



**SYSTEMATIC PRICING DURING THE STOCK CRASH ON
THAILAND'S BLACK TUESDAY: ASSESSING MARKET
EFFICIENCY**

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(INTERNATIONAL PROGRAM)
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An Independent Study
Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Science (Finance)

Master of Science Program in Finance
(International Program)
Faculty of Commerce and Accountancy
Thammasat University, Bangkok, Thailand
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By

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Systematic Pricing During the Stock Crash on Thailand's Black Tuesday: Assessing Market Efficiency

ABSTRACT

The reaction of SET50 stocks to the Thai stock market crash on "Black Tuesday" is examined. Percentage decline in stock prices on Black Tuesday are significantly correlated to stocks' historically estimated betas. High beta stocks experienced a fall in prices more than those with lower one, and the negative return ranking are orderly. However, SET50 stock prices reaction fail to reflect market efficiency. The stock prices had deviated from their fair prices at least two weeks after the crash and this would create some investment strategies.

I. INTRODUCTION

Thai stock market crash on “Black Tuesday”, December 19, 2006 is an opportunity to test the validity of pricing behavior according to the Efficient Market Hypothesis (EMH). EMH assumes that market prices reflect all available information and expectation, and that any new information is properly incorporated into prices without any delay. However, unexpected events can put more stress on the financial market, and market participants may lose their abilities to assess rationally to the valuation implications of event.

The Bank of Thailand decided to impose an unremunerated reserve requirement on short-term capital inflows on December 18, 2006. Financial institutions were required to withhold 30% of foreign currencies bought or exchanged against the Thai Baht, except those related to trade in goods and services, or repatriation of investment by Thai nationals abroad. Foreign direct investment (FDI) or unrequited transfers were also exempted with legitimate proof. The Reserve Requirement Measure had immediate effects on the financial market. Consequently, on December 19, 2006, Thai Stocks Index (SET Index) experienced a historic fall. The Stock Exchange of Thailand (SET) had to launch the Circuit Breaker to temporarily stop stock trading after SET index had fallen more than 10% in value by tremendous selling orders from panicked investors.

This paper examines three questions. First is whether the fall in stock prices during the crash period was related to systematic risk of each security according to market model or not. And second is to see if the evidence is a proof of market inefficiency which meaning that the stock prices deviated from what it should have been according to the market model. Regarding to second question, the last question is whether we can construct a portfolio that may create abnormal profits by categorizing stocks into groups using their common factors such as betas, percentage of foreign ownership and industry sectors.

The result found that percentage decline in stock prices on Black Tuesday are significantly correlated to stocks' historically estimated betas. As high beta stock experienced fallen in prices more than lower one, and the negative return ranking are orderly. However, SET50 stock prices reaction fail to reflect market efficiency. The arbitrage opportunities exist for at least two weeks trading days after

the crash. Investors who use quantitative method as their investment strategies should short-sell stock in first quintile which exhibiting low betas characteristics.

II. LITERATURE REVIEW

There are many studies about stocks pricing behavior during the time of market crash. Normally, researchers group papers into three categories according to sources of crash internationally which are from economics, political and catastrophic factors.

My study's emphasis on an unexpected economics event impact to Thai stock market was influenced by several literature. The results of most literature suggest that systematic risk had a significant impact on the stock's movement. The differences are the directions of prices reaction to the event. In some stock markets, the percentage decline in stock prices are less than stocks implied historical betas same as vice versa.

Systematic risk had a significant influence on the U.K. stock's movement, especially in October 1987 in which a major price adjustment occurred (Linmack and Ward, 1990). The influences were strengthened when the test were conducted on portfolio data. This study also conducted based on a numbers of competing models, including the market model and factor based models. Also, the 30 DJIA stocks reacted to two extreme single-day declines in stock prices due to Asian crisis on September 1, 1998 and on September 11, 2001 (Feinberg and Tokic, 2002). The stocks' systematic betas are significantly explanatory of percentage decline in stock prices. The stock with higher betas decreased relatively more in a single day than stocks with lower betas. Similarly, stocks with higher betas were found to increase relatively more in a single-rise in the stock market than stocks with lower betas.

While the reaction of S&P 500 stocks to the market crash on Black Monday, October 19, 1987 appears to be something between efficiency and irrationality (Harris and Spivey, 1990). Because of delays caused by the enormous trading volumes over that period, well-informed and rational investors may have been unable to take advantage quickly of all opportunities that resulted from panic selling by some investors. Nevertheless, an investor who had acted on the assumption that prices would ultimately reflect the fundamental economic characteristics of the stocks, such as beta, would have obtained an

abnormal profit. This study also extended to the implication of regulatory policy. Normally, as stock trading suspension will launch after stock index value falls more than 10%. It suggested that rule governing suspension should be triggered once the volumes of transactions exceed some pre-determined limit. This limit would be reflect the judgment of the exchange as to the maximum volume of trading that could be processed without the delays that created many of the problems on Black Monday. As it is likely to happen after some unexpected negative event released, investors tend to place large selling orders due to their panic. These panic-selling orders lead to heavily fall in stock prices. This limit would be reflected the judgment of the exchange as to the maximum.

Nevertheless, no literature has been conducted by using evidence from Thai Stock Market Crash. However, it had some literature on Turkish Stock Market Crash (Aktas and Oncu, 2006) which the fundamental of the market is similar to Thai as both markets are categorized as emerging markets. On March 1, 2003 Turkish parliament rejected the highly controversial bill that allows the deployment of U.S. Troop in Turkey. In response to unfavorable political events, stock prices are expected to behave differently in the efficient market since new information will have different impact to individual firms. The study of Aktas and Oncu supports the assumption of EMH that betas are significant explanatory variable of stock returns during the day of the crash. However, there is no clear evidence of under-priced or over-priced of stock returns. For the study of Thai stock market, I found only some research papers written by security analysts of foreign brokerage firm on this topic. For example, Citi Securities (Thailand) advised their foreign institutions to buy banks and properties which expected price would bounce back largely according to their high betas characteristics. As well as high yield stocks, in particular property funds which were directly affected by capital control curb.

III. METHODOLOGY

1. To test the hypothesis that the percentage declines in individual stocks on Black Tuesday are unrelated to their historically estimated beta. Daily returns for all stock listed in the SET50 were collected from Bloomberg since market for these stocks tend to exhibit the greatest breadth and depth. Individual betas were estimated by regressing daily returns on the individual stocks (R_{it}) against the

daily returns on the SET index (R_{mt}) over the period of December 12, 2001 through December 15, 2006 for 5-year historical betas and period December 15, 2004 to December 15, 2006 for 2-year historical betas. Equation (1) shows the regression of daily returns on the individual stock (R_{it}) against the daily returns on the SET index (R_{mt}) in order to get estimated stocks' estimated historical beta.

$$R_{it} = \alpha_i + \beta_i R_{mt} + \mu_{it} \quad (1)$$

Where

R_{it} = Daily Return to Stock i calculated over period t

R_{mt} = Daily Returns to the market index calculated over period t

α_i = The intercept

β_i = Systematic risk of stock i

μ_{it} = A zero mean random disturbance term

The percentage changes in the individual stock prices on Black Tuesday ($R_{i,BM}$) were then regressed on these previously estimated betas to test for a linear relationship between systematic risk and magnitude of the stocks response to the crash, that is

$$R_{i,BM} = \delta_0 + \delta_1 \beta_i + \mu_i \quad (2)$$

The procedure summarized in equation 1) and 2) was then repeated with two other estimates of each security's beta. Two other estimated betas were obtained with the use of subsets of the sample time period (January 1, 2002 to December 15, 2006 and January 1, 2005 to December 15, 2006 and January 1 to December 15, 2006). The repeated procedure was designed to check the sensitivity of the results to different estimates of individual stock beta.

If F statistics result from OLS estimates of equation (2) is highly significant, it will imply that the estimated systematic risk of the security is a significant explanatory variable for the magnitude of the securities price drop on the day of crash regardless of which time period used to estimate the beta. Accordingly, if the estimation of the slope coefficient (δ_1) turns significantly negative, it will suggest

rejection of the hypothesis that individual stock returns on Black Tuesday failed to reflect fundamental economic characteristics as measured by historical betas.

Although the F statistics for the regression are highly significant, the percent of variation in stock returns on Black Tuesday explained by variation in systematic risk is not high. It may be because of estimated errors for individual stock betas are relatively large, and individual betas do change over time. This estimation error can be reduced substantially by estimation of average portfolio betas. Accordingly, the stocks will be ranked according to their 2002-2006 beta estimates and will be divided into quintiles.

2. From 1, it is possible that prices of some portfolios fell too much, while prices of some portfolios fell too little. If so, then stock prices would have to readjust eventually in a predictable pattern, which violate market efficiency. Investors would have had an opportunity to earn abnormal returns. Hence, the hypothesis that a profitable arbitrage opportunity arose as a result of the crash may be tested.

To examine whether expected changes in value of stocks are less or more than true economic value, daily residual returns for each stock on the first day of event were estimated ($DR_{i,BM}$) by following formula.

$$DR_{i,BM} = R_{i,BM} - (\beta_{0,i} + \beta_{1,i} I_{B,M}) \quad (3)$$

Where

$DR_{i,BM}$ = daily residual returns for each stock on the first day of event

$R_{i,BM}$ = The stock's actual price change on Black Tuesday

$I_{B,M}$ = The market index's return on Black Tuesday

The stock will be ranked according to the magnitude of the average residual return and grouped into quintiles. Accordingly, stocks in the first quintile are those for which the price on Black Tuesday fell by much more than the amount implied by their betas. Stocks in the fifth quintile are those the price fell by much less than that implied by their betas. The average residual for each stock was then computed for each of the remaining days of the week. (December 20 – 22)

$$DR_{i,T} = R_{i,T} - (\beta_{0,i} + \beta_{1,i} I_T) \quad (4)$$

Where R_{it} is the actual return for the i^{th} stock on day T ($T = 20 - 22$), and I , is the average return for all the stocks on day T.

I hope the result will demonstrate the correction is complete, by Thursday the average daily residuals for all five portfolios are expected to converge to zero. The Deviation Observed on Black Tuesday ($R_{i,BM}$) will be regressed onto the Deviation observed the subsequent days of the week (December 20 -22) to see the percent variation in excess return on day t that is explained by variation in the residual return for the securities on Black Tuesday by this formula.

$$R_{i,BM} = \beta_{0,t} + \beta_{1,t} DR_{i,t} + u_i \quad (5)$$

The delay in making this correction would have permitted a risk-free arbitrage profit. A knowledgeable investor knows that the price changes have been linearly related historically to the stock's betas. They could have bought firm that price fell too much relative to their betas or they would have sold or short firm that price fell less much relative to their betas. This strategy requires no net investment and hedged against general movements in the market. If the market moved up or down, the gain or loss in the long position would have been offset by the loss or gain in the short position.

IV. DATA

This paper uses SET daily return and SET50 stock daily returns over the period of January 1, 2002 through December 15, 2006. SET50 stock constituents are a proxy of Thai stock market since it is likely that market for these stocks tend to exhibit the greatest breadth and depth. All data can be downloaded from Bloomberg.

V. EMPIRICAL RESULT

1. To test the hypothesis that the percentage declines in individual stocks on Black Tuesday are unrelated to their historically estimated beta. Daily returns for all stock listed in the SET50 were collected from Bloomberg. Individual betas were estimated by regressing daily returns on the individual stocks (R_{it}) against the daily returns on the SET index (R_{mt}) over the period of December 12, 2001

through December 15, 2006 for 5-year historical betas and period December 15, 2004 to December 15, 2006 for 2-year historical betas according to equation (1). Table I shows SET50 Stocks 5-year and 2-year historical betas estimated by equation (1).

[Table I is here]

The percentage changes in the individual stock prices on Black Tuesday ($R_{i, BM}$) were then regressed on these previously estimated betas to test for a linear relationship between systematic risk and magnitude of the stocks response to the crash according to equation (2). In order to check for the sensitivity of the results to different historical beta estimates, repeated procedure of equation (1) and (2) required for 2-year and 5-year historical estimated beta (obtained by stock prices data for the time period of 2004-2006 and 2001-2006 respectively). Table II reports the results of ordinary least squares estimates of equation (2).

[Table II is here]

As shown in table II, the highly significant F statistic for both estimated historical betas used suggest rejection null hypothesis. The fundamental characteristic of stocks as measured by their betas are significant explanatory variables to the magnitude of securities price drops on Black Tuesday, regardless of time period used to estimate betas. The estimates of the slope coefficient δ_1 which vary from -0.082 to -0.114 are both negative. This evidence also assures the rejection of null hypothesis.

Accordingly, the stocks are ranked according to their 5 year historical beta estimates. This time period betas can explain the characteristic of the stocks reaction to foreign capital inflow better. Since Thai stock market started rallies in the year 2002 and enjoyed massive foreign fund inflow after Thai economy fully recover from Asian Financial Crisis in 1997 and Thai banks balance sheets were cleaned up. Data estimated that approximately 500 billion Baht of foreign capital invested in Thai stocks market during the year 2002-2006 before government impose an unremunerated reserve requirement on short-term capital inflows on December 18, 2006. Table 3 shows the average Return on Black Tuesday for Five Portfolios Formed on the Basis of Estimated Historical Betas Ranking (from Lowest to Highest).

[Table III is here]

Referring to table III, the quintiles were ranked based on lowest to highest 5 year historical estimated betas to reflect the magnitudes of stock price changes on Black Tuesday. Obviously, that the magnitude changes in stock prices are correlated with each quintile's beta. Portfolio with lowest betas has smallest price drop while portfolios with highest betas has highest price drop. However, the fifth quintile average betas are more than five times the first quintile average betas, but the magnitude of average return drop is only three times. It implies that stock's beta could not explain price fully, still have other factors incorporated with stock return.

Table III shows that the magnitude of average stock price fell in each quintile are orderly. Hence, orderly pricing behavior is concrete evidence that stock prices were not driven by panic among investors. Furthermore, since SET50 are very liquid and traded among portfolio arbitragers who are quantitative driven, speculators and long-term portfolio managers. The depth and resiliency of participated investors are diversified.

Evidence of Thailand Stock Market Inefficiency

In efficient market, prices are rational in the sense that they reflect the true fundamental of each stock. Although, irrational investors are active in stock markets, they can manipulate price only with stocks which have small market caps, less market players and illiquid. However, SET50 stocks which were selected by their market cap and market turnover are not that easy to do the same since market players are broad based. Market players include local funds, foreign funds and hedge funds which have more instruments than retail investors which facilitate them to do stock arbitrage. For example, Securities Exchange Committee (SEC) allows foreign funds to short-sell stocks and allows institutional investors both local and foreign to do stock borrowing and lending transaction (SBL). Hence, when these arbitragers see opportunities that some stocks are over-valued or under-valued, they will step in to narrow the gap and eventually drive the stock price to its fair value.

While Table III does demonstrate the correlation between returns and betas, one can oppose that the average price drops between each quintile are less than the difference between each quintile beta. For example, the fifth quintile average betas are more than five times the first quintile average betas, but the

magnitude of average return drop is only three times. Is it possible that the price in first quintile fell too much while the fifth quintile fell too little. If true, then stock prices should not take time to readjust in predictable pattern to be consistent with efficient market hypothesis. Arbitrager would have had opportunities to earn abnormal return during time of price readjusting. Thailand Black Tuesday rose the test of market efficiency hypothesis that any arbitrage opportunities exist as a result of market crash.

To examine whether expected changes in value of stocks are less or more than true economic value, daily residual returns for each stock on the first day of event were estimated by equation (3).

To test this hypothesis, the expected change in the individual stock prices on Black Tuesday were estimated by multiplying stock's estimated five years beta with market return on Black Tuesday ($I_{B,M}$). Each stock expected price change was then subtracted by the actual price change on Black Tuesday. Daily residual returns for each stock on the day of the crash were estimated by above method. Then repeating this procedure with the subsequent day of the week, we will get the daily residual return of each subsequent day of the week.

The stock will be ranked according to the magnitude of the average residual return and grouped into quintiles. Accordingly, stocks in the first quintile are those for which the price on Black Tuesday fell by much more than the amount implied by their betas. Stocks in the fifth quintile are those the price fell by much less than that implied by their betas. The average residual for each stock was then computed for each of the remaining days of the week. (December 20 – 22). See table IV.

[Table IV is here]

Table IV reports the average estimated betas of each quintile along with each quintile average residual returns (ADR) for the day of the crash and the subsequent days in the whole week. As shown in Table IV, The t statistics for average residual returns (ADR) are significant which means that SET50 stocks had residual return during the day of the crash and subsequent days after. The first quintile which has lowest systematic risk also exhibits the lowest residuals on Black Tuesday (-6.01%), which is consistent with the failure of the stocks to reflect completely systematic risk on Black Tuesday. However, the failure of stock to reflect their systematic risks completely are continues in December 21 and 22 and the subsequent trading days following the week of the crash. Hence, Thai stock market

pricing behavior during the stock crash on Thailand Black Tuesday is not consistent with the Efficient Market Hypothesis. As shown in Table IV, the average residual returns on the quintile does not reveal a predictable correction patterns during the subsequent three trading days of the week. Furthermore, the average residual returns on December 21 and 22 show that the price of stocks in the first quintile continue to fell too much by -4.42% and -2.72% respectively. See Figure 1.

[Figure 1 is here]

To demonstrate Table IV clearer, Figure 1 graphs the average daily residual returns for each quintile portfolio during the week of the crash from December 19 through December 23. The average daily residual that surged unexpectedly on December 19 are narrowing during the subsequent days of the week. Table V shows the Average Residual Returns on Black Tuesday and Subsequent Days of the first two weeks after the crash for Portfolio formed on the Basis of the December 19th Residual Returns and ranked from the most negative to the most positive. Also, the t statistics for average residual returns (ADR) for the first two weeks after the crash are significant. And figure 2 shows the Daily Average Residual Return.

[Table V is here]

[Figure 2 is here]

However, the price gaps are not converge to zero during the first and the second week of the crash (as shown in Table V and Figure 2 data below). Still, we can see the significant average daily residual return. More importantly, figure 1 demonstrates that portfolio in each quintile has their own average daily residual patterns during the first week of the crash, and they tend to keep their own pattern for the path of subsequent trading day.

Testing the statistical significance of the individual stock's subsequent day average daily residuals to the average daily residual of the day of the crash. The individual daily stock residuals (DR_i) observed from Wednesday, December 20 were then regressed with the individual stock residual on the Black

Tuesday. The procedure was repeated for the subsequent days of the week. The results of all three regressions are demonstrated in Table VI.

[Table VI is here]

Table VI reports the significant relationship between individual stock's subsequent day average daily residuals to the average daily residual of the day of the crash. The results support the hypothesis that the profitable arbitrage existed.

The delay in making a correction of SET50 stock prices would have permitted profitable arbitrage. Investors should short-sell stock in the first two quintile and long stocks in the fourth and fifth quintile after the day of the crash. From the concrete evidences above demonstrates that stocks with low beta (Betas below 0.9) tend to fall too much than they should be. While stocks with high beta (Betas greater than 0.9) tend to fall less than what it should be. SET50 stock pricing behavior failure to reflect the efficient market hypothesis that SET50 stock price could not readjust without any delays which allows profitable arbitrage opportunities exist for at least two week after the crash.

Portfolio managers should short-sell stocks in first quintile as the price fell more than the expected return derived by market models and long stock in the fifth quintile as they gave higher return on investment comparing to expected return.

This research extends to study other factors incorporated with this event that may impacted SET50 stocks return. First is percentage of foreign holding in each stock. This regulation subjects to foreign capital inflow into Thailand to invest in stock market, bond market, property funds and others, and requires financial institutions to withhold 30% of foreign currency and remitted it to the Bank of Thailand. Hence, regard to this regulation, foreign investors may not bring more foreign currencies to invest in Thai stock markets and go to other emerging markets instead since they can fully invest the whole capital and get the return on investments. Stocks with high percentage of foreign holding should be affected more as no new foreign investors are willing to invest in Thai stocks, while existing foreign shareholders were selling from worried about regulation uncertainties. Furthermore, foreign shareholders including foreign mega funds have to pull out from Thai stock because of imposing such regulations was violate their fund's investment criterias. All the factors above should impact stocks

with high percentage of foreign holding to fall more during the day of the crash. Table VII ranked SET50 stocks according to percentage of foreign holding.

[Table VII is here]

However, as shown in Table VII, stocks with high percentage of foreign holding fell less than higher one. Hence, percentage of foreign holding is not significantly explanatory factor for stock return on the day of the crash. Furthermore, this regulation was lifted immediately after the stock market closed, and the revised regulations exempt foreign capital inflows to invest in stock markets.

Second factor is stock's industry categorized impacted to the stock return during the day of the crash. As mentioned above that the regulation imposed was directly affected property funds, hence property sector should suffered loss more than others. In particular, property stocks that mainly raised funds based on selling assets to its property funds such as CPN and TICON. Table VIII shows the daily residual returns of stocks ranked by industry.

[Table VIII is here]

As shown in Table VIII, Media sectors had highest daily residual returns, follows by Telecom and property sectors. While the stocks that had lowest daily residual returns are stocks in Banks, Food and Electronic sectors. The reasons that stocks in Media and Telecom sectors fell more than what implied by market model could not explain on the day of the crash. As it was no regulations subjected to these two sectors specifically at that time. Nevertheless, seems market had anticipated about the revision of Foreign Business Act as later on January 10, 2007, government announced the revision of the Act which detailed about industries that allow foreigners to be major shareholder and have major controls in the board of directors. Media and Telecom sectors are in list two which is related to nation's security and prohibit foreigners to hold stock more than 50% and could not have voting right and board seats more than 50% too. This also counts the holding through nominees. Thus, telecom sectors especially ADVANC and SHIN suffered the most. However, as Media companies such as BEC and MCOT are belong to Thai owners, they should have no affected by this regulations. Hence, industrial sectors are not significantly explanatory factor for stock return during the day of the crash.

VI. Conclusion

Whether the Thai stock market is efficient during time of crash has fundamental implications for investment strategies. The empirical results demonstrate in this paper has lead to conclude that Thai Stock Market is inefficiency during time of market crash from unexpected event. As the Bank of Thailand (BOT) issued a regulation imposing capital reserve rules on inbound payments of foreign capital inflow is determined as market intervention. Thus, the stock prices are not freely adjusted to the correct direction during time of market intervention. Clearly, the closing price on Black Tuesday of SET50 stocks failed to reflect their fundamental characteristics which were explained by each stock estimated betas. The arbitrage opportunities exist for at least two trading weeks after the crash. Investors who use quantitative method as their investment strategies should short-sell stock in first quintile which exhibiting low betas characteristics.

As such, the results are quite contrast to the study of Harris and Spivey (1990) which they used the S&P500 stocks as proxies to study the reaction of New York Stock Exchange to the crash during Black Monday event. Black Monday referred to the day of worldwide stock crash the highest in percentage in stock market history. The event driven from slowdown in economy and was catalyzed from the event that U.S. warships shelled Persian Gulf. Harris and Spivey found that S&P500 stocks spent only two trading days after the crash to correction, and no profitable arbitrage exist after that. Average daily residuals (ADR) of stocks in the fourth and fifth subsequent trading days after the crash converge to zero. The price adjustment of S&P500 to unexpected event should be faster than the event happened in Thailand because the event was not caused by an imposed of any regulations to distort the market. The Black Monday Crash was entirely from panic from wars associated with soft landing economy.

Nevertheless, SET50 stocks return during the day of the crash could explain by their betas in terms of the absolute magnitude fell. This paper indicates that stock with higher betas fell more than stocks with lower beta, and the negative return ranking are orderly. However, in comparative term, the negative return of highest betas quintile are only three times comparing to the lowest betas quintile while their betas are greater than the lowest around five times.

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Table I

SET50 Stocks 5-year and 2-year historical betas obtained by equation (1).

$$R_{it} = \alpha_i + \beta_i R_{mt} + \mu_{it} \quad (1)$$

STOCK	$R_{i, BM}$	$Beta_{5-year}$	$Beta_{2-year}$	STOCK	$R_{i, BM}$	$Beta_{5-year}$	$Beta_{2-year}$
ADVANC	-0.23	1.08	1.20	MAKRO	0.00	0.41	0.47
AOT	-0.15	0.78	0.62	MCOT	-0.19	0.00	0.00
ATC	-0.22	1.52	1.55	MINT	-0.14	0.59	0.76
BANPU	-0.15	1.06	0.99	PS	-0.23	-0.06	-0.06
BAY	-0.19	1.12	0.92	PSL	-0.15	1.22	1.13
BBL	-0.18	1.24	1.19	PTT	-0.19	0.95	1.34
BEC	-0.20	0.70	0.67	PTTCH	-0.07	0.65	0.65
BGH	-0.09	0.39	0.54	PTTEP	-0.18	0.84	1.12
BH	-0.05	0.63	0.58	QH	-0.20	1.11	0.91
BIGC	-0.05	0.33	0.20	RATCH	-0.01	0.17	0.01
CCET	0.05	0.41	0.32	RRC	-0.18	0.73	0.73
CPALL	-0.03	0.47	0.61	SCB	-0.23	1.31	1.25
CPF	-0.13	0.62	0.53	SCC	-0.13	0.99	0.97
CPN	-0.16	0.52	0.51	SCCC	-0.17	0.81	0.93
DELTA	-0.06	0.74	0.81	SCIB	-0.21	0.98	1.10
EGCO	-0.13	0.62	0.52	TCAP	-0.23	1.19	0.96
GLOW	-0.07	0.47	0.47	THAI	-0.10	1.02	0.77
HANA	-0.07	0.83	0.81	TMB	0.01	1.19	1.26
IRPC	-0.19	1.68	1.38	TOP	-0.16	1.14	1.11
ITD	-0.34	1.64	1.93	TPC	-0.07	0.63	0.52
KBANK	-0.20	1.33	1.31	TSTH	-0.14	1.27	0.83
KSL	-0.09	0.85	0.85	TTA	-0.18	1.11	1.11
KTB	-0.24	1.28	1.31	TUF	-0.06	0.38	0.34
LH	-0.16	1.27	1.25	TRUE	-0.35	1.63	1.61

Source: Author's Calculations.

Table II

Regression of Individual Stock Return on Black Tuesday (19 December, 2006) on historical 5-year-
stock betas

$$R_{i,BM} = \delta_0 + \delta_1\beta_i + \mu_i \quad (2)$$

Parameters	<i>B_i</i> Estimate Using Daily Returns for the Following Years ^a	
	2004-2006	2001-2006
δ_0	-0.074 (-2.979) ^b	-0.045 (-1.911) ^b
δ_1	-0.082 (-3.143) ^b	-0.114 (-4.684) ^b
No. of Observations	47	47
F statistic	48.70	23.75
R²(%)	52.50	34.54
Adjusted R² (%)	51.46	33.09

Source: Author's Calculations.

^a $R_{i,BM}$ is the return on the *i* security on Black Tuesday: B_i is the estimated of security *i* systematic risk: δ_0 and δ_1 are the estimates of the intercept and slope, respectively, for regression of the daily security returns for Black Tuesday on the estimates of their systematic risk. The t and Prob. Demonstrate the significance of the linear relationship between the return on Black Tuesday and the historic estimate of systematic risk, which is significant despite various time periods used to estimate the systematic risk. Hence, information about the systematic risk of individual stocks was reflected in individual stock price movements on the day of the crash.

^b The t statistics for the hypothesis that the true parameter is zero are reported in parenthesis below each parameter estimated.

Table III

Average Return on Black Tuesday for Five Portfolios Formed on the Basis of Estimated Historical

Betas Ranking (from Lowest to Highest)

Quintile	Average Beta	Average Return Dec 19 (%)
1	0.28	-6.87%
2	0.61	-11.97%
3	0.88	-13.61%
4	1.15	-16.65%
5	1.44	-22.99%

Source: Author's Calculations.

Table IV

Average Residual Returns on Black Tuesday and Subsequent Days of the week for Portfolio formed on the Basis of the December 19th Residual Returns and ranked from the most negative to the most positive

$$DR_{i,T} = R_{i,T} - (\beta_{0,i} + \beta_{1,i} I_T) \quad (4)$$

Quintile	Beta	Average Residual Returns (%)			
		19 Dec	20-Dec	21-Dec	22-Dec
1	0.28	-7.31%	0.79%	-4.75%	-2.96%
		(-3.68)	(-0.56)	(-19.07)	(-12.10)
2	0.61	-4.03%	2.15%	-2.01%	-1.88%
		(-8.05)	(3.63)	(-7.50)	(-10.13)
3	0.88	-0.12%	-3.02%	0.01%	-0.29%
		(-0.24)	(-6.53)	(0.06)	(-2.01)
4	1.15	2.88%	-0.43%	1.53%	-0.02%
		(3.36)	(-0.91)	(2.26)	(2.47)
5	1.44	3.18%	0.01%	1.57%	1.62%
		(4.12)	(3.57)	(5.99)	(4.89)
Average	0.87	-1.08%	-0.10%	-0.73%	-0.71%
		(6.23)	(1.08)	(-9.81)	(-15.78)

Source: Author's Calculations.

Table V

Average Residual Returns on Black Tuesday and Subsequent Days of the first two weeks after the crash for Portfolio formed on the Basis of the December 19th Residual Returns and ranked from the most negative to the most positive

Average Residual Returns (%)										
Quintile	Beta	19-Dec	20-Dec	21-Dec	22-Dec	25-Dec	26-Dec	27-Dec	28-Dec	29-Dec
1	0.28	-7.31%	0.79%	-4.75%	-2.96%	-3.2%	-3.4%	-4.1%	-3.8%	-3.2%
		(-3.68)	(-0.56)	(-19.07)	(-12.10)	(-13.3)	(-15.3)	(-20.4)	(-13.06)	(-13.81)
2	0.61	-4.03%	2.15%	-2.01%	-1.88%	-0.7%	-1.9%	-2.0%	-2.6%	-2.7%
		(-8.05)	(3.63)	(-7.50)	(-10.13)	(-2.99)	(-10.59)	(-17.73)	(-18.79)	(-24.57)
3	0.88	-0.12%	-3.02%	0.01%	-0.29%	-0.4%	-0.1%	-0.9%	-1.0%	-0.2%
		(-0.24)	(-6.53)	(0.06)	(-2.01)	(-3.09)	(-0.95)	(-14.42)	(-6.47)	(-0.75)
4	1.15	2.88%	-0.43%	1.53%	-0.02%	1.1%	0.8%	1.2%	1.1%	1.1%
		(3.36)	(-0.91)	(2.26)	(2.47)	(7.67)	(7.01)	(8.16)	(11)	(10.21)
5	1.44	3.18%	0.01%	1.57%	1.62%	1.5%	2.0%	2.2%	1.9%	2.9%
		(4.12)	(3.57)	(5.99)	(4.89)	(19)	(6.43)	(17.78)	(12.12)	(10.53)
Average	0.87	-1.08%	-0.10%	-0.73%	-0.71%	-0.35%	-0.52%	-0.73%	-0.89%	-0.43%
		(6.23)	(1.08)	(-9.81)	(-15.78)	(-6.88)	(-10.84)	(-13.39)	(-16.18)	(-7.32)

Source: Author's Calculations.

Table VI

Regression of the Deviation Observed on Black Tuesday ($R_{i,BM}$) onto the Deviation observed the subsequent Days of the week.

$$R_{i,BM} = \beta_{0,t} + \beta_{1,t} DR_{i,t} + u_i \quad (5)$$

Deviation Observed on Day ($DR_{i,t}$)	$B_{0,t}$	$B_{1,t}$	$R^2(\%)$
Wednesday, Dec. 20	-0.01 (-1.52)	-1.26 (-9.18)	64.67
Thursday, Dec 21	-0.00042 (-0.04)	1.43 (4.49)	30.43
Friday, Dec 22	0.02 (1.72)	-2.77 (-4.59)	31.44

Source: Author's Calculations.

R^2 can be interpreted as the percent of variation in excess return on day t that is explained by variation in the residual return for securities on Black Tuesday. The significant of the t statistics for the slope coefficients ($B_{1,t}$) on Wednesday, Thursday and Friday supports the hypothesis that a profitable arbitrage opportunity existed.

The t statistics for the hypothesis that the true parameter is zero is reported in parenthesis below each parameter estimate.

Table VII. Percentage of foreign holding and Avg. Daily Residual of SET50 stocks on Black Tuesday.

STOCK	$R_{i, BM}$	R_f	BETA5yr	I_{BM}	R_i	$DR_{i, BM}$	Sector	Foreign %	Avg. DR
CCET	4.7%	5.0%	0.41	-16.06%	-3.6%	8.2%	Elec	92.2	0.81%
DELTA	-5.8%	5.0%	0.74	-16.06%	-10.5%	4.7%	Elec	90.8	
HANA	-7.5%	5.0%	0.83	-16.06%	-12.4%	4.9%	Elec	79.2	
TRUE	-35.2%	5.0%	1.27	-16.06%	-21.8%	-13.4%	Telecom	70.1	
GLOW	-6.6%	5.0%	0.47	-16.06%	-4.9%	-1.8%	Utilities	49.6	
BIGC	-5.2%	5.0%	0.33	-16.06%	-2.0%	-3.3%	Comm	49.0	
PSL	-14.9%	5.0%	1.22	-16.06%	-20.6%	5.7%	Transport	49.0	
KBANK	-20.4%	5.0%	1.33	-16.06%	-23.1%	2.7%	Bank	49.0	
BAY	-19.0%	5.0%	1.12	-16.06%	-18.6%	-0.5%	Bank	48.6	
BH	-5.3%	5.0%	0.63	-16.06%	-8.4%	3.0%	Services	48.6	0.47%
ADVANC	-23.4%	5.0%	1.08	-16.06%	-17.8%	-5.6%	Telecom	48.1	
TCAP	-23.4%	5.0%	1.19	-16.06%	-20.0%	-3.4%	Bank	47.1	
CPALL	-3.3%	5.0%	0.47	-16.06%	-4.8%	1.6%	Comm	46.2	
EGCO	-12.6%	5.0%	0.62	-16.06%	-8.0%	-4.6%	Utilities	44.8	
TTA	-17.9%	5.0%	0.38	-16.06%	-3.1%	-14.8%	Transport	44.5	
TUF	-6.2%	5.0%	1.63	-16.06%	-29.4%	23.2%	Food	43.6	
QH	-20.3%	5.0%	1.11	-16.06%	-18.5%	-1.9%	Prop	42.3	
TSTH	-14.0%	5.0%	1.11	-16.06%	-18.4%	4.5%	Conmat	42.0	
BANPU	-14.6%	5.0%	1.06	-16.06%	-17.3%	2.7%	Energy	40.0	
MAKRO	0.0%	5.0%	0.41	-16.06%	-3.7%	3.7%	Comm	38.2	0.61%
TMB	0.8%	5.0%	1.19	-16.06%	-20.1%	20.9%	Bank	36.5	
LH	-15.6%	5.0%	1.27	-16.06%	-21.8%	6.2%	Prop	32.6	
CPF	-13.5%	5.0%	0.62	-16.06%	-8.1%	-5.4%	Food	30.5	
BEC	-19.9%	5.0%	0.70	-16.06%	-9.6%	-10.3%	Media	30.2	
CPN	-16.1%	5.0%	0.52	-16.06%	-5.9%	-10.2%	Prop	30.0	
ITD	-33.7%	5.0%	1.64	-16.06%	-29.6%	-4.1%	Conmat	29.2	
SCB	-23.2%	5.0%	1.31	-16.06%	-22.6%	-0.6%	Bank	26.3	
BBL	-17.7%	5.0%	1.24	-16.06%	-21.2%	3.5%	Bank	25.0	
SCC	-13.4%	5.0%	0.99	-16.06%	-15.8%	2.5%	Conmat	25.0	
SCIB	-21.5%	5.0%	0.98	-16.06%	-15.6%	-5.8%	Bank	25.0	-2.07%
TOP	-16.1%	5.0%	1.14	-16.06%	-18.9%	2.9%	Refineries	24.7	
KTB	-24.3%	5.0%	1.28	-16.06%	-22.0%	-2.3%	Bank	24.3	
MINT	-13.9%	5.0%	0.59	-16.06%	-7.4%	-6.5%	Hotel	22.4	
AOT	-15.0%	5.0%	0.78	-16.06%	-11.5%	-3.6%	Transport	21.4	
PTTEP	-18.2%	5.0%	0.84	-16.06%	-12.6%	-5.6%	Energy	21.1	
PTT	-18.6%	5.0%	0.95	-16.06%	-15.1%	-3.5%	Energy	19.2	
THAI	-10.5%	5.0%	1.02	-16.06%	-16.5%	6.0%	Transport	18.4	
ATC	-21.8%	5.0%	1.52	-16.06%	-26.9%	5.2%	Petrochem	16.5	
RRC	-17.8%	5.0%	0.73	-16.06%	-10.3%	-7.5%	Petrochem	15.3	
SCCC	-16.6%	5.0%	0.81	-16.06%	-12.0%	-4.6%	Conmat	14.3	-5.24%
BGH	-8.9%	5.0%	0.39	-16.06%	-3.2%	-5.7%	Services	12.3	
PTTCH	-7.4%	5.0%	0.65	-16.06%	-8.6%	1.3%	Petrochem	10.7	
RATCH	-0.6%	5.0%	0.17	-16.06%	1.3%	-1.9%	Utilities	10.3	
KSL	-9.1%	5.0%	0.85	-16.06%	-12.9%	3.7%	Food	9.9	
PS	-23.1%	5.0%	-0.06	-16.06%	6.2%	-29.3%	Prop	9.7	
IRPC	-18.7%	5.0%	1.68	-16.06%	-30.5%	11.8%	Refineries	8.8	
MCOT	-19.2%	5.0%	0.00	-16.06%	5.0%	-24.2%	Media	6.7	
TPC	-6.6%	5.0%	0.63	-16.06%	-8.4%	1.7%	Petrochem	4.0	

Source: Author's Calculations.

Table VIII. Industry and Avg. Daily Residual of SET50 stocks on Black Tuesday.

STOCK	$R_{i, BM}$	R_f	BETA5yr	I_{BM}	R_i	$DR_{i, BM}$	Sector	Foreign %	Avg. DR	Avg. Beta
BEC	-19.9%	5.0%	0.70	-16.06%	-9.64%	-10.3%	Media	30.2		
MCOT	-19.2%	5.0%	0.00	-16.06%	4.98%	-24.2%	Media	6.7	-17.23%	0.35
ADVANC	-23.4%	5.0%	1.08	-16.06%	-17.79%	-5.6%	Telecom	48.1		
TRUE	-35.2%	5.0%	1.27	-16.06%	-21.77%	-13.4%	Telecom	70.1	-9.50%	1.18
QH	-20.3%	5.0%	1.11	-16.06%	-18.45%	-1.9%	Prop	42.3		
LH	-15.6%	5.0%	1.27	-16.06%	-21.84%	6.2%	Prop	32.6		
CPN	-16.1%	5.0%	0.52	-16.06%	-5.85%	-10.2%	Prop	30.0	-8.80%	0.71
PS	-23.1%	5.0%	-0.06	-16.06%	6.20%	-29.3%	Prop	9.7		
EGCO	-12.6%	5.0%	0.62	-16.06%	-7.96%	-4.6%	Utilities	44.81		
GLOW	-6.6%	5.0%	0.47	-16.06%	-4.86%	-1.8%	Utilities	49.55	-2.77%	0.42
RATCH	-0.6%	5.0%	0.17	-16.06%	1.34%	-1.9%	Utilities	10.3		
ITD	-33.7%	5.0%	1.64	-16.06%	-29.63%	-4.1%	Conmat	29.2		
SCC	-13.4%	5.0%	0.99	-16.06%	-15.85%	2.5%	Conmat	25.0	-2.06%	1.15
SCCC	-16.6%	5.0%	0.81	-16.06%	-11.99%	-4.6%	Conmat	14.3		
BH	-5.3%	5.0%	0.63	-16.06%	-8.36%	3.0%	Services	48.6		
BGH	-8.9%	5.0%	0.39	-16.06%	-3.19%	-5.7%	Services	12.3		
PSL	-14.9%	5.0%	1.22	-16.06%	-20.64%	5.7%	Transport	49.0		
TTA	-17.9%	5.0%	0.38	-16.06%	-3.09%	-14.8%	Transport	44.5	-0.69%	0.79
TSTH	-14.0%	5.0%	1.11	-16.06%	-18.44%	4.5%	Services	42.0		
AOT	-15.0%	5.0%	0.78	-16.06%	-11.46%	-3.6%	Transport	21.4		
THAI	-10.5%	5.0%	1.02	-16.06%	-16.50%	6.0%	Transport	18.4		
BIGC	-5.2%	5.0%	0.33	-16.06%	-1.96%	-3.3%	Comm	49.0		
CPALL	-3.3%	5.0%	0.47	-16.06%	-4.83%	1.6%	Comm	46.2	0.65%	0.40
MAKRO	0.0%	5.0%	0.41	-16.06%	-3.67%	3.7%	Comm	38.2		
BANPU	-14.6%	5.0%	1.06	-16.06%	-17.35%	2.7%	Energy	40.0		
PTTEP	-18.2%	5.0%	0.84	-16.06%	-12.64%	-5.6%	Energy	21.1		
PTT	-18.6%	5.0%	0.95	-16.06%	-15.09%	-3.5%	Energy	19.2	1.01%	1.02
ATC	-21.8%	5.0%	1.52	-16.06%	-26.94%	5.2%	Petrochem	16.5		
RRC	-17.8%	5.0%	0.73	-16.06%	-10.32%	-7.5%	Petrochem	15.3		
PTTCH	-7.4%	5.0%	0.65	-16.06%	-8.63%	1.3%	Petrochem	10.7		
TPC	-6.6%	5.0%	0.63	-16.06%	-8.36%	1.7%	Petrochem	4.0		
TOP	-16.1%	5.0%	1.14	-16.06%	-18.94%	2.9%	Refineries	24.7		
IRPC	-18.7%	5.0%	1.68	-16.06%	-30.49%	11.8%	Refineries	8.8		
KBANK	-20.4%	5.0%	1.33	-16.06%	-23.09%	2.7%	Bank	49.0		
BAY	-19.0%	5.0%	1.12	-16.06%	-18.56%	-0.5%	Bank	48.6		
TCAP	-23.4%	5.0%	1.19	-16.06%	-19.99%	-3.4%	Bank	47.1	1.80%	1.21
TMB	0.8%	5.0%	1.19	-16.06%	-20.08%	20.9%	Bank	36.5		
SCB	-23.2%	5.0%	1.31	-16.06%	-22.62%	-0.6%	Bank	26.3		
BBL	-17.7%	5.0%	1.24	-16.06%	-21.21%	3.5%	Bank	25.0		
SCIB	-21.5%	5.0%	0.98	-16.06%	-15.63%	-5.8%	Bank	25.0		
KTB	-24.3%	5.0%	1.28	-16.06%	-21.99%	-2.3%	Bank	24.3		
CPF	-13.5%	5.0%	0.62	-16.06%	-8.07%	-5.4%	Food	30.5		
KSL	-9.1%	5.0%	0.85	-16.06%	-12.86%	3.7%	Food	9.9	3.74%	0.92
TUF	-6.2%	5.0%	1.63	-16.06%	-29.37%	23.2%	Food	43.6		
MINT	-13.9%	5.0%	0.59	-16.06%	-7.36%	-6.5%	Hotel	22.4		
CCET	4.7%	5.0%	0.41	-16.06%	-3.56%	8.2%	Elec	92.2		
DELTA	-5.8%	5.0%	0.74	-16.06%	-10.49%	4.7%	Elec	90.8	5.95%	0.66
HANA	-7.5%	5.0%	0.83	-16.06%	-12.40%	4.9%	Elec	79.2		

Source: Author's Calculations.

Table IX. Average Betas and Average Daily Residual of SET50 stocks on Black Tuesday (19 Dec, 2006)

Stock	$R_{i, BM}$	R_f	5yr Beta	I_{BM}	R_i	$DR_{i, BM}$	Sector	Foreign Holding %	Avg. Beta	ADR.
PS	-23.1%	5.0%	-0.06	-16.1%	6.2%	-29.3%	Prop	9.7	0.28	-6.01%
MCOT	-19.2%	5.0%	0.00	-16.1%	5.0%	-24.2%	Media	6.7		
RATCH	-0.6%	5.0%	0.17	-16.1%	1.3%	-1.9%	Utilities	10.3		
BIGC	-5.2%	5.0%	0.33	-16.1%	-2.0%	-3.3%	Comm	49.0		
TUF	-6.2%	5.0%	0.38	-16.1%	-3.1%	-3.1%	Food	44.5		
BGH	-8.9%	5.0%	0.39	-16.1%	-3.2%	-5.7%	Services	12.3		
CCET	4.7%	5.0%	0.41	-16.1%	-3.6%	8.2%	Elec	92.2		
MAKRO	0.0%	5.0%	0.41	-16.1%	-3.7%	3.7%	Comm	38.2		
CPALL	-3.3%	5.0%	0.47	-16.1%	-4.8%	1.6%	Comm	46.2	0.61	-4.03%
GLOW	-6.6%	5.0%	0.47	-16.1%	-4.9%	-1.8%	Utilities	49.6		
CPN	-16.1%	5.0%	0.52	-16.1%	-5.9%	-10.2%	Prop	30.0		
MINT	-13.9%	5.0%	0.59	-16.1%	-7.4%	-6.5%	Hotel	22.4		
EGCO	-12.6%	5.0%	0.62	-16.1%	-8.0%	-4.6%	Utilities	44.8		
CPF	-13.5%	5.0%	0.62	-16.1%	-8.1%	-5.4%	Food	30.5		
TPC	-6.6%	5.0%	0.63	-16.1%	-8.4%	1.7%	Petrochem	4.0		
BH	-5.3%	5.0%	0.63	-16.1%	-8.4%	3.0%	Services	48.6		
PTTCH	-7.4%	5.0%	0.65	-16.1%	-8.6%	1.3%	Petrochem	10.7		
BEC	-19.9%	5.0%	0.70	-16.1%	-9.6%	-10.3%	Media	30.2		
RRC	-17.8%	5.0%	0.73	-16.1%	-10.3%	-7.5%	Petrochem	15.3	0.88	-0.12%
DELTA	-5.8%	5.0%	0.74	-16.1%	-10.5%	4.7%	Elec	90.8		
AOT	-15.0%	5.0%	0.78	-16.1%	-11.5%	-3.6%	Transport	21.4		
SCCC	-16.6%	5.0%	0.81	-16.1%	-12.0%	-4.6%	Conmat	14.3		
HANA	-7.5%	5.0%	0.83	-16.1%	-12.4%	4.9%	Elec	79.2		
PTTEP	-18.2%	5.0%	0.84	-16.1%	-12.6%	-5.6%	Energy	21.1		
KSL	-9.1%	5.0%	0.85	-16.1%	-12.9%	3.7%	Food	9.9		
PTT	-18.6%	5.0%	0.95	-16.1%	-15.1%	-3.5%	Energy	19.2		
SCIB	-21.5%	5.0%	0.98	-16.1%	-15.6%	-5.8%	Bank	25.0		
SCC	-13.4%	5.0%	0.99	-16.1%	-15.8%	2.5%	Conmat	25.0		
THAI	-10.5%	5.0%	1.02	-16.1%	-16.5%	6.0%	Transport	18.4	1.15	2.49%
BANPU	-14.6%	5.0%	1.06	-16.1%	-17.3%	2.7%	Energy	40.0		
ADVANC	-23.4%	5.0%	1.08	-16.1%	-17.8%	-5.6%	Telecom	48.1		
TTA	-17.9%	5.0%	1.11	-16.1%	-18.4%	0.6%	Transport	42.0		
QH	-20.3%	5.0%	1.11	-16.1%	-18.5%	-1.9%	Prop	42.3		
BAY	-19.0%	5.0%	1.12	-16.1%	-18.6%	-0.5%	Bank	48.6		
TOP	-16.1%	5.0%	1.14	-16.1%	-18.9%	2.9%	Refineries	24.7		
TCAP	-23.4%	5.0%	1.19	-16.1%	-20.0%	-3.4%	Bank	47.1		
TMB	0.8%	5.0%	1.19	-16.1%	-20.1%	20.9%	Bank	36.5		
PSL	-14.9%	5.0%	1.22	-16.1%	-20.6%	5.7%	Transport	49.0		
BBL	-17.7%	5.0%	1.24	-16.1%	-21.2%	3.5%	Bank	25.0	1.44	2.31%
TSTH	-14.0%	5.0%	1.27	-16.1%	-21.8%	7.8%	Conmat	70.1		
LH	-15.6%	5.0%	1.27	-16.1%	-21.8%	6.2%	Prop	32.6		
KTB	-24.3%	5.0%	1.28	-16.1%	-22.0%	-2.3%	Bank	24.3		
SCB	-23.2%	5.0%	1.31	-16.1%	-22.6%	-0.6%	Bank	26.3		
KBANK	-20.4%	5.0%	1.33	-16.1%	-23.1%	2.7%	Bank	49.0		
ATC	-21.8%	5.0%	1.52	-16.1%	-26.9%	5.2%	Petrochem	16.5		
TRUE	-35.2%	5.0%	1.63	-16.1%	-29.4%	-5.8%	Telecom	43.6		
ITD	-33.7%	5.0%	1.64	-16.1%	-29.6%	-4.1%	Conmat	29.2		
IRPC	-18.7%	5.0%	1.68	-16.1%	-30.5%	11.8%	Refineries	8.8		

Source: Author's Calculations.

Table X. Average Betas and Average Daily Residual of SET50 stocks on 20 December, 2006

Stock	R _{i,19-20}	R _f	5yr Beta	I _{BM}	R _i	DR _{i,19-20}	Sector	Foreign Holding %	Avg. Beta	ADR.		
PS	18.2%	5.0%	-0.06	10.6%	4.7%	13.6%	Prop	4.0	0.28	0.58%		
MCOT	15.9%	5.0%	0.00	10.6%	5.0%	10.9%	Media	6.7				
RATCH	0.0%	5.0%	0.17	10.6%	6.0%	-6.0%	Utilities	32.6				
BIGC	2.1%	5.0%	0.33	10.6%	6.8%	-4.7%	Comm	38.2				
TUF	0.0%	5.0%	0.38	10.6%	7.1%	-7.1%	Food	44.8				
BGH	8.2%	5.0%	0.39	10.6%	7.2%	1.0%	Services	49.0				
CCET	-0.5%	5.0%	0.41	10.6%	7.3%	-7.7%	Elec	46.2				
MAKRO	5.1%	5.0%	0.41	10.6%	7.3%	-2.2%	Comm	22.4				
CPALL	4.7%	5.0%	0.47	10.6%	7.6%	-3.0%	Comm	70.1			0.61	2.15%
GLOW	0.8%	5.0%	0.47	10.6%	7.6%	-6.9%	Utilities	79.2				
CPN	16.8%	5.0%	0.52	10.6%	7.9%	9.0%	Prop	25.0				
MINT	13.1%	5.0%	0.59	10.6%	8.3%	4.8%	Hotel	30.2				
EGCO	10.0%	5.0%	0.62	10.6%	8.4%	1.5%	Utilities	92.2				
CPF	11.5%	5.0%	0.62	10.6%	8.5%	3.1%	Food	14.3				
TPC	6.0%	5.0%	0.63	10.6%	8.5%	-2.5%	Petrochem	42.0				
BH	2.7%	5.0%	0.63	10.6%	8.5%	-5.8%	Services	49.0				
PTTCH	12.2%	5.0%	0.65	10.6%	8.6%	3.6%	Petrochem	16.5				
BEC	19.4%	5.0%	0.70	10.6%	8.9%	10.6%	Media	24.3				
RRC	13.2%	5.0%	0.73	10.6%	9.1%	4.2%	Petrochem	30.0	0.88	3.02%		
DELTA	-0.6%	5.0%	0.74	10.6%	9.1%	-9.7%	Elec	29.2				
AOT	7.8%	5.0%	0.78	10.6%	9.4%	-1.6%	Transport	47.1				
SCCC	10.9%	5.0%	0.81	10.6%	9.5%	1.4%	Conmat	12.3				
HANA	2.9%	5.0%	0.83	10.6%	9.6%	-6.7%	Elec	90.8				
PTTEP	5.4%	5.0%	0.84	10.6%	9.7%	-4.3%	Energy	9.7				
KSL	4.4%	5.0%	0.85	10.6%	9.7%	-5.3%	Food	44.5				
PTT	15.0%	5.0%	0.95	10.6%	10.3%	4.6%	Energy	15.3				
SCIB	9.4%	5.0%	0.98	10.6%	10.5%	-1.1%	Bank	48.6				
SCC	7.7%	5.0%	0.99	10.6%	10.5%	-2.8%	Conmat	8.8				
THAI	6.0%	5.0%	1.02	10.6%	10.7%	-4.7%	Transport	43.6	1.15	0.43%		
BANPU	11.3%	5.0%	1.06	10.6%	10.9%	0.4%	Energy	25.0				
ADVANC	14.7%	5.0%	1.08	10.6%	11.0%	3.6%	Telecom	48.6				
TTA	12.3%	5.0%	1.11	10.6%	11.2%	1.1%	Transport	49.6				
QH	13.7%	5.0%	1.11	10.6%	11.2%	2.5%	Prop	42.3				
BAY	12.9%	5.0%	1.12	10.6%	11.2%	1.7%	Bank	26.3				
TOP	10.6%	5.0%	1.14	10.6%	11.3%	-0.8%	Refineries	18.4				
TCAP	15.5%	5.0%	1.19	10.6%	11.6%	3.9%	Bank	48.1				
TMB	0.0%	5.0%	1.19	10.6%	11.6%	-11.6%	Bank	21.4				
PSL	11.2%	5.0%	1.22	10.6%	11.8%	-0.5%	Transport	10.7				
BBL	7.5%	5.0%	1.24	10.6%	11.9%	-4.5%	Bank	36.5	1.44	1.37%		
TSTH	12.2%	5.0%	1.27	10.6%	12.1%	0.1%	Conmat	10.3				
LH	10.7%	5.0%	1.27	10.6%	12.1%	-1.4%	Prop	9.9				
KTB	14.5%	5.0%	1.28	10.6%	12.1%	2.3%	Bank	30.5				
SCB	13.9%	5.0%	1.31	10.6%	12.3%	1.6%	Bank	24.7				
KBANK	11.5%	5.0%	1.33	10.6%	12.4%	-1.0%	Bank	19.2				
ATC	17.3%	5.0%	1.52	10.6%	13.5%	3.9%	Petrochem	25.0				
TRUE	16.8%	5.0%	1.63	10.6%	14.1%	2.7%	Telecom	49.0				
ITD	22.3%	5.0%	1.64	10.6%	14.2%	8.1%	Conmat	21.1				
IRPC	10.2%	5.0%	1.68	10.6%	14.4%	-4.2%	Refineries	40.0				

Table XI. Betas and Average Daily Residual of SET50 stocks on 21 December, 2006

Stock	$R_{i,20-21}$	R_f	5yr Beta	$I_{m,20-21}$	R_i	$DR_{i,20-21}$	Sector	Foreign Holding %	Avg.Beta	ADR
PS	0.0%	5.0%	-0.06	-2.3%	5.4%	-5.4%	Prop	4.0	0.28	-4.4%
MCOT	-2.1%	5.0%	0.00	-2.3%	5.0%	-7.1%	Media	6.7		
RATCH	-0.6%	5.0%	0.17	-2.3%	3.7%	-4.3%	Utilities	32.6		
BIGC	-2.7%	5.0%	0.33	-2.3%	2.6%	-5.3%	Comm	38.2		
TUF	0.0%	5.0%	0.38	-2.3%	2.2%	-2.2%	Food	44.8		
BGH	-0.7%	5.0%	0.39	-2.3%	2.2%	-2.9%	Services	49.0		
CCET	-0.5%	5.0%	0.41	-2.3%	2.0%	-2.5%	Elec	46.2		
MAKRO	0.0%	5.0%	0.41	-2.3%	2.0%	-2.0%	Comm	22.4		
CPALL	-6.4%	5.0%	0.47	-2.3%	1.6%	-8.0%	Comm	70.1		
GLOW	0.0%	5.0%	0.47	-2.3%	1.6%	-1.6%	Utilities	79.2		
CPN	-3.4%	5.0%	0.52	-2.3%	1.3%	-4.6%	Prop	25.0		
MINT	-0.8%	5.0%	0.59	-2.3%	0.7%	-1.6%	Hotel	30.2		
EGCO	1.6%	5.0%	0.62	-2.3%	0.5%	1.0%	Utilities	92.2		
CPF	-1.4%	5.0%	0.62	-2.3%	0.5%	-1.9%	Food	14.3		
TPC	-1.8%	5.0%	0.63	-2.3%	0.4%	-2.2%	Petrochem	42.0		
BH	0.7%	5.0%	0.63	-2.3%	0.4%	0.3%	Services	49.0		
PTTCH	-2.0%	5.0%	0.65	-2.3%	0.3%	-2.3%	Petrochem	16.5		
BEC	-5.3%	5.0%	0.70	-2.3%	0.0%	-5.2%	Media	24.3		
RRC	-2.3%	5.0%	0.73	-2.3%	-0.3%	-2.0%	Petrochem	30.0	0.88	0.0%
DELTA	0.6%	5.0%	0.74	-2.3%	-0.3%	0.9%	Elec	29.2		
AOT	0.8%	5.0%	0.78	-2.3%	-0.7%	1.5%	Transport	47.1		
SCCC	-4.5%	5.0%	0.81	-2.3%	-0.9%	-3.7%	Conmat	12.3		
HANA	-0.9%	5.0%	0.83	-2.3%	-1.0%	0.0%	Elec	90.8		
PTTEP	-2.1%	5.0%	0.84	-2.3%	-1.1%	-1.0%	Energy	9.7		
KSL	-1.6%	5.0%	0.85	-2.3%	-1.2%	-0.5%	Food	44.5		
PTT	-4.7%	5.0%	0.95	-2.3%	-1.9%	-2.8%	Energy	15.3		
SCIB	-4.0%	5.0%	0.98	-2.3%	-2.1%	-1.9%	Bank	48.6		
SCC	-1.7%	5.0%	0.99	-2.3%	-2.2%	0.5%	Conmat	8.8		
THAI	4.5%	5.0%	1.02	-2.3%	-2.4%	6.9%	Transport	43.6	1.15	0.5%
BANPU	-0.6%	5.0%	1.06	-2.3%	-2.7%	2.1%	Energy	25.0		
ADVANC	0.0%	5.0%	1.08	-2.3%	-2.9%	2.9%	Telecom	48.6		
TTA	-3.0%	5.0%	1.11	-2.3%	-3.1%	0.1%	Transport	49.6		
QH	-2.6%	5.0%	1.11	-2.3%	-3.1%	0.5%	Prop	42.3		
BAY	-3.8%	5.0%	1.12	-2.3%	-3.1%	-0.6%	Bank	26.3		
TOP	-2.8%	5.0%	1.14	-2.3%	-3.3%	0.5%	Refineries	18.4		
TCAP	-4.9%	5.0%	1.19	-2.3%	-3.6%	-1.3%	Bank	48.1		
TMB	-4.4%	5.0%	1.19	-2.3%	-3.6%	-0.7%	Bank	21.4		
PSL	-2.2%	5.0%	1.22	-2.3%	-3.8%	1.7%	Transport	10.7		
BBL	-3.7%	5.0%	1.24	-2.3%	-4.0%	0.4%	Bank	36.5	1.44	2.3%
TSTH	6.8%	5.0%	1.27	-2.3%	-4.2%	11.1%	Conmat	10.3		
LH	-6.0%	5.0%	1.27	-2.3%	-4.3%	-1.7%	Prop	9.9		
KTB	-5.7%	5.0%	1.28	-2.3%	-4.3%	-1.4%	Bank	30.5		
SCB	-5.9%	5.0%	1.31	-2.3%	-4.5%	-1.3%	Bank	24.7		
KBANK	-3.1%	5.0%	1.33	-2.3%	-4.7%	1.5%	Bank	19.2		
ATC	-2.3%	5.0%	1.52	-2.3%	-6.0%	3.7%	Petrochem	25.0		
TRUE	-2.4%	5.0%	1.63	-2.3%	-6.8%	4.5%	Telecom	49.0		
ITD	-6.2%	5.0%	1.64	-2.3%	-6.9%	0.7%	Conmat	21.1		
IRPC	-3.3%	5.0%	1.68	-2.3%	-7.2%	4.0%	Refineries	40.0		

Source: Author's Calculations.

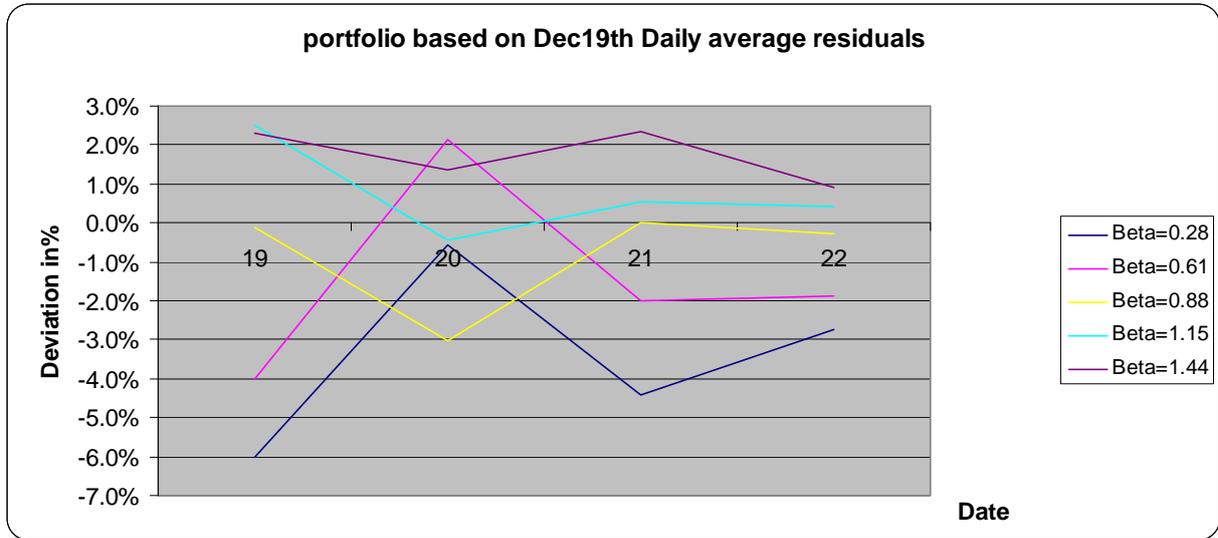
Table XII. Average Betas and Average Daily Residual of SET50 stocks on 22 December, 2006

Stock	$R_{i,21-22}$	R_f	5yr Beta	$I_{m,21-22}$	R_i	$DR_{1,21-22}$	Sector	Foreign Holding %	Avg. Beta	ADR
PS	-0.8%	5.0%	-0.1	0.6%	5.2%	-6.1%	Prop	4.0	0.28	-2.7%
MCOT	1.3%	5.0%	0.0	0.6%	5.0%	-3.7%	Media	6.7		
RATCH	1.8%	5.0%	0.2	0.6%	4.2%	-2.4%	Utilities	32.6		
BIGC	3.2%	5.0%	0.3	0.6%	3.6%	-0.4%	Comm	38.2		
TUF	2.1%	5.0%	0.4	0.6%	3.3%	-1.2%	Food	44.8		
BGH	-0.7%	5.0%	0.4	0.6%	3.3%	-4.0%	Services	49.0		
CCET	1.3%	5.0%	0.4	0.6%	3.2%	-1.9%	Elec	46.2		
MAKRO	0.0%	5.0%	0.4	0.6%	3.2%	-3.2%	Comm	22.4	0.61	-1.9%
CPALL	1.4%	5.0%	0.5	0.6%	3.0%	-1.6%	Comm	70.1		
GLOW	-3.1%	5.0%	0.5	0.6%	2.9%	-6.0%	Utilities	79.2		
CPN	3.3%	5.0%	0.5	0.6%	2.7%	0.5%	Prop	25.0		
MINT	-0.8%	5.0%	0.6	0.6%	2.4%	-3.3%	Hotel	30.2		
EGCO	1.5%	5.0%	0.6	0.6%	2.3%	-0.8%	Utilities	92.2		
CPF	2.4%	5.0%	0.6	0.6%	2.3%	0.1%	Food	14.3		
TPC	0.6%	5.0%	0.6	0.6%	2.2%	-1.6%	Petrochem	42.0		
BH	-0.7%	5.0%	0.6	0.6%	2.2%	-2.9%	Services	49.0		
PTTCH	0.0%	5.0%	0.6	0.6%	2.2%	-2.2%	Petrochem	16.5		
BEC	0.0%	5.0%	0.7	0.6%	2.0%	-2.0%	Media	24.3		
RRC	1.0%	5.0%	0.7	0.6%	1.8%	-0.8%	Petrochem	30.0		
DELTA	2.9%	5.0%	0.7	0.6%	1.8%	1.2%	Elec	29.2		
AOT	0.8%	5.0%	0.8	0.6%	1.6%	-0.8%	Transport	47.1		
SCCC	1.5%	5.0%	0.8	0.6%	1.5%	0.1%	Conmat	12.3		
HANA	2.8%	5.0%	0.8	0.6%	1.4%	1.4%	Elec	90.8		
PTTEP	0.0%	5.0%	0.8	0.6%	1.3%	-1.3%	Energy	9.7		
KSL	-0.5%	5.0%	0.8	0.6%	1.3%	-1.8%	Food	44.5		
PTT	2.9%	5.0%	1.0	0.6%	0.8%	2.0%	Energy	15.3		
SCIB	-1.2%	5.0%	1.0	0.6%	0.7%	-1.9%	Bank	48.6		
SCC	1.7%	5.0%	1.0	0.6%	0.7%	1.0%	Conmat	8.8		
THAI	-2.2%	5.0%	1.0	0.6%	0.5%	-2.8%	Transport	43.6	1.15	0.4%
BANPU	1.7%	5.0%	1.1	0.6%	0.4%	1.3%	Energy	25.0		
ADVANC	-1.3%	5.0%	1.1	0.6%	0.3%	-1.6%	Telecom	48.6		
TTA	0.0%	5.0%	1.1	0.6%	0.1%	-0.1%	Transport	49.6		
QH	0.0%	5.0%	1.1	0.6%	0.1%	-0.1%	Prop	42.3		
BAY	-1.7%	5.0%	1.1	0.6%	0.1%	-1.8%	Bank	26.3		
TOP	0.6%	5.0%	1.1	0.6%	0.0%	0.6%	Refineries	18.4		
TCAP	1.4%	5.0%	1.2	0.6%	-0.2%	1.6%	Bank	48.1		
TMB	0.0%	5.0%	1.2	0.6%	-0.2%	0.2%	Bank	21.4		
PSL	2.2%	5.0%	1.2	0.6%	-0.3%	2.5%	Transport	10.7		
BBL	0.9%	5.0%	1.2	0.6%	-0.4%	1.4%	Bank	36.5	1.44	0.9%
TSTH	-4.2%	5.0%	1.3	0.6%	-0.6%	-3.7%	Conmat	10.3		
LH	0.8%	5.0%	1.3	0.6%	-0.6%	1.3%	Prop	9.9		
KTB	-0.8%	5.0%	1.3	0.6%	-0.6%	-0.2%	Bank	30.5		
SCB	1.7%	5.0%	1.3	0.6%	-0.7%	2.5%	Bank	24.7		
KBANK	-0.8%	5.0%	1.3	0.6%	-0.8%	0.0%	Bank	19.2		
ATC	0.8%	5.0%	1.5	0.6%	-1.6%	2.4%	Petrochem	25.0		
TRUE	0.0%	5.0%	1.6	0.6%	-2.1%	2.1%	Telecom	49.0		
ITD	0.0%	5.0%	1.6	0.6%	-2.2%	2.2%	Conmat	21.1		
IRPC	-0.8%	5.0%	1.7	0.6%	-2.4%	1.5%	Refineries	40.0		

Source: Author's Calculations.

Figure 1

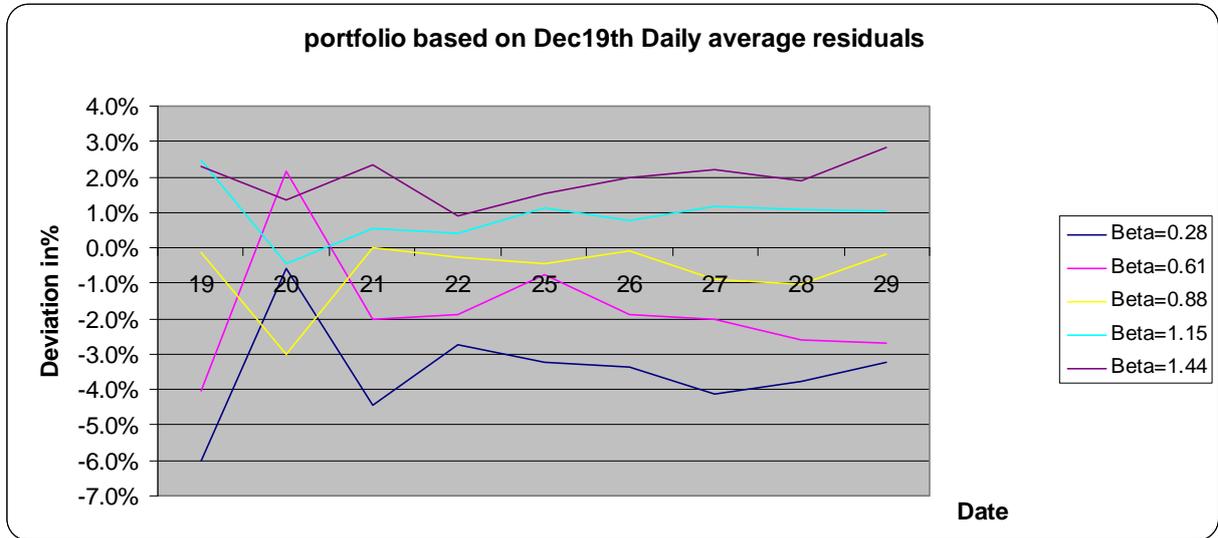
Daily Average Residual Return



Source: Author's Calculations.

Figure 2

Daily Average Residual Return



Source: Author's Calculations.