamk & Fin.	2005/06 to 2007/08	32
35	Cosmic Mer. Bank & Fin.	2004/05 to 2007/08	50
36	Everest Finance Ltd.	2005/06 to 2007/08	32
37	Fewa Finance Co. Ltd.	2004/05 to 2007/08	46
38	Goodwill Finance Co. Ltd.	1999/00 to 2007/08	114
39	General Finance Ltd.	1998/99 to 2007/08	121
40	Gorkha Finance Ltd.	1999/00 to 2007/08	111
41	Guheyshwori Mer. Bank. Fin.	2006/07 to 2007/08	24
42	HISEF Finance Company Ltd.	2000/01 to 2004/05	41
43	International Leasing & Fin. Co.	2002/03 to 2007/08	66
44	IME Financial Institution	2005/06 to 2007/08	21
45	Janaki Finance Ltd.	2003/04 to 2007/08	54
46	Kathmandu Finance Ltd.	1997/98 to 2007/08	132
47	KIST Merchant Bank. & Fin	2004/05 to 2007/08	42
48	Lalitpur Finance Ltd.	1998/99 to 2007/08	117
49	Lumbini Finance Ltd.	2001/02 to 2007/08	90
50	Maha Laxmi Finance Ltd.	1998/99 to 2007/08	119
51	Nepal Aawas Bikas Beeta Co. Ltd.	2002/03 to 2007/08	74
52	NIDC Capital Markets Ltd.	1997/98 to 2007/08	132
53	Nava Durga Finance Co. Ltd	2002/03 to 2007/08	59
54	National Finance Co. Ltd.	1997/98 to 2007/08	132
55	Narayani Finance Ltd.	1997/98 to 2007/08	132
56	Nepal Finance and Saving Co. Ltd.	1997/98 to 2007/08	132
57	Nepal Housing & Merchant Fin.	1997/98 to 2007/08	130
58	Nepal Shree Lanka Merchant Bank	2002/03 to 2007/08	62
59	Nepal Share Markets Ltd.	1997/98 to 2007/08	132

60	Om Finance Ltd.	2003/04 to 2007/08	52
61	Paschimanchal Finance Co. Ltd	1998/99 to 2007/08	110
62	Peoples Finance Ltd.	1997/98 to 2007/08	132
63	Premier Finance Co. Ltd	2002/03 to 2007/08	62
64	Prudential Bittiya Sans	2005/06 to 2007/08	28
65	Pokhara Finance Ltd.	1998/99 to 2007/08	107
66	Royal Mer. Bank. & Fin	2005/06 to 2007/08	25
67	Samjhana Finance Co. Ltd.	1997/98 to 2007/08	132
68	Siddhartha Finance Ltd.	2000/01 to 2007/08	85
69	Shree Investment Finance Co. Ltd	2002/03 to 2007/08	65
70	Standard Finance Ltd.	2003/04 to 2007/08	52
71	Union Finance Co. Ltd.	2001/02 to 2007/08	71
72	United Finance Ltd 12.0	2002/03 to 2007/08	65
73	Universal Finance Ltd.	1997/98 to 2007/08	132
74	World Merchant Bank Ltd	2004/05 to 2007/08	41
75	Yeti Finance Company Ltd.	1997/98 to 2007/08	132
	D. Insurance		
76	Alliance Insurance Co. Ltd.	1999/00 to 2007/08	101
77	Everest Insurance Co. Ltd.	1997/98 to 2007/08	132
78	Himalayan Gen. Insu. Co. Ltd.	1997/98 to 2007/08	132
79	Life Insurance Co. Nepal	2002/03 to 2007/08	63
80	NB Insurance Co. Ltd.	2003/04 to 2007/08	52
81	Nepal Insurance Co. Ltd.	1997/98 to 2007/08	132
82	Neco Insurance Co.	1997/98 to 2007/08	123
83	Nepal Life Insurance Co. Ltd.	2002/03 to 2007/08	65
84	National Life Insu. Co. Ltd.	1997/98 to 2007/08	132
85	Premier Insurance co. Ltd.	1997/98 to 2007/08	131
86	Prudential Insurance Co.	2003/04 to 2007/08	52
87	Rastriya Beema Sansthan	1997/98 to 2007/08	132
88	Sagarmatha Insurance Co. Ltd	2002/01 to 2007/08	88
89	Shikhar Insurance Co. Ltd.	2006/07 to 2007/08	12
90	United Insurance Co. Ltd.	1997/98 to 2007/08	132
	E. Manufacturing & Processing		
91	Arun Vanaspati Udyog Ltd.	2002/03 to 2007/08	48
92	Birat Shoes Com. Ltd.	2004/05 to 2007/08	28
93	Bottlers Nepal Ltd. (Balaju)	1997/98 to 2007/08	132
94	Bottlers Nepal (Terai) Ltd.	1997/98 to 2007/08	132
95	Gorakhakali Rubber Udyog Ltd	1997/98 to 2007/08	120
96	Harisiddhi Brick and Tile Fac. Ltd.	1997/98 to 2007/08	132
97	Himalayan Distillery Ltd.	2002/03 to 2007/08	61
98	Jyoti Spinning Mills Ltd.	1997/98 to 2007/08	120
99	Nepal Bitumin and Barrel Udyog	2002/03 to 2006/07	48
100	Nepal Lube Oil Ltd.	1997/98 to 2007/08	132
101	Nepal Lever Ltd.	1997/98 to 2007/08	120
102	Shree Bhirkuti Paper (Nepal) Ltd	2001/02 to 2007/08	58
103	Uniliver Nepal Ltd.	2004/05 to 2007/08	41
	F. Trading		

104	Bishal Bazar Co. Ltd.	1997/98 to 2007/08	132
105	Nepal Welfare Company Ltd.	1997/98 to 2007/08	132
106	Salt Trading Corporation	1997/98 to 2007/08	132
	G. Hotels		
107	Oriental Hotel Ltd.	2002/03 to 2007/08	81
108	Soaltee Hotel Ltd.	1997/98 to 2007/08	132
109	Taragaon Regency Hotel	1998/99 to 2007/08	104
	H. Others		
110	Butwal Power Co. Ltd.	2003/04 to 2007/08	48
111	Chilime Hydro power Co.	2005/06 to 2007/08	26
112	National Hydro Power Co.	2005/06 to 2007/08	30
113	NCM Mutual Fund	2003/04 to 2007/08	49
114	Necon Air Ltd	1997/98 to 2007/08	96
115	Nepal Film Dev. Co. Ltd.	1997/98 to 2007/08	120

(Source : NEPSE Annual Reports)

Appendix 3 :

CAPM Test
Monthly Basis Analysis from 1998 to 2008

Month/year	Marekt Return R_m	Portfolio Return R_p	Portfolio Beta β_P	$t_{\text{-value of } \beta}$	$p_{\text{-value of } \beta}$
Aug-98	0.0144	0.3873	0.2105	−0.0794	0.9397
Sep-98	0.0019	0.0008	0.1477	0.5751	0.5901
Oct-98	0.0913	0.0349	0.2039	6.7848	0.0010
Nov-98	0.0162	0.0381	0.3022	−0.4605	0.6644
Dec-98	−0.0293	0.0658	0.2841	−0.5816	0.5862
Jan-99	−0.0175	0.0262	0.2177	−0.7483	0.4879
Feb-99	0.0094	0.0011	0.2653	0.5201	0.6251
Mar-99	0.0455	0.0555	0.2527	−0.4044	0.7026
Apr-99	0.0456	0.0592	0.0850	2.0784	0.0922
May-99	0.0782	0.0623	0.0612	−0.0828	0.9372
Jun-99	0.0213	0.0416	0.1416	−0.1832	0.8617
Jul-99	0.0501	0.0602	0.1585	−1.0229	0.3532
Aug-99	0.0507	0.1127	0.1421	0.0944	0.9283
Sep-99	0.0253	0.0261	0.3197	0.9684	0.3773
Oct-99	0.0373	0.02526	0.2204	0.2257	0.8303
Nov-99	−0.0010	0.0851	0.2981	0.40408	0.7028
Dec-99	0.0612	0.1641	0.1926	0.5104	0.6314
Jan-00	0.0571	0.0815	0.5293	0.6379	0.5515
Feb-00	0.1538	0.1119	0.7072	0.3470	0.7426

Mar-00	0.0077	0.0671	0.0671	0.1711	0.8707
Apr-00	0.0978	0.0069	0.4529	0.9985	0.3638
May-00	−0.0699	0.1069	0.4194	−0.7016	0.5141
Jun-00	0.0218	0.0157	0.3852	1.6403	0.1618
Jul-00	0.0522	0.1089	0.3661	0.0383	0.9709
Aug-00	0.1563	0.0397	0.3626	−0.2145	0.8386
Sep-00	0.0302	0.0887	0.3531	4.1324	0.0090
Oct-00	0.1968	0.0393	0.0964	0.8975	0.4105
Nov-00	−0.06408	0.0271	0.3234	−2.3520	0.0653
Dec-00	−0.1673	0.0043	0.2622	−4.3623	0.0072
Jan-01	0.1251	−0.0657	0.2105	−0.6337	0.5540
Feb-01	−0.1306	−0.0186	0.2545	−2.6873	0.0434
Mar-01	−0.0677	−0.0117	0.2756	0.8909	0.4137
Apr-01	−0.0364	−0.0437	0.2777	−0.33910	0.7483
May-01	−0.0630	0.0183	0.3048	−0.0155	0.9881
Jun-01	0.0457	−0.0263	0.3143	0.8658	0.4261
Jul-01	−0.0754	−0.0602	0.3281	−3.1387	0.0257
Aug-01	−0.1766	0.0052	0.2764	−3.2324	0.0231
Sep-01	0.0602	0.027	0.2537	1.0079	0.3597
Oct-01	0.0673	0.0009	0.1759	3.2077	0.0237
Nov-01	−0.0522	−0.0148	0.1840	−1.9099	0.1143
Dec-01	−0.1003	−0.0354	0.2687	−1.14050	0.3057
Jan-02	−0.0777	−0.0773	0.3290	−2.7629	0.0396
Feb-02	−0.1787	0.0265	0.3410	−2.5145	0.0535
Mar-02	0.1154	0.0142	0.3099	5.9150	0.0019
Apr-02	0.1058	−0.0055	0.3231	9.6061	0.0002
May-02	−0.0545	0.0250	0.3128	−2.2494	0.0743
Jun-02	0.0066	−0.0161	0.3460	−0.4240	0.6891
Jul-02	−0.0041	−0.0069	0.3482	−0.0049	0.9962
Aug-02	−0.0159	−0.0265	0.3394	−0.6235	0.5602
Sep-02	−0.0166	0.0146	0.3472	−0.0771	0.9415
Oct-02	0.0067	−0.0076	0.3521	3.6524	0.0147
Nov-02	−0.0279	−0.0432	0.3923	−3.7249	0.0136
Dec-02	−0.0641	0.0538	0.4334	−1.2244	0.2753
Jan-03	0.0623	−0.0039	0.4749	2.5393	0.0519
Feb-03	−0.0171	0.0007	0.4459	−1.0658	0.3354
Mar-03	0.0210	0.0025	0.4958	0.8255	0.4466

Apr-03	−0.0309	0.0072	0.5498	−2.3183	0.0681
May-03	0.0009	−0.0223	0.6585	−0.2438	0.8170
Jun-03	−0.0134	0.0006	0.5832	−1.2419	0.2693
Jul-03	0.0149	0.0104	0.6848	1.0492	0.3421
Aug-03	0.0025	−0.0055	0.7059	−0.5282	0.6199
Sep-03	−0.0044	−0.0089	0.6018	−0.9591	0.3815
Oct-03	−0.0064	−0.0077	0.5870	0.0644	0.9511
Nov-03	−0.0206	0.0089	0.4911	−2.8835	0.0344
Dec-03	0	0.0178	0.4137	−0.7125	0.5079
Jan-04	0.0463	−0.0036	0.3189	2.3603	0.0647
Feb-04	−0.0166	−0.0091	0.3552	0.6157	0.5649
Mar-04	−0.0316	0.0063	0.3878	0.5898	0.5809
Apr-04	0.0155	0.0123	0.5320	4.0639	0.0096
May-04	0.0429	0.0141	0.4262	2.5769	0.0496
Jun-04	0.0418	0.0390	0.3468	0.2673	0.7998
Jul-04	0.0876	−0.0005	0.3920	2.9844	0.0306
Aug-04	−0.0291	−0.0033	0.3678	−1.6960	0.1506
Sep-04	−0.0135	0.0047	0.3626	−0.8628	0.4276
Oct-04	0.0162	0.0072	0.3480	1.0761	0.3310
Nov-04	0.0055	−0.0045	0.3545	0.6839	0.5243
Dec-04	0.0136	0.0178	0.4137	0.4805	0.6511
Jan-05	0.0737	0.0158	0.3529	0.2293	0.8276
Feb-05	0.0907	0.0181	0.3079	4.6803	0.0054
Mar-05	0.0449	0.0222	0.2541	4.7075	0.0053
Apr-05	−0.0267	0.0426	0.2487	1.6255	0.1649
May-05	−0.0267	0.0114	0.1653	−2.3634	0.0644
Jun-05	0.0319	0.0336	0.1166	−1.8686	0.1206
Jul-05	0.0466	0.0144	0.1332	1.4731	0.2006
Aug-05	−0.0223	−0.0022	0.1022	−0.0232	0.9823
Sep-05	0.0136	0.0290	0.2167	5.4753	0.0027
Oct-05	0.0169	0.0174	0.0677	−0.2686	0.7989
Nov-05	0.0024	0.0398	0.0637	0.2035	0.8467
Dec-05	0.0078	0.0436	0.0910	−2.0903	0.0908
Jan-06	0.0402	0.0067	−0.0079	4.9576	0.0042
Feb-06	0.0692	0.0489	−0.0394	−0.2622	0.8035
Mar-06	−0.0147	0.0043	0.0390	−1.1337	0.3083
Apr-06	0.1527	0.0322	0.0922	2.2798	0.0715

May-06	−0.0359	−0.0020	0.1261	−1.5096	0.1915
Jun-06	−0.2294	0.0195	0.1424	1.1890	0.2877
Jul-06	0.3634	0.0058	0.0438	−1.8863	0.1179
Aug-06	−0.0212	0.0040	−6.6540	−1.5273	0.1872
Sep-06	0.0415	0.0176	−0.0009	0.8309	0.4438
Oct-06	0.1229	0.0476	−0.0003	1.7153	0.1469
Nov-06	0.1366	0.0683	0.0083	1.5914	0.1723
Dec-06	0.0560	0.0992	0.0295	−0.4782	0.6526
Jan-07	−0.0244	0.0338	0.0849	−1.0143	0.3569
Feb-07	−0.0570	0.0182	0.0868	−1.9200	0.1129
Mar-07	0.0010	−0.0052	0.0114	0.9686	0.3771
Apr-07	0.0381	0.0317	−0.0058	−0.4378	0.6797
May-07	0.1199	0.0835	−0.0048	3.3208	0.0209
Jun-07	0.1893	0.0765	−0.0020	3.7072	0.0138
Jul-07	0.0321	0.0450	−0.0385	−1.5297	0.1866
Aug-07	0.1574	0.0532	0.1174	3.1095	0.0265
Sep-07	0.0542	0.0614	0.0266	3.1649	0.0245
Oct-07	0.0627	0.0548	−0.0111	2.0785	0.0922
Nov-07	0.1207	0.1568	0.0016	2.8976	0.0338
Dec-07	−0.0653	0.5467	0.0647	−1.8678	0.1207
Jan-08	−0.1506	0.0191	−0.2797	−1.7377	0.1427
Feb-08	−0.1223	0.0416	−0.1231	−1.5038	0.1929
Mar-08	0.0446	0.0748	−0.0543	−0.8236	0.4474
Apr-08	0.0797	0.1189	−0.0779	−3.7872	0.0127
May-08	0.1207	0.2117	−0.0691	−1.2545	0.2651
Jun-08	0.0660	0.0687	−0.0012	−0.6225	0.5608

(Source: My Original Research File in 2009)