ACTIVE PORTFOLIO MANAGEMENT USING CROSS-SECTIONAL DISPERSION: EVIDENCE FROM THAILAND

BY

MR. PASAKORN CHAWAPONGSAKORN

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ABSTRACT

In this study, I tried to prove whether I could outperform SET50 index by using cross-sectional dispersion. Data was brought from analyst target price in order to find expected return then using cross-sectional dispersion to find weight of each stock. This study has 4 portfolios to test about formation period data and event driven strategy, which is one of method that uses top deciles cross-sectional dispersion as a component to create portfolio. As for event period, it used last year target price data, which was a set period in analyst research target price duration. From this study, I found that 1-year formation period underperform the market, while latest 3 months target price outperform the market in cumulative return in both event driven strategy portfolio and every stork portfolio, but only portfolio with every stock has significant positive alpha.

Keywords: Cross-sectional dispersion, Active portfolio management

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURE

CHAPTER 1
INTRODUCTION

At this moment, the world economy is driven by many investors. Competition in stock market is very high. Investment involved both success and failure. Some led people into a pitfall. And some led people into a gold mine, became a millionaire in overnight. This might sound like a gamble, but it greatly attracted many new generation investors. The problem is, how should they invest?

Normally, SET50 was main target of interest for many investors because its high market capital made it highly difficult to do a price making. Buy and sale were also in high demand, liquidity risk was of no concern. According to this, mutual fund has become something attractive for beginners or those without sufficient knowledge. Mutual fund was something that was created in order to manage funds from investors. Expert investor would use those funds to invest in stock markets to make a profit; hence the risk would be lowered. Furthermore, mutual fund also has other benefits, such as: able to invest even if you don't have much money, your profit from selling would not be deducted from tax.

As for experienced investors, each one used different investment strategy. Some relied on technical indicator. Some gathered information from those companies before investment. Some invested by following analyst's recommendation. In Thailand, there's a study of those articles, such as a study from Pimolrat S. (2003) indicated that analyst's recommendation was capable of causing a significant cumulative abnormal return. Nuntawan (2003) also found that analyst's recommendation could create excess return for investors.

The most focused investment strategy in these days is active investment. It is an investment strategy that focus on trying to make outperform benchmark index (SET50, S&P500) as an objective. Investors would gather various data, such as: market flow, economic situation, company-specific factor. Stocks with positive

opinion would be overweight. Likewise, stocks with less favorably would be underweight.

Event driven strategy is an investment strategy where investors seek to capitalize on the opportunities in specific event, but those event cannot be systematically defined. The study from Gorman, Sapra, Weigand (2010) indicated that the change in cross-sectional dispersion represented opportunity to earn higher return. Cross-sectional dispersion is a theory created by Gorman, Sapra, Weigand (2010). This method created analytical framework, based on modern portfolio theory and active portfolio management, by derived and interpreted in cross-sectional dispersion perspective that, if portfolio has a high correspond with market movement, residual risk should be lowered. Then it should be deducted by the proportion of correlation which made it more appropriate.

Because cross-sectional dispersion has never been studied before in Thailand. This study has implemented cross-sectional dispersion in order to find whether using this strategy could outperform market, and whether this strategy could generate alpha. I hope this study will lead to further studied in cross-sectional dispersion, and investment in active investment in Thailand will be further developed. This study should be able to use in investment which will increase a chance and opportunity for investors, and become a study model for active portfolio management further development.

CHAPTER 2
REVIEW OF LITERATURE

The main objective of this paper is to construct an active portfolio using cross-sectional dispersion which obtain from the result of regression of asset pricing model.

2.1 Asset Pricing Model

Sharpe (1964), Lintner (1965) and Mossin (1966) proposed Capital Asset Pricing Theory, (CAPM),which based on Modern Portfolio Theory(MPT) Markowitz (1952), to estimate the relationship between beta and return of assets. Then Fama, French (1992) extended the basic CAPM by adding market cap and book to market factors, which make the model could explain market better. After that Ruzhe (2004) demonstrated that Fama French 3 factor model was more appropriate model to estimate Thai stock market.

2.2 Cross-sectional dispersion

Gorman, Sapra, Weigand (2010) proposed that cross-sectional dispersion of returns was more applicable measure of risk than time series volatility for active investors, if managers' information ratio is fixed, change in cross-sectional dispersion represent opportunities to earn higher return. Cross-sectional dispersion has two main drivers, which are average volatility of individual securities (σ) and securities average correlation (ρ).

$$\sigma_{CS} = \sigma\sqrt{1 - \rho} \tag{1}$$

Gorman, Sapra, Weigand (2010), by using equally-weighted portfolio they found relationship between cross-sectional dispersion and portfolio risk could be expressed as:

$$\sigma_P^2 = \rho\sigma^2 + \frac{\sigma_{CS}^2}{n} \tag{2}$$

Where σ_P is portfolio volatility

ρ is return correlation

σ_{CS} is cross-sectional dispersion

n is portfolio size

σ is average stock volatility

Systematic risk of portfolio can be expressed as:

$$SR_P = \rho\sigma^2 + \frac{\sigma_{CS}^2}{N} \tag{3}$$

Where SR_P is the portfolio's systematic risk

N is total number of assets in market

ρ is return correlation

σ_{CS} is cross-sectional dispersion

σ is average stock volatility

Residual risk of portfolio can be expressed as a scaled of cross-sectional dispersion

$$\sigma_e^2 = \sigma_{cs}^2 \left[\frac{1}{n} - \frac{1}{N}\right] \tag{4}$$

Where σ_e is the portfolio's residual risk

n is portfolio size

N is total number of assets in market

σ_{cs} is the portfolio's cross-sectional dispersions

When consider the case where n=1 and n=N. For n=1 case, equation 4 shows that individual asset residual risk (idiosyncratic risk) is virtually equal to cross-section dispersion (since N becomes large,1/N becomes very small), when n →N, residual risk is completely diversified.

To find the effect of changes in either σ^2 or ρ on three risk measures, I partially derive each expression.

Therefore, the partial derivatives for

Total risk:

$$\frac{\partial \sigma_P^2}{\partial \sigma^2} = \rho + \frac{1-\rho}{n} > 0 \tag{5}$$

$$\frac{\partial \sigma_P^2}{\partial \rho} = \sigma^2 \left[1 - \frac{1}{n}\right] \geq 0 \tag{6}$$

Residual risk:

$$\frac{\partial \sigma_e^2}{\partial \sigma^2} = 1 - \rho \left[\frac{1}{n} - \frac{1}{N}\right] \geq 0 \tag{7}$$

$$\frac{\partial \sigma_e^2}{\partial \rho} = -\sigma^2 \left[\frac{1}{n} - \frac{1}{N}\right] \leq 0 \tag{8}$$

Cross-sectional risk:

$$\frac{\partial \sigma_{cs}^2}{\partial \sigma^2} = 1 - \rho \geq 0 \tag{9}$$

$$\frac{\partial \sigma_e^2}{\partial \rho} = -\sigma^2 \le 0 \tag{10}$$

To find the magnitude and direction of the impact the values of $\sigma^2 = 0.25$, $\rho = 0.2$, n=10 and N=100

Table 2.1 Impact of change in σ^2 and ρ on total, residual, cross-sectional risk

Risk Measure: VCV Input:	$\partial \sigma_P^2$	$\partial \sigma_e^2$	$\partial \sigma_{CS}^2$
$\partial \sigma^2$	0.28	0.0072	0.8000
$\partial \rho$	0.225	-0.0225	-0.2500

From Table 2.1 I can see that total risk, residual risk and cross-sectional dispersion are positively related to σ^2, but not for ρ. Residual risk and cross-sectional dispersion are negatively related to ρ while total risk is positively related to ρ.

2.3 Analyst recommendation in Thailand

Pimolrat (2003) using the technique of event studies to study the effect of analyst recommendation for one year and found that after the release of analyst's buy recommendation, there are positive investment value for the first 30 trading days but that value disappear after 6 months.

Nuntawan (2003) using analyst recommendation in 2002 to equally-weight and value-weight portfolios that rebalancing response to analyst recommendation daily and found that there are positive abnormal alpha in both equally-weight and value-weight but that abnormal return was disappear after commission fee.

CHAPTER 3
THEORETICAL FRAMEWORK

3.1 Efficient Market Hypothesis (EHM)

This hypothesis states that the price of assets has been reflected on information. Fama (1970)has classify the efficient into:

3.1.1 Weak-form efficiency

It is the situation that the past information cannot be use to predict the future price; therefore, any technical analysis technique cannot be used in this level of efficiency.

3.1.2 Semi-strong-form efficiency

It is the situation that asset prices reflect rapidly to public information; therefore, no one can earn excess return from public information but traders who have private information may earn excess return.

3.1.3 Strong-form efficiency

It is the situation that all information including private information is fully reflect in asset price;therefore, no one can consistently earn excess return.

3.2 Asset Pricing Model

Fama, French (1992) suggested that, adding market cap and book to market factors to basic CAPM, could explain market better than basic CAPM.

$$R = R_f + \beta_m(R_m - R_f) + \beta_s\text{SMB} + \beta_v\text{HML} + \alpha \qquad (11)$$

3.3 Portfolio Theory

3.3.1 Active Portfolio Management

Clarke, Silva, Thorley (2006) proposed that, to construct portfolio that maximize utility function is to maximize expected active return while minimize portfolio active risk.

$$U = E(\text{R}_\text{A}) - \lambda \sigma_\text{A}^2 \tag{12}$$

Where $E(\text{R}_\text{A})$ is the portfolio expected active return

σ_A is portfolio active risk

λ is risk-aversion coefficient

3.3.2 Cross-Sectional Dispersion

Gorman, Sapra, Weigand (2010) showed us that cross-sectional dispersion of return (σ_{CS}) has two main drivers, average volatility of individual securities (σ) and securities average correlation (ρ) from equation 1.

3.4 Portfolio Evaluation

Jensen (1968) proposed that I could use the alpha from Capital Asset Pricing Model (CAPM) to evaluate ability of portfolio manager.

$$R = R_f + \beta_\text{m}(\text{R}_\text{m} - \text{R}_\text{f}) + \alpha \tag{13}$$

Treynor, Fischer (1973) proposed that I could measure performance of active manager by comparing the return of alpha to the residual risk.

$$Appraisal\ ratio = \frac{\alpha}{\sigma_e} \tag{14}$$

CHAPTER 4
RESEARCH METHODOLOGY

4.1 Data

This paper used daily data of SET50 stocks and SET50 index collected from Data Stream during 2006-2015 closing price and target price from Kasikorn Securities during Jan 2009- Dec 2015.Then I chose the latest 3 years stock from SET50 index component that has at least 4 years data to build portfolios. In order to estimate beta of each stock, I used 3 years lag data to estimate the beta of stock from each year.

4.2 Portfolio Construction

    4.2.1 Cross-Sectional Dispersion

To find the cross-sectional dispersion of the stock, I used the regression output from the model to find the cross-sectional for each stock, which could interpret from equation 5. The cross-sectional dispersion was calculated every month.

$$R_{st} = R_f + \beta_m(R_m - R_f) + \beta_s SMB + \beta_v HML + \alpha + \varepsilon_{st}$$

$$\text{Regression } R^2$$

$$\text{Volatility of } \varepsilon_{st} = \sigma$$

$$\sigma_{CS} = \sigma\sqrt{1 - R} \qquad \sqrt{R^2}$$

4.2.2 Expected return

Normal expected return could be calculated from latest target price from 3 months prior from equation 15, but for formation portfolios, the target price was the last year target price because target price of stock analyst used 1 year in order to calculate target price in equation 16.

$$E(R_i) = \ln\left(\frac{targetPrice_t}{Price_t}\right) \tag{15}$$

Where $E(R_i) \geq 0.1 \text{else} E(R_i) = 0$

$$E(R_i) = \ln\left(\frac{targetPrice_{t-1year}}{Price_t}\right) \tag{16}$$

Where $E(R_i) \geq 0.1 \text{else} E(R_i) = 0$

4.2.3 Stock selection

For normal portfolio, I used every stock from SET50. But for top deciles cross-sectional dispersion and top deciles cross-sectional dispersion formation period portfolio I selected the top 10% highest cross-sectional dispersion to build portfolio.

4.2.4 Portfolio weight

The selected stock was the stock that has at least 10% expected return. If the stock has less than 10% expected return, I will assume that it has 0% expected return. I weighted the stock by using expected active return respected to cross-sectional dispersion; then normalize. Portfolio weight was calculated every month.

$$w_A^* = \frac{E(R)}{\lambda \sigma_{CS}^2} \tag{17}$$

Where $\sum_{k=1}^{n} W_{Ak}^* = 1$ $\qquad w_{Ak}^* > 0$

4.2.5 Type of portfolios

This paper will build 4 portfolios, which are:

4.2.5.1 Cross-sectional dispersion portfolio

Using a total of 50 stocks in order to build portfolios and weight stock by using expected return calculated from equation 15.

4.2.5.2 Top deciles cross-sectional dispersion portfolio

Select stock that has 10% maximum cross-sectional dispersion and weight stock by using expected return calculated from equation 15.

4.2.5.3 Formation period portfolio

Using a total of 50 stocks in order to build portfolio and using expected return calculated from last year target price from equation 16.

4.2.5.4 Top deciles cross-sectional dispersion formation period portfolio

Select stock that has 10% maximum cross-sectional dispersion and weight stock by using expected return calculated from equation 16.

4.3 Portfolio Evaluation

4.3.1 Jensen's alpha

Using intercept term from regression of pricing model equation 11 to measure the performance of strategy,

If α_j is significant and >0 then this method outperform benchmark index.

If α_j is significant and <0 then this method underperform benchmark index.

If α_j is insignificant this method get the same result as benchmark index.

4.3.2 Appraisal ratio

Measure the performance of portfolio by using ratio of Jensen's alpha to residual risk

$$Appraisal\ ratio = \frac{\alpha}{\sigma_e} \tag{18}$$

4.3.3 Adjusted appraisal ratio

Measure the performance of portfolio by using ratio of Jensen's alpha to cross-sectional dispersion

$$Adj.\ appraisal\ ratio = \frac{\alpha}{\sigma_{CS}} \tag{19}$$

CHAPTER 5
RESULTS AND DISCUSSION

5.1 Data

The stocks used in portfolio were selected from SET50 Index component from the last4 years that met the criteria. These stocks were listed in table 5.1. And the stock that use to build dataset to use for estimate will be the same stock that use to calculate SET50 stock from2006-2015.

Table 5.1 List of stock that used to build portfolios

AIS	CENT	INVX	SCQT
AIRT	KAR	JASM	SCCT
BPCT	CPSE	TFBT	SPLA
BAYT	CPFT	KTBT	NFST
BBLT	CPN	LAHT	TAI
BCPL	DELT	RGRT	SHS
BECW	TACM	PST	TMBT
BDME	ELG	PTTB	THOI
BHOT	SGHX	PTTE	TSIA
SKGC	GLWM	PTTG	TAP
BJCT	HPC	RATE	TUF
BANL	SHNW	ROBN	
TANA	TPI	SBBT	

5.1.1 SET50 3 factor model data

Built 6 portfolios to calculate the SMB HML premium, and used them in estimation model. These portfolios list were adjusted every first trading day of January.

$$W_i = \frac{MV_i}{\sum MV} \text{ where } \sum w_i = 1; w_i > 0 \qquad (20)$$

Table 5.2 List of stocks and weights used in Small-cap Growth portfolio in 2015

STOCK	weight
BECW	0.09511
BHOT	0.09364
BJCT	0.06021
CENT	0.03852
CPN	0.18532
HPC	0.0921
RGRT	0.11789
SCCT	0.09049
SKGC	0.18526
TAP	0.04147

Then I calculate SMB HML value from 6 portfolios with equation 21 and 22 then I got result like table 5.3

$$SMB = \frac{1}{3} * (SV + SN + SG) - (\frac{1}{3} * (BV + BN + BG)) \qquad (21)$$

$$HML = \frac{1}{2} * (SV + BV) - (\frac{1}{2} * (SG + BG)) \qquad (22)$$

Where SV is Small Value portfolio return   SN is Small Neutral portfolio return

SG is Small Growth portfolio return   BV is Small Value portfolio return

BN is Big Neutral portfolio return   BG is Big Growth portfolio return

Table 5.3 Return of 6 portfolios and SMB HML calculated from 6 portfolios

Date	Bg	Bv	Bn	Sg	Sv	Sn	HML	SMB
8/1/2013	0.0034	0.01058	0.00677	0.02429	0.01599	0.01822	-0.000559	0.012583
8/2/2013	-0.01404	-0.00691	-0.00818	-0.01159	-0.01356	-0.01889	0.002581	-0.004974
8/5/2013	0.00954	0.00292	-0.00654	0.00997	0.00933	0.00585	-0.003629	0.00641
8/6/2013	0.01753	0.0026	-0.0067	0.01375	0.00271	0.00306	-0.012991	0.002032
8/7/2013	0.00669	-0.00994	-0.00641	0.00061	-0.00177	0.00184	-0.009505	0.003443
8/8/2013	-0.00387	0.01213	0.00405	0.03355	-0.00316	0.01795	-0.010358	0.012011
8/9/2013	-0.00974	-0.00266	-0.01235	-0.0448	0.00148	-0.00687	0.026674	-0.00848
8/13/2013	0.01739	0.02097	0.02971	0.02256	0.02611	0.02006	0.003562	0.000218
8/14/2013	0.00968	-0.00265	0.01231	-0.00142	-0.0106	0.00154	-0.010755	-0.009937
8/15/2013	-0.00166	-0.0107	-0.01045	-0.00984	0.00088	-0.0026	0.000837	0.003752
8/16/2013	-0.02237	-0.00705	0.00408	-0.00718	0.01197	-0.0072	0.017236	0.007642
8/19/2013	-0.038	-0.02854	-0.03462	-0.03783	-0.03422	-0.03414	0.006537	-0.001677

By using SAS 9.4, I estimated parameter sensibility of each stock(Beta) from Fama French 3 factor model equation 11. This estimation used 3 years moving windows period which was estimated every year.

Table 5.4 Parameter Estimation of Airport of Thailand(AIRT) from 2009-2013

AIRT	intercept	Market_beta	SMB_Beta	HML_Beta	R_sqre
2009	-0.00019	0.5655	0.22996	0.37659	0.1785
2010	-0.00083	0.68204	0.39368	0.27696	0.24319
2011	-0.00057	0.66027	0.33969	0.19082	0.22241
2012	0.000234	0.64796	0.38167	0.18429	0.19063
2013	0.000701	0.61291	0.42223	0.06055	0.14664

After that I calculate epsilon by using data from previous calculation and I calculate ρ by take square root of R_sqre.

$$\varepsilon = (R - R_f) - (\beta_m(R_m - R_f) + \beta_s SMB + \beta_v HML + \alpha)$$

Where $(R - R_f)$ =RP and $(R_m - R_f)$ =MP

$$\rho = \sqrt{R^2}$$

Table 5.5 Epsilon calculation of AIRT

stock	Date	MP	RP	HML	SMB	alpha	beta_MP	beta_SMB	beta_HML	epsilon	Rho
AIRT	9/9/2010	-0.003924	-0.000044	-0.015034	0.000462	-0.00083	0.68204	0.39368	0.27696	0.007445	0.49315
AIRT	9/10/2010	0.004529	-0.006475	0.002378	0.013584	-0.00083	0.68204	0.39368	0.27696	-0.01474	0.49315
AIRT	9/13/2010	0.015784	0.006387	-0.001249	-0.011947	-0.00083	0.68204	0.39368	0.27696	0.001502	0.49315
AIRT	9/14/2010	-0.020017	-0.000043	-0.002029	0.01213	-0.00083	0.68204	0.39368	0.27696	0.010226	0.49315
AIRT	9/15/2010	-0.001941	-0.000044	-0.010392	0.010773	-0.00083	0.68204	0.39368	0.27696	0.000747	0.49315
AIRT	9/16/2010	0.002438	-0.012947	-0.004983	0.009352	-0.00083	0.68204	0.39368	0.27696	-0.016082	0.49315
AIRT	9/17/2010	-0.001023	-0.000044	0.002476	-0.001611	-0.00083	0.68204	0.39368	0.27696	0.001432	0.49315
AIRT	9/20/2010	-0.000265	0.006429	0.010666	-0.002728	-0.00083	0.68204	0.39368	0.27696	0.00556	0.49315
AIRT	9/21/2010	0.017118	0.006387	0.000921	-0.009966	-0.00083	0.68204	0.39368	0.27696	-0.000789	0.49315

So at 9/9/2010 I will get

ε = -0.000044-((0.68204*-0.003924)+(0.39368*0.000462)+(0.27696*-0.015034)-0.00083)=0.007445

5.1.2 Cross-sectional dispersion

Then I calculated standard deviation of ε from each month. After that calculate cross-sectional dispersion using equation 1 $\sigma_{CS} = \sigma\sqrt{1-\rho}$; where $\sigma = t\_std$. The result was shown in table 5.6.

Table 5.6 Cross-sectional dispersion of AIRT in September, 2010

Date	stock	t_std	epsilon	Rho	CS
9/9/2010	AIRT	0.015073	0.007445	0.49315	0.010731

5.2 Portfolio Construction

First, I rank cross-sectional dispersion of every stock each month then select top high deciles to selected for Top deciles cross-sectional dispersion portfolio and Top deciles cross-sectional dispersion formation period portfolio.

Table 5.7 top deciles cross-sectional dispersion of September, 2010

Date	STOCK	top_flag	t_std	CS
9/1/2010	JASM	1	0.063197	0.053194
9/1/2010	TSIA	1	0.062036	0.048037
9/1/2010	SHS	1	0.049348	0.03734
9/1/2010	TUFP	1	0.032094	0.027984
9/1/2010	BJCT	1	0.029698	0.026432
9/1/2010	CENT	0	0.029529	0.024628
9/1/2010	CPN	0	0.030711	0.023393

After then, I calculate expected return to cross-sectional dispersion to find the proportion that will be used in portfolios.

Table 5.8 Expected return of all portfolios over cross-sectional dispersion in September, 2012

Date	stock	top_flag	ex_expected	expected	top_exp_gain	top_return over_CS	Return over_CS	exp2_return over_CS	exp2_top_ret over_CS
9/17/2010	AIRT	0	0	0	0	0	0	0	0
9/17/2010	AIS	0	0	0.1657	0	0	1372.49	0	0
9/17/2010	BAYT	0	0	0	0	0	0	0	0
9/17/2010	BBLT	0	0	0.14197	0	0	4570.74	0	0
9/17/2010	BCPL	0	0	0	0	0	0	0	0
9/17/2010	BDME	0	0	0	0	0	0	0	0
9/17/2010	BECW	0	0	0.12563	0	0	554.32	0	0
9/17/2010	BHOT	0	0	0	0	0	0	0	0
9/17/2010	BJCT	1	0	0	0	0	0	0	0
9/17/2010	BPCT	0	0	0.24432	0	0	19471.61	0	0
9/17/2010	CENT	0	0	0	0	0	0	0	0
9/17/2010	CPFT	0	0	0	0	0	0	0	0

Where top_flag was a flag for top deciles portfolio and ex_expected was expected return of formation period equation 16. I calculated expected return over cross-sectional dispersion in order to use them to calculate portfolio weight, using equation 17.Then I calculated return of each stock in portfolio by using weight of each stock in portfolio weight multiply by return of each day. After that, combined every return of stocks in each day. A return of portfolio in each day was shown in table 5.9.

Table 5.9 Daily return of every portfolios.

Date	port_return	top_decile return	formation return	top_formation return
3/26/2010	-0.012796	-0.02338	0	0
3/29/2010	-0.018839	-0.00934	0	0
3/30/2010	0.029448	0.04394	0	0
3/31/2010	0.002521	-0.02956	0	0
4/1/2010	0.010677	0	0.012224	0.028171
4/2/2010	-0.000363	0	-0.013931	0.009217
4/5/2010	-0.00145	0	-0.005334	-0.009217
4/7/2010	0.008733	0	0.022449	0.062801
4/8/2010	-0.029849	0	-0.017099	-0.044452
4/9/2010	0.006129	0	-0.004047	0.00905
4/12/2010	-0.032278	0	-0.03905	-0.065139
4/16/2010	-0.028246	0	-0.022614	-0.039221

5.3 Performance Evaluation

Table 5.10 Regression result of cross-sectional dispersion portfolio

Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	**1**	**0.00022477***	0.00010708	2.1	0.036
MP	**1**	**0.92258***	0.01262	73.11	<.0001
SMB	**1**	**-0.03692***	0.01615	-2.29	0.0224
HML	**1**	**0.03655***	0.01269	2.88	0.004

Table 5.10 can be implied that using cross-sectional dispersion to weight all stock from SET50 I got significant positive alpha which implied that this portfolio has excess return.

Table 5.11 Regression result of top deciles cross-sectional dispersion portfolio

Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.00002832	0.000316	-0.09	0.9286
MP	1	0.61995*	0.03669	16.9	<.0001
SMB	1	0.3219*	0.04735	6.8	<.0001
HML	1	-0.04187	0.03706	-1.13	0.2588

Table 5.11 can be implied that using top deciles cross-sectional dispersion has insignificant alpha.

Table 5.12 Regression result of formation period cross-sectional dispersion portfolio

Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.00072591*	0.0001602	-4.53	<.0001
MP	1	0.64314*	0.01869	34.41	<.0001
SMB	1	0.02131	0.02391	0.89	0.3729
HML	1	0.05465*	0.01826	2.99	0.0028

Table 5.12 can be implied that using formation period cross-sectional dispersion has significant negative alpha which implied that this portfolio has negative excess return.

Table 5.13 Regression result of top formation period cross-sectional dispersion
portfolio

Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.00044668*	0.00016	-2.8	0.0052
MP	1	0.10801*	0.01786	6.05	<.0001
SMB	1	0.02382	0.02348	1.01	0.3106
HML	1	0.0153	0.019	0.81	0.4206

Table 5.13 can be implied that using top deciles cross-sectional dispersion
formation period has significant negative alpha which implied that this portfolio has
negative excess return. After that I calculate appraisal ratio and adjust appraisal ratio
of every stock.

Table 5.14 Appraisal ratio of portfolios

	portfolio return	top_deciles return	formation period return	top_formation return
appraisal ratio	0.04684	-0.0014839	-0.09317533	-0.0297103
Adj. appraisal ratio	0.14547	-0.0019326	-0.1674261	-0.0325473

Table 5.14 show that only portfolio which using cross-sectional
dispersion to weight all stock from SET50 has positive appraisal ratio and positive
adjusted appraisal ratio.
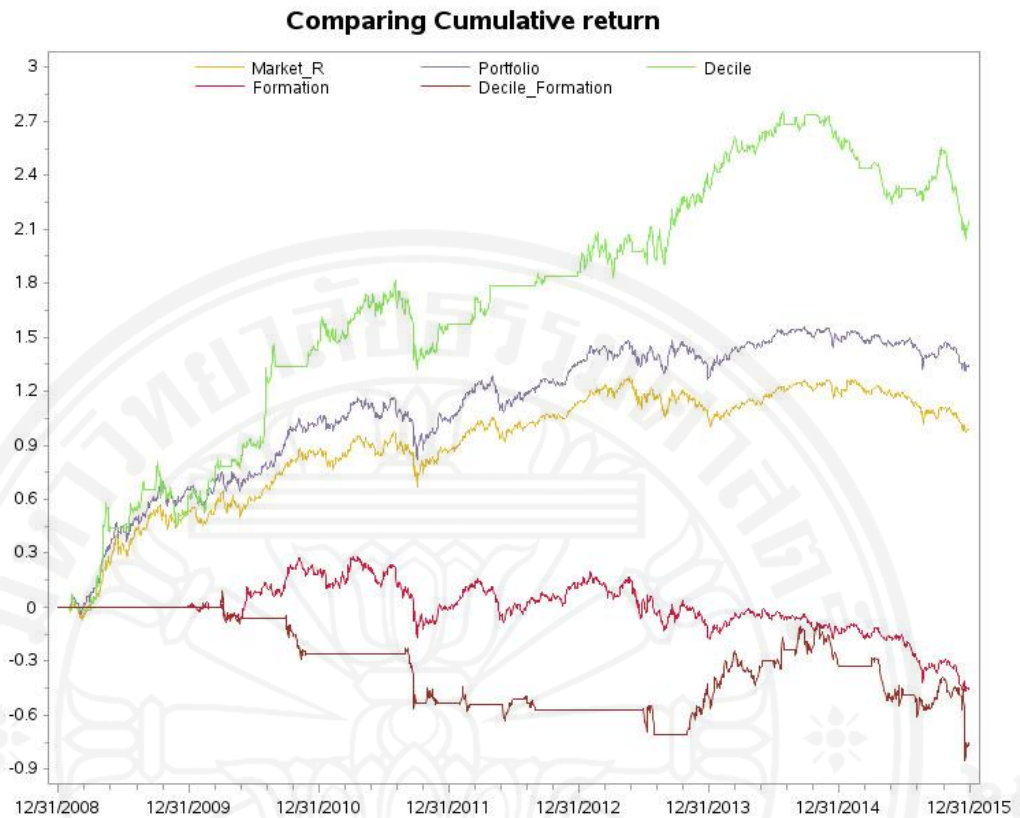
Figure 5.1 Cumulative return of market and portfolios

Figure 5.1 show that portfolios that use latest 3 months target price data outperform SET50 index while formation period portfolios underperform SET50 which may conclude that 1 year target price is not appropriated while latest 3 months target price is more appropriate to use with this strategy.

Table 5.15 Statistic data of portfolios

Variable	Total return	Mean	Std Dev	Minimum	Maximum
Market Return	0.985734	0.000553	0.012985	-0.0584662	0.0721626
Portfolio Return	1.3441	0.000772	0.013447	-0.0689599	0.0633144
Top_deciles return	2.147118	0.001257	0.022009	-0.1198176	0.1640681
Information_period return	-0.45238	-0.00027	0.012541	-0.0745337	0.074535
Top_Information Period return	-0.76654	-0.00045	0.015299	-0.2121133	0.1126857

Table 5.15 show the risk and statistic data of each portfolios. Top_deciles portfolios has highest risk while information_period return has lower risk which lower than market. I can see that portfolios that used latest 3 months target price beat market return in both total return and mean return.

Table 5.16 correlation of market and portfolios

	Market return	portfolio return	top_deciles return	information period return	top_information return
Market return	1	0.93312 <.0001	0.53357 <.0001	0.71312 <.0001	0.31243 <.0001
portfolio return	0.93312 <.0001	1	0.509 <.0001	0.72765 <.0001	0.28724 <.0001
top_deciles return	0.53357 <.0001	0.509 <.0001	1	0.41326 <.0001	0.44895 <.0001
information period return	0.71312 <.0001	0.72765 <.0001	0.41326 <.0001	1	0.32775 <.0001
top_information return	0.31243 <.0001	0.28724 <.0001	0.44895 <.0001	0.32775 <.0001	1

Table 5.16 show that by using all of SET50 stock to build portfolio, I diversified the risk of misidentify future winners and losers which made this portfolio has corresponded movement with the market at 0.93312 correlation.

The most important factor that controls successfulness of active portfolio is Information coefficient or manager skill which in this case is target price from analyst, which Gorman, Sapra, Weigand (2010) said, by using risk diversification for modern portfolio theory, I could interpreted from either a pure time series or cross-sectional perspective. I could summarize that: when active investor increased the number of stocks in a portfolio, they were diversifying away the risk of misidentifying future winners and losers. Furthermore, top deciles portfolio has significant negative alpha while cross-sectional dispersion has significant positive alpha. According to this, I may conclude that analyst target price is not appropriate as target price for this study.

CHAPTER 6
CONCLUSIONS AND RECOMMENDATIONS

This paper studied an active portfolio management by using cross-sectional dispersion as risk measure and tool to detected opportunities in specific event, based on Gorman, Sapra, Weigand (2010) research. In this study, target price forecast from analyst was used as an expected return, which was manager skill, and I used SET50 index as a benchmark index.

Empirical analysis showed that by using cross-sectional dispersion with formation period of one year got significant negative alpha, appraisal ratio, adjusted appraisal ratio and cumulative return lower than market. I may conclude that one year formation period is not appropriate for using as target price of this strategy, while using latest 3 months target price outperform market in term of cumulative return. But if I consider the regression result I can see that only portfolio that use every SET50 stock has positive alpha, appraisal ratio, and adjusted appraisal ratio. According to this, I may conclude that I can use cross-sectional dispersion as a risk measure to build portfolio that has significant positive alpha and outperform market.

For further studies, it is interesting to test cross-section dispersion with other model because this strategy depend heavily on how well the model describes the stock which lead to cross-sectional dispersion value. Furthermore, it might be possible to find another representative for expected return, which used to calculate stock weight that determined successful of active portfolio management.

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APPENDIX

APPENDIX A

LIST OF STOCK USING TO BUILD SMB HML DATA EACH YEAR

stock	SET	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
AIS	ADVANC	1	1	1	1	1	1	1	1	1	1
PAKO	AMATA	0	1	1	0	0	0	0	0	0	0
AIRT	AOT	1	1	1	1	1	1	1	1	1	1
AROM	ATC	1	1	0	0	0	0	0	0	0	0
BPCT	BANPU	1	1	1	1	1	1	1	1	1	1
BAYT	BAY	1	1	1	1	1	1	1	1	1	1
BBLT	BBL	1	1	1	1	1	1	1	1	1	1
BCPL	BCP	0	0	0	0	1	0	1	1	1	1
BECW	BEC	1	1	1	1	1	1	1	1	1	1
BECL	BECL	1	1	1	0	1	0	0	0	0	0
BDME	BDMS	1	1	1	1	1	1	1	1	1	1
BHOT	BH	1	1	1	1	1	1	1	1	1	1
SKGC	BIGC	0	0	0	1	1	1	1	1	1	1
BJCT	BJC	0	0	0	0	0	0	1	1	1	1
BANL	BLA	0	0	0	0	0	1	1	1	1	0
TANA	BTS	0	0	0	0	0	1	1	1	1	1
CCEL	CCET	0	1	1	1	0	0	0	0	0	0
CENT	CENTEL	0	0	0	0	0	0	0	0	1	1
KAR	CK	1	0	0	0	0	0	0	0	1	1
CPSE	CPALL	1	1	1	1	1	1	1	1	1	1
CPFT	CPF	1	1	1	1	1	1	1	1	1	1
CPN	CPN	1	1	1	1	1	1	1	1	1	1
DCC	DCC	0	0	0	0	0	1	1	0	0	0
DELT	DELTA	1	1	1	1	1	1	1	1	1	1
TACM	DTAC	0	0	1	1	1	1	1	1	1	1
ELG	EGCO	1	1	0	1	1	1	1	1	1	1
ESOT	ESSO	0	0	0	1	1	1	1	1	0	0
SGHX	GLOBAL	0	0	0	0	0	0	0	0	1	0
GLWM	GLOW	1	1	1	1	1	1	1	1	1	1
HANA	HANA	1	1	1	1	1	0	0	0	0	0
HPC	HMPRO	0	0	0	0	0	1	1	1	1	1
SHNW	INTUCH	1	0	0	0	0	0	0	1	1	1
TPI	IRPC	0	1	1	1	1	1	1	1	1	1
ITAL	ITD	1	1	1	1	0	0	0	0	0	0
ITVV	ITV	1	0	0	0	0	0	0	0	0	0
INVX	IVL	0	0	0	0	0	1	1	1	1	1
JASM	JAS	0	0	0	0	0	0	0	1	1	1

stock	SET	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TFBT	KBANK	1	1	1	1	1	1	1	1	1	1
KEST	KEST	1	0	0	0	0	0	0	0	0	0
KNFT	KK	1	1	1	0	0	1	0	1	0	0
KSLM	KSL	0	1	1	1	1	0	0	0	0	0
KTBT	KTB	1	1	1	1	1	1	1	1	1	1
LAHT	LH	1	1	1	1	1	1	1	1	1	1
CIGR	MAJOR	0	0	1	0	0	0	0	0	0	0
MAKR	MAKRO	1	1	1	1	1	1	1	1	0	0
MCOT	MCOT	1	1	1	1	1	0	0	0	0	0
RGRT	MINT	0	1	1	1	1	1	1	1	1	1
PST	PS	0	0	1	1	1	1	1	1	1	1
PSL	PSL	1	1	1	1	1	0	0	0	0	0
PTTB	PTT	1	1	1	1	1	1	1	1	1	1
PTTA	PTTAR	0	0	1	1	1	1	0	0	0	0
PTPC	PTTCH	1	1	1	1	1	1	0	0	0	0
PTTE	PTTEP	1	1	1	1	1	1	1	1	1	1
PTTG	PTTGC	0	0	0	0	0	0	1	1	1	1
QUHO	QH	0	0	0	1	1	0	0	0	0	0
RATE	RATCH	1	1	1	1	1	1	1	1	1	1
RCCT	RCL	1	1	1	0	0	0	0	0	0	0
ROBN	ROBINS	0	0	0	0	0	1	1	1	1	1
SBBT	SCB	1	1	1	1	1	1	1	1	1	1
SCQT	SCC	1	1	1	1	1	1	1	1	1	1
SCCT	SCCC	1	1	1	1	1	1	1	1	1	1
SCBT	SCIB	1	1	1	1	1	0	0	0	0	0
SPLA	SPALI	0	0	0	0	0	0	1	1	0	1
SAV	SSI	1	1	0	0	0	1	0	0	0	0
STAI	STA	0	0	0	0	0	1	1	0	0	0
NFST	TCAP	1	1	1	1	1	1	1	1	1	1
TAI	THAI	1	1	1	1	1	1	1	1	1	0
SHS	THCOM	1	0	0	0	0	0	0	0	1	1
TIST	TISCO	1	1	0	0	0	1	1	1	0	0
TMBT	TMB	1	1	1	1	1	1	1	1	1	1
THOI	TOP	1	1	1	1	1	1	1	1	1	1
TPCT	TPC	1	1	1	1	1	0	1	0	0	0
TPIP	TPIPL	1	1	1	0	0	1	1	0	0	0
NTS	TSTH	0	0	0	1	1	0	0	0	0	0
TSIA	TRUE	1	1	1	1	1	1	1	1	1	1
THTA	TTA	1	1	1	1	1	0	0	0	0	0
TAP	TTW	0	0	0	1	1	1	0	1	1	1
TUFP	TUF	1	1	1	1	1	1	1	1	1	1

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