© 2013,
Science-Line Publication
www.science-line.com

ISSN: 2322-4770
Journal of Educational and Management Studies
J. Educ. Manage. Stud., 3(3): 246-250, 2013

JEMS

An Investigation into the Adjusted Dynamic Capital Asset Pricing Model (D-CAPM) in Different Time Series Using Wavelet; a Case Study: TSE

Esmat Boromand, Hamidreza Vakilifard and Ghodratollah Talebnia
Islamic Azad University, Bandar Abbas Branch, Bandar Abbas, Iran

* Corresponding author's Email: boroomand2160@yahoo.com

ORIGINAL ARTICLE

ABSTRACT: This study aimed to access the Downside Capital Asset Pricing Model at different time scales with use of wavelet analysis. Transform was performed at Tehran stock exchange a surrey of all the companies on the stock exchange in the period 2006-2009 comprised. Research sample was comprised of 48 companies forum three industries pharmaceutical, food and automotive cluster sampling method was selected. Data for study during research required by the calculation of wavelet in MATLAB programming adjusted the Capital Asset Pricing Model was evaluated. The result showed most anticipated Downside Capital Asset Pricing Model (DCAPM) at 16-32 day intervals.
Keywords: Downside Capital Asset Pricing Model (DCAPM), Time Scales, Wavelet Analysis, Systematic Risk

INTRODUCTION

Investment is one of the essential and principle elements of a country's economic growth. The investor's attention to investment risk and return on investment (ROI) is among the factors affecting the process of investment selection. Investors try to invest their financial resources where they receive the maximum possible return and encounter the minimum possible risk (Shahveise, 2010).

Investing in stocks has a significant relationship with determining the expected value i.e. predicted return. Pricing of capital assets is among important topics, which is practiced using pricing models. CAPM has been introduced as the first non-conditional model standardized by Sharp followed by developing different pricing models including conditional models like DCAPM (Hafeznia, 1998).

In general, the net asset value computed by D-CAPM in higher than that of computed by CAPM and lower than that of computed by risk double calculation models. Thus, D-CAPM not only explicates returns in the developed countries but also it should do so in the new emerged markets (Raie et al., 2004).

The only difference between D-CAPM and CAPM is the use of semi variance and negative beta. On this ground, net asset value formula in D-CAPM is derived as:

$$C_E = R_F + \beta^D \times (R_M - R_F) + R_U$$

Where β^D is the negative beta [Davisis and Yankaskas, 2004].

In D-CAPM, the mean of the semi variance of investor's security returns determines its profitability. The risk of single asset, i, is measured by the negative standard deviation (S_i semi deviation) of returns asset and is calculated using the following formula:

$$S_i = \sqrt{E\{Min[(R_i - \mu_i), O]^2\}}$$

Where μ_i is the mean return of the asset i which could be substituted with any base return.

Thus, covariance (two-way semi variance) of the asset i to the stock of securities in market, is derived as follows:

$$\delta_{i,m} = E\{Min[(R_i - \mu_i), O] \times Min[(R_m - \mu_m), O]\}$$

Thus, the negative beta of the asset i, is equivalent to CAPM beta and equals to the ratio of two-way semi variance to the semi variance of returns market or:

$$\beta_i^D = \frac{\delta_{im}}{\delta_m^2} = \frac{E\{Min[(R_i - \mu_i), O] \times Min[(R_m - \mu_m), O]\}}{E\{Min[(R_m - \mu_m), O]^2\}}$$

Relying on decades of research on harmonic analysis, wavelet analysis is one of the relatively new and interesting mathematics outcomes, which is widely used in most of engineering sciences nowadays and it has been equipped with new facilities for better understanding of its mathematical aspects as well as widening its applications.

In 2005, in a study with the title of *the initial structure of securities markets* Cohen, Hawawini, Mayer, Schwarts and Whitcomb concluded that beta estimations are sensitive to return intervals. In 2005, in a research with the title of *the wavelet analysis of African stock market*, Gallegati 92005) concluded that the variance and correlation of stock return in African stock market vary in terms of scale.

In 2007, in a study with the title of *the relationship between stock price change and bound*

To cite this paper: Boromand E. Vakilifard H. and Talebnia GH. 2013. An Investigation into the Adjusted Dynamic Capital Asset Pricing Model (D-CAPM) in Different Time Series Using Wavelet; a Case Study: TSE. *J. Educ. Manage. Stud.,* 3(3): 246-250.

returns in G7 countries based on wavelet analysis, Kim found that the return of bound and stock varies with scale change which proves from country to country.

In a study Shadi Shahveriani and Feridoon Rahnemai Roudposhti investigated and explicated DCAPM as the supplementary of CAPM in computing the return rate of the stock of the companies listed in TSE and concluded that the difference between the systematic risk computed by the adjusted beta and that of computed by traditional beta is significant. Also, DCAPM model estimates the expected return rate more accurately and describes the relationship between risk and return in asymmetric markets better than CAPM model.

MATERIALS AND METHODS

This is a descriptive ex post facto research. Regarding objective it is an applied research. Its statistical population comprised of all the companies listed in TES. Among the companies listed in TSE, 48 companies out of 3 industrial classes, i.e. pharmaceutical, food and car industries, form the study sample.

The time scope of this research is a 5-year period from 2006 to 2010. The employed data, including stock return and market index during the calculation period of systematic risk index, was collected for a 5-year fiscal period from computer databases processed by Excel and other soft wares as well as weekly, monthly and annual publications of TSE. To analyze the collected data, at first Jarque-Bera normality test was applied to check whether the initial time series are normal. To test study hypotheses, descriptive statistics statics including mean, average, standard deviation, coefficient of kurtosis and coefficient of skewness as well as inferential statistics tests like correlation coefficient, determination coefficient, adjusted determination coefficient and regression analysis were used. Statistical tables, graphs, data analysis and statistical tests were done in Excel and MATLAN

RESULTS

To investigate Dynamic Capital Asset pricing Model (DCAPM) of single stock in different time series using wavelet tool, the studied companies' beta value was computed in different time scales by DCAPM model separately for every year. Then, the return of time series as well as beta value of the studied companies was evaluated. The results are as follows:

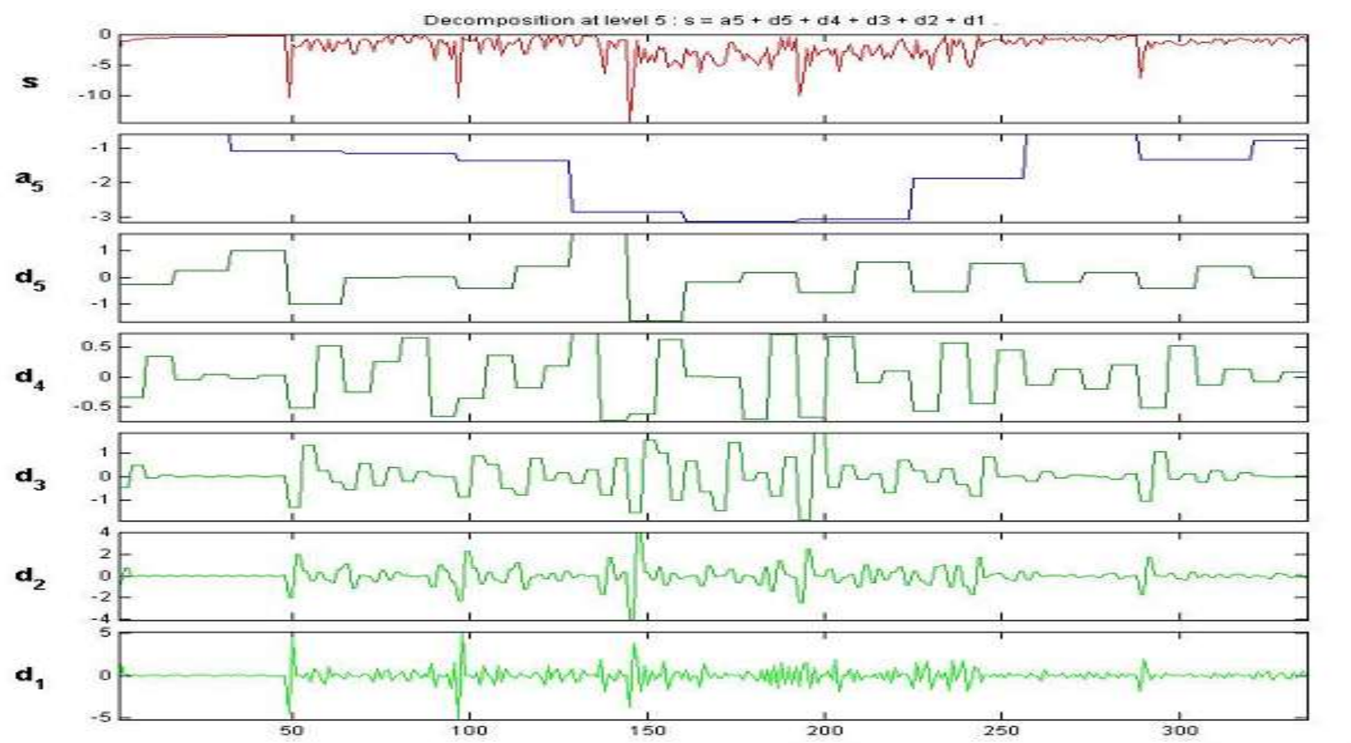

Figure 1. The trend of systematic risk and single stock return of the studied companies

Figure1 shows the oscillation of systematic risk in different periods and stock return. Curve S shows systematic risk trend in six time scales and mean of stock return and curve a_5 shows its long-term trend. This figure shows the impact of oscillation in different time series using 8th-order Daubechies Wavelet, a multiple analysis wavelet derived from the six time periods of systematic risk and single stock return. Then, one factor variance analysis derived from the wavelet was calculated.

Table 1. One factor variance analysis of the studied companies' systematic risk time series and single stock return

Computed F	DF	Sig.	SS	Durbin-Watson
3.33	47	0.001	47.199	**1.809**

The investigation of the above table shows that in the studied companies the relationship between systematic risk and single stock return in different time scales is significant at the confidence level of 99% (p=0.001). In other words, different time series are significant in predicting the companies' single stock return.

Thus, H1 hypothesis is confirmed.

Table 2. Linear regression between the systematic risk time series and single stock return of the studied companies

Time Period	Tolerance	Mean	SD	Coefficient of Prediction	Sig.
2-4	0.181	-0.3714	1.0021	0.238	**0.001**
4-8	0.110	-0.4542	0.5228	0.022	**0.001**
8-16	0.136	-1.3196	1.6392	0.284	**0.001**
16-32	0.360	-3.5676	1.7949	-0.118	**0.001**
32-64	0.340	-2.8483	2.2090	0.448	**0.001**
64-128	0.198	-0.8476	1.8214	0.321	**0.001**

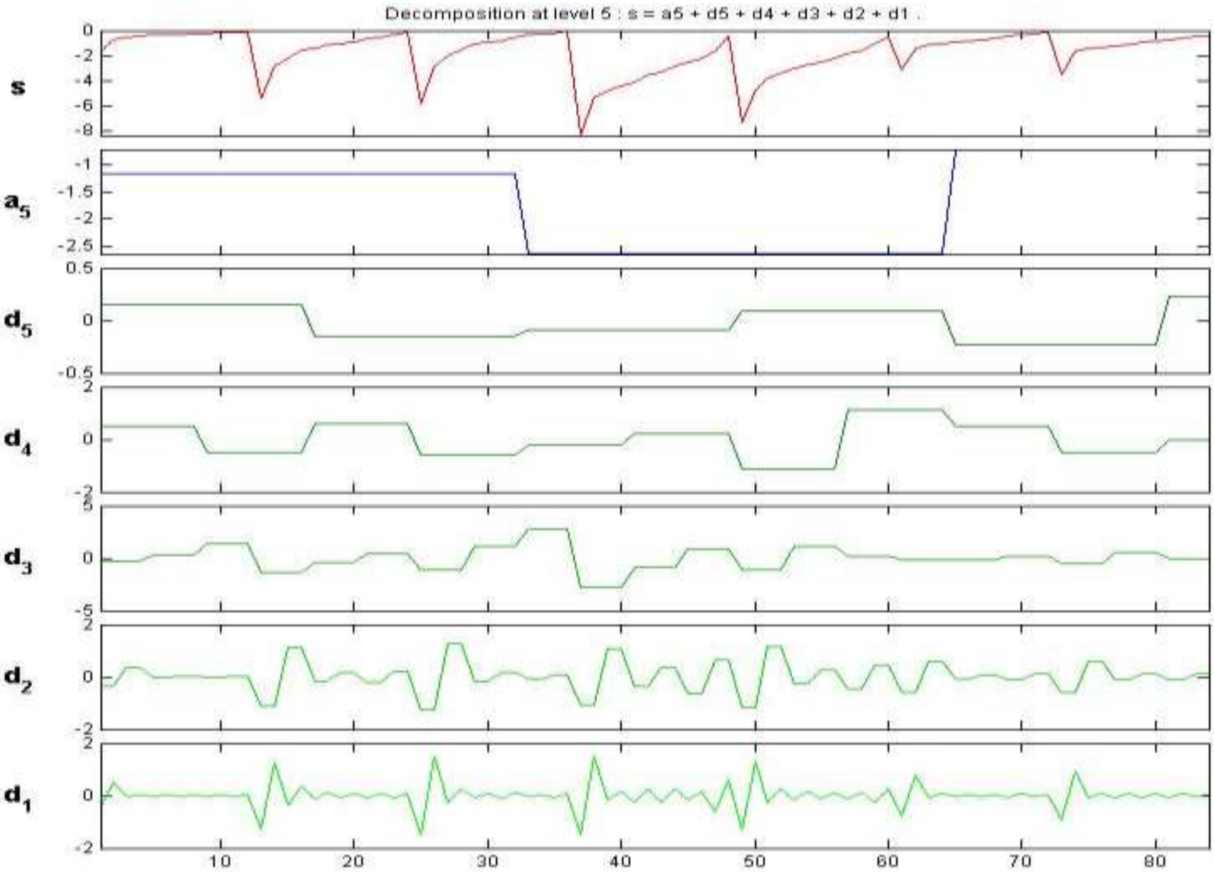

Figure 2. The trend of systematic risk and stock portfolio return of the studied companies

Figure 2 shows the oscillation of the systematic risk of stock portfolio in different time periods as well as stock portfolio return. Curve S shows the trend of systematic risk and the average stock portfolio return in six time scales. Curve a_5 shows its long-term trend. Fig. 4-2 shows the impact of oscillation in different time series using 8th-order Daubechies Wavelet, a multiple analysis wavelet derived from the six time periods of systematic risk and stock portfolio return. Then, one factor variance analysis derived from the wavelet was calculated.

Table 2. One factor variance analysis of systematic risk and stock portfolio return time series in the studied companies

Computed F	DF	Sig.	SS	Durbin-Watson
1074.315	11	0.001	7.615	**2.46**

The investigation of the above table shows that in the studied companies the relationship between systematic risk and stock portfolio return in different time scales is significant at the confidence level of 99% (p=0.001). In other words, different time series are significant in predicting the companies' stock portfolio return. Thus, H1 hypothesis is confirmed.

Table 2. Linear regression between the time series of systematic risk and stock portfolio return in the studied companies

Time Period	Tolerance	Mean	SD	Coefficient of Prediction	Sig.
2-4	0.01	-0.3708	0.4076	-0.202	0.665
4-8	0.02	-1.4542	1.4467	0.186	0.527
8-16	0.02	-1.3192	1.6293	0.149	0.619
16-32	0.05	-3.5673	2.0155	0.517	0.038
32-64	0.01	-2.8488	1.8068	-0.018	0.074
64-128	0.01	-0.8473	0.7904	0.370	0.027

The values of above table show that among the predicted stock portfolio return of the studied companies the maximum prediction belongs to 64-128 time period with a coefficient of 1.370. Next ranks belong to 32-64 (coefficient=1.018) and 16-32 (coefficient=0.517) periods, respectively while 8-16 time period has the minimum coefficient of prediction with a coefficient of 0.149.

DISCUSSION

This study was carried out aiming at explicating the relationship between risk and return in different time series during 2006 to 2010 in TSE using wavelet tool based on adjusted D-CAPM model. The obtained results revealed that wavelet analysis could explicate the relationship between single stocks' systematic risk and expected return. In other words, the results implied that wavelet is an appropriate tool for evaluating the adjusted DCAPM model in the different time series of single stocks' risk and expected return. The results agree with those of obtained by BenAmmou et al. (2007), Kim (2007), Gencay et al. and Shahveisi (2010). Ben Ammou et al. (2007) stated that the relationship between stock return and systematic risk is tighter in long-term and short-term scales. On the other side, the results of this study indicated that long-term periods could be considered as a proper scale for explicating the relationship between stock risk and return. Since long-term time periods cover a wider range of changes, they would be more powerful in predicting change trends. On this ground and according to the results, it appears that long-term time scales are appropriate trend for explicating risk and return relationship.

The results showed, however, that there is a positive and significant relationship between systematic risk and stock portfolio return. The results actually indicated that wavelet analysis could explicate appropriate and reliable changes of the relationship between risk and stock portfolio return. The results are in concordance with the results of Kim (2007) and Shahveisi (2010). On this ground and according to the study results, it seems that, as it was mentioned before, long-term time scales would be more powerful in explicating risk and return relationship as they cover a wider range of changes.

REFERENCES

BenAmmou, S. & BenMabrouk, A. (2007). Estimation of Capital Asset Pricing Model at Different Time Scales: Application to French Stock Market". The International Journal of Applied Economics and Finance.

Gallegati, M. (2005). A Wavelet Analysis of MENA Stock Market.Finance0512027,Econwpa,2005a,Http://Ideas.repec.Org/p/Wpa/Wuwpfi/0512027.Html

Gencay, R., Selcak, F., & Whitcher, B. (2002). "An Introduction to wavelets and other filtering method in finance and economics. Academic press, San Diego.

Hafeznia, M.R. (1998). Introduction on Research Method in Human Science, Tehran, Samt publication.

Markowitz, H. (1952). “Portfolio selection”. Journal of Finance, 77–91.

Kim, S. (2007). On the Relationship between Changes in Stock Prices and Bond Yields in the G7 Countries: Wavelet Analysis”. Journal of International Financial Markets, Institutions and Money, 67-179.

Raie, R & Tolangi, A. (2004). Advanced Investment Management. Tehran: the books studying humanities universities (Samt).

Shahveisi, F. (2010). Application of wavelet analysis in the assessment of systemic risk based capital asset pricing model. Quarterly Industrial Management. 6, 1.