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Equity sector investing over business cycles: The case of Thailand

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Abstract

This paper applied the business cycle approach to sector investing by using monthly sector returns in The Stock Exchange of Thailand (SET) from January 2004 to March 2018. It was found that construction material performed better than other stock sectors in the recovery stage. In the expansion stage, commerce, finance & securities, and paper & printing materials were top performers. In the contraction stage, commerce and health care services gave significant positive Jansen's alpha while automotive and finance & securities sectors showed significant negative Jansen's alpha. The overall results were in alignment with previous study and investment recommendations especially for the contraction stage. The results of this study provide practical recommendations to investors on which stock sector to focus on along the different stages of the business cycle.

Introduction

There has been a growing debate about the interrelation between equity investing and business cycles. The issue has gained growing attention among both academics and practitioners in recent years. Understanding various asset classes' characteristics can help identify points in the business cycle when they traditionally do well (Pring, 1992). Different stages of the business cycle inevitably connect with the risk and return of equities associated with different underlying industries or sectors. Therefore, stock returns can respond differently to economic factors depending on the economy's stage (DeStefano, 2004). This study aimed to explore which stock sectors should be recommended to invest in at each business cycle stage according to risk-adjusted return framework.

Literature Review

In principle, real economic growth translates into higher profits for firms and shareholders (Ritter, 2005); therefore, we can expect higher stock returns along with economic growth, and vice versa. Empirically, Singh, Mehta, and Varsha (2011) found a positive relationship between GDP and stock returns in Taiwan. Similarly, Amtiran, Indiastuti, Nidar and Masyita (2017) found significant positive beta for GDP in the APT model studying sensitivity of macroeconomic factors and stock returns in Indonesia. On the other hand, Hamilton and Lin (1996) found that economic recessions are the main factor that drives fluctuations in the volatility of stock returns.

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To explore the relationship between business cycle stages and stock returns, DeStefano (2004, pp. 527–547) investigated data in the U.S. stock market and business cycle using dummy variables for each of the four business cycle stages (early expansion, late expansion, early recession, and late recession) and found that stock returns decrease throughout the economic expansion and become negative during the first half of recession. The largest stock returns were found in the late recession stage, which suggested possible expected earnings effect where the investors expect future, increasing earnings in late recession stage similarly to late expansion stage where the investors expect the future decline in earnings; therefore, stock returns slow down.

As an attempt to study the sector rotation strategy over the different stages of business cycles, Stangl, Jacobsen, and Visaltanachoti (2008) determined business cycle stages using peak and trough dates from NBER, which enable separate expansion and recession phases. The authors estimated excess market industry performance across the business cycle and reported Jansen's alpha used for each business cycle stage. Unfortunately, there were only 5 industries with significant outperformance in the stage where they should perform. Another study conducted by Song and Qian (2017) used 3 methodologies to investigate the relationship between sectoral stock returns over 10 sectors of the U.S. stock market (by Dow Jones sectoral indexes system) and the U.S. business cycle. To evaluate sectoral stock return behavior over the business cycles, Song and Qian (2017, p. 84) used a similar method with DeStefano (2004) to identify the business cycle stages. The results found that positive and significant parameters were detected in the recovery stage with finance, energy, industrial, and consumer goods (ranked in the dummy variable coefficient's magnitude, respectively). In the prosperity stage, positive and significant parameters were detected with energy, basic materials, industrials, and technology. In the recession stage, negative and significant parameters were detected with telecommunication and utilities. In the depression stage, negative and significant parameters were detected with finance, industrials, energy, utility, and U.S. whole market. Song and Qian (2017) concluded that it was apparent that the business cycle and sectoral stock returns have a close relationship.

In addition, Maniam and Lee (2018) examined the market liberalization policy in Malaysia on the sectoral stock market using Dynamic Fixed Effect method to analyze stock market liberalization policy's efficiency and effectiveness on stock market performance using stock return in the finance sector and service sector. The results revealed that the liberalization policy has a positive significant impact on the service sector but not on the finance stock sector return.

Methodology

Theoretical Background

Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT) have been the two major models to demonstrate capital asset return in association with risk with the ground principle that capital assets with the same level of systematic risk should have the same level of expected return. The difference between CAPM and APT is CAPM considered a market risk as the only systematic risk measured by the beta coefficient in the model, while APT considered more systematic risk factors expressed by the sensitivity of return to the numbers of risk factors (Huberman, 2005).

Leković and Stanišić (2018) described that securities' return is a function of market risk, but in the APT model return of security assets is a function of multiple unknown risk factors. Theoretically, the APT model should explain the unclear part that was unexplained by the CAPM model. However, controversies still occur in literature, and neither of these two models is perfect nor superior to another (Leković &Stanišić, 2018).

Considering that there is no consensus on which model is better to analyze sectoral stock returns in different stages of the business cycle; therefore, this study analyzed risk- adjusted sectoral stock performance along the different stages of the business cycle using the CAPM model to calculate the beta value of each equity sector, then evaluated with modified Jansen's alpha equation by incorporating business cycle stage dummy into alpha value as indicated by an interaction term representing Jansen's alpha in the different stage of the business cycle. Jansen's alpha is a measurement of risk-adjusted performance, reflecting the average stock return given its beta value from the CAPM equation; therefore, the modified Jansen's alpha incorporating business cycle stage dummy can be utilized to compare risk-adjusted sectoral stock returns in the different business cycle stages.

Data Collection

The samples being used in the study included 24 stock sectors from The Stock Exchange of Thailand (SET). Four sectors (Construction Services, Industrial Materials

& Machinery, Property Fund & REIT, and Steel) were excluded due to incomplete data during the study period due to different sector categorization methodology in the different time periods. The primary analysis of sectoral stock returns in this study was based on the Thailand stock market that had never been studied in this area. The data were exported from Thomson Reuters Eikon Datastream in monthly frequency within the period of 1 January 2002 to 31 December 2019; however, the period was narrowed down to 1 January 2004 to 31 March 2018 for the study of business cycle due to its clear stage identification. There was a total of 171 observations for time-series analysis.

To identify business cycle stages, the methodology from Talthip and Sukcharoensin (2021) was modified, starting with defining local maxima and local minima in the real GDP growth (YoY, Seasonally Adjusted) chart. Local maxima are the highest value between two points where the real GDP growth curve crosses over the horizontal steady zero-growth line. Local minima are the lowest value between two points where the real GDP growth curve crosses over the horizontal steady zero-growth line. Then, the real GDP growth path was divided into growth (incline) and contraction (decline) phases. The growth phase was further divided into recovery and expansion stages using a horizontal steady zero-growth line. The recovery stage is the stage of negative real GDP growth, but the real GDP growth recovered from local minima up to a steady zero-growth line (inclining from trough to the horizontal steady zero-growth line). The expansion stage represents positive real GDP growth in an uptrend, moving apart from a horizontal steady zero-growth line towards the local maxima (inclining from horizontal steady zero-growth line to the peak). The contraction stage is the stage of declining real GDP growth from local maxima towards local minima (declining from peak to trough). Figure 1 demonstrates the stages of business cycle using the methodology described above.

Table 1 shows reference business cycle dates and stage partition of the business cycle in Thailand during the study period.

The relationship between the real GDP growth (YoY, Seasonally Adjusted) and the stock market return (YoY) in Thailand during the study period (1 January 2004 to 31 March 2018) can be demonstrated as the graphical presentation in Figure 2.

The descriptive statistics and correlation with stock market return for each stage of business cycle are demonstrated in Table 2.

The descriptive statistics show that the expansion stage has highest mean and volatility of real GDP growth. The recovery stage has highest correlation with stock market return however the sample size for recovery stage marked too small.

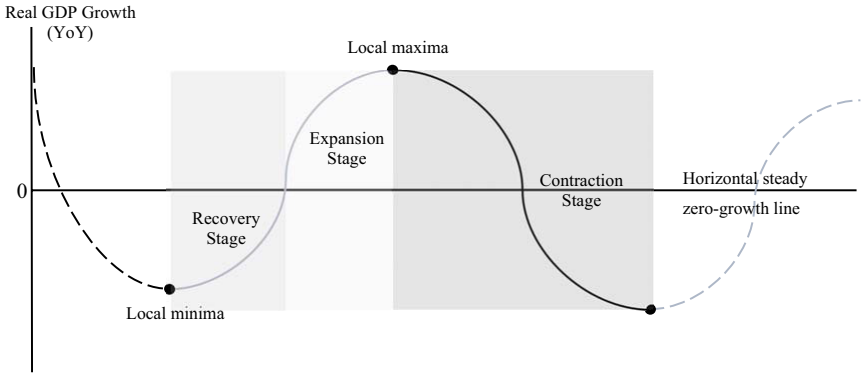

Figure 1 The business cycle stages using real GDP growth curve and steady zero-growth line

Table 1 Reference business cycle dates and stage partitions

Recovery	Expansion	Contraction
Apr 2009 – Sep 2009	Oct 2009 – Mar 2010	Jan 2004 – Mar 2009
Jan 2012 – Mar 2012	Apr 2012 – Dec 2012	Apr 2010 – Dec 2011
	Apr 2014 – Mar 2018	Jan 2013 – Mar 2014

Note: Use real GDP growth data (YoY, seasonally adjusted) together with a steady zero-growth line for business cycle stages identification.

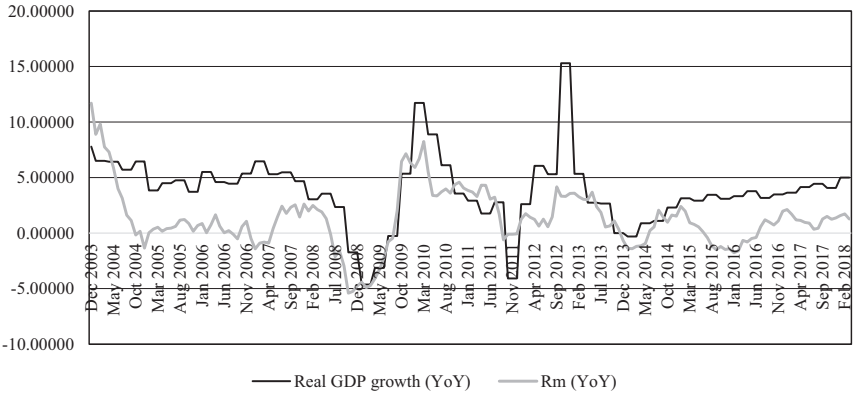

Figure 2 Comparison of Plotted Chart between Real GDP Growth (YoY) and Stock Market Return (YoY) in Thailand during period December 2003 to March 2018
Source: Author's plot based on Thailand real GDP growth (YoY, SA) from CEIC database and stock market return (Rm) data from Thomson Reuters Datastream

Table 2 Descriptive statistics of each business cycle stage and correlation with the stock market return

Business cycle stage	Number of months in the study period	Real GDP growth (Average)	Real GDP growth (Standard Deviation)	Correlation with stock market return
Recovery stage	9	-0.26	2.48	0.88
Expansion stage	63	4.67	3.23	0.59
Contraction stage	99	3.64	2.96	0.56

Data Analysis

From the previous section, the CAPM model was used to find the beta value of each stock sector. To evaluate risk-adjusted performance, Jansen's alpha equation was modified by introducing an interaction term between the alpha value and dummy variables α_i*D_s representing Jansen's alpha in each stage of the business cycle under the assumption that risk-adjusted return varies along the business cycle stages. Therefore, the Jansen's alpha equation in this study was modified by introducing dummy variables, representing each business cycle stage identified in Table 1, as described in Equation (1).

$$\sum\alpha_i*D_s = R_{i,t} - [R_{f,t} + \beta_i*(R_{m,t} - R_{f,t})] \quad (1)$$

For previously defined 4 different stages of the business cycle, the regression model can be specified as Equation (2), which can be consecutively rearranged as Equation (3):

$$\alpha_i*D_{recovery} + \alpha_i*D_{expansion} + \alpha_i*D_{contraction} = R_{i,t} - [R_{f,t} + \beta_i*(R_{m,t} - R_{f,t})] \quad (2)$$

$$\text{or } R_{i,t} - R_{f,t} = \alpha_i*D_{recovery} + \alpha_i*D_{expansion} + \alpha_i*D_{contraction} + \beta_i*(R_{m,t} - R_{f,t}) \quad (3)$$

where $R_{i,t}$ is a return of the stock in sector i at time t, $R_{f,t}$ is the risk-free rate at time t, $(R_{m,t} - R_{f,t})$ is market risk premium or excess market return over the risk-free rate at time t, D_s is dummy variable representing s^{th} stage of the business cycle, which are $D_{recovery}$ for recovery stage, $D_{expansion}$ for expansion stage, and $D_{contraction}$ for contraction stage, and β_i represents the systematic risk (market risk) of stock in sector i during the study period. The beta value cannot be made specific to each business cycle stage due to limitation of the amount of data in recovery period, which causes insignificance of the value; therefore, beta value of the whole study period was used for each stock sector.

Results

The descriptive statistics of sectoral stock returns are presented in Table 3.

Table 3 Descriptive Statistics of Sectoral Stock Returns during 1 Jan 2002 – 31 Dec 2019

Sector	Mean Return	Median Return	Max Min	*SD*	Skewness	Kurtosis	Jarque-Bera (Prob.)	Sum Sq. Dev
Rm	0.87433	1.11997	19.52231 -30.17568	5.56116	-0.70462	7.27784	181.7277 (0.0000)	6618.275
AGRI	0.62328	0.29537	22.34548 -24.19583	6.88262	0.12932	4.08229	11.09262 (0.0039)	10137.28
AUTO	0.65100	0.19746	35.66389 -24.21564	6.70125	0.84042	7.69620	222.8795 (0.0000)	9610.057
BANK	0.66204	0.89242	31.82638 -28.6476	6.64066	0.03409	5.99683	80.49657 (0.0000)	9437.039
COMM	1.55296	1.62567	20.69477 -24.46749	5.55266	-0.15415	5.20461	44.39159 (0.0000)	6598.051
CONMAT	0.90928	0.52400	20.55461 -26.90616	6.82230	0.02960	4.49434	20.03618 (0.0000)	9960.354
ETRON	0.43321	0.77780	29.81880 -32.9031	7.38431	-0.15777	5.70132	66.26189 (0.0000)	11669.01
ENERG	1.25950	1.80724	53.28470 -32.83434	7.673063	1.073063	13.57867	1043.836 (0.0000)	12599.44
FASHION	0.28601	-0.01076	15.99750 -10.71775	3.61947	0.90465	5.88485	103.8804 (0.0000)	2803.522
FIN	0.94133	1.01354	27.84329 -34.94846	7.54052	-0.32130	5.59177	63.87499 (0.0000)	12167.93
FOOD	0.99564	1.15805	15.53482 -24.98639	5.19336	-0.53166	5.54147	67.99128 (0.0000)	5771.782
HELTH	2.17303	1.84033	34.22415 -27.82078	6.51155	0.37050	7.09308	155.0006 (0.0000)	9073.660
HOME	0.57129	0.32237	42.18750 -25.93699	6.88578	0.88501	10.21505	494.4100 (0.0000)	10146.59
ICT	0.81208	0.87658	28.60119 -22.73476	6.95518	0.02751	4.65990	24.70974 (0.0000)	10352.16
INSUR	0.96029	0.82440	16.87874 -20.55608	4.76919	-0.15938	5.34484	50.16557 (0.0000)	4867.459
MEDIA	0.27204	0.16807	26.31579 -37.28240	6.51642	-0.58501	8.42951	276.3510 (0.0000)	9087.235
MINE	0.31037	0.00000	59.25373 -50.87311	12.12256	0.55278	7.16859	166.6195 (0.0000)	31448.70
PKG	0.83667	-0.04941	41.75017 -26.69015	7.96838	0.82285	7.30422	190.2275 (0.0000)	12930.58
PERSON	0.69781	0.59685	60.66151 -23.99967	7.77324	2.28643	20.63890	2974.537 (0.0000)	12930.58
PETRO	1.40815	1.29159	36.0465 -40.64502	9.55240	0.08981	6.13159	88.13687 (0.0000)	19527.15
PAPER	1.46535	0.62887	53.94718 -18.69953	8.68487	1.61610	9.54857	477.7562 (0.0000)	16141.37
PROF	0.35915	-0.07216	58.98125 -41.13022	10.77714	0.90625	8.35678	286.4895 (0.0000)	24855.41
PROP	0.97695	1.25241	33.23853 -34.46774	8.05363	0.18194	5.24599	46.37625 (0.0000)	13880.24
TOURISM	0.71314	0.68658	23.44946 -22.45856	5.61188	0.22795	6.20022	93.60783 (0.0000)	6739.533
TRANSP	1.28553	1.58053	27.74019 -41.29515	7.78316	-0.63883	7.83258	223.8346 (0.0000)	12963.61

Source: Author's calculation based on monthly market and sector returns data in The Stock Exchange of Thailand from Thomson Reuters Datastream

Table 4 demonstrates the regression results from econometric analysis utilizing the modified Jansen's alpha equation incorporating business cycle stage dummy.

Table 4 Regression analysis results of sectoral stock return and Jansen's alpha in the different stages of business cycle during period January 2004 to March 2018

Sector	β_i	$\alpha_{i,recovery}$ (Prob.)	$\alpha_{i,\ expansion}$ (Prob.)	$\alpha_{i,\ contraction}$ (Prob.)	Adjusted R^2
Agribusiness	0.677845	3.637392 (0.0544)	0.242796 (0.7327)	0.085149 (0.8800)	0.318655
Automotive	0.681464	2.149337 (0.1420)	0.430649 (0.4353)	-1.266314 (0.0043)	0.447457
Banking	1.072954	1.266824 (0.2246)	-0.147395 (0.7080)	-0.018030 (0.9540)	0.793089
Commerce	0.702860	1.219986 (0.3582)	1.119547 (0.0266)	1.256766 (0.0018)	0.495262
Construction materials	0.986605	2.950556 (0.0104)	0.056192 (0.8962)	-0.649923 (0.0587)	0.729529
Electronic components	0.856581	3.252152 (0.0655)	-0.062998 (0.9244)	-0.324395 (0.5385)	0.459895
Energy & Utilities	1.214959	-2.383607 (0.0804)	-0.296740 (0.5632)	0.745782 (0.0684)	0.741715
Fashion	0.267009	-1.169368 (0.2478)	0.152493 (0.6896)	-0.511651 (0.0926)	0.200272
Finance & Securities	1.031887	-0.551489 (0.6948)	1.307170 (0.0147)	-0.835498 (0.0488)	0.660883
Food & Beverage	0.693993	1.407452 (0.2440)	0.116193 (0.7984)	0.380368 (0.2928)	0.540160
Health care services	0.567204	0.433726 (0.8057)	1.029458 (0.1237)	1.514707 (0.0047)	0.264918
Home & Office Products	0.624046	0.658713 (0.7176)	0.742101 (0.2817)	-0.780400 (0.1544)	0.296958
ICT	0.803724	-0.320808 (0.8488)	-0.778456 (0.2220)	0.627945 (0.2146)	0.449045
Insurance	0.438973	1.052416 (0.4623)	0.231924 (0.6681)	0.541412 (0.2082)	0.246938
Media & Publishing	0.892353	-2.189434 (0.1626)	-0.283692 (0.6313)	-0.315796 (0.5011)	0.535211
Mining	1.003554	-4.054591 (0.2047)	0.969248 (0.4218)	-0.121697 (0.8988)	0.261109
Packaging	0.777074	-1.202337 (0.5704)	0.143786 (0.8575)	-0.255487 (0.6877)	0.317220
Personal products & Pharmaceuticals	0.294071	0.512970 (0.8006)	-0.004358 (0.9955)	0.580077 (0.3417)	0.060029
Petrochemicals & Chemicals	1.364664	1.148557 (0.5531)	0.168206 (0.8182)	0.248537 (0.6687)	0.636693
Paper & Printing materials	0.314645	0.857475 (0.7672)	2.720627 (0.0138)	-0.045624 (0.9581)	0.048911
Professional services	0.889030	-1.744437 (0.6137)	-0.025138 (0.9846)	-0.804290 (0.4381)	0.182753
Property development	1.193801	1.825195 (0.1712)	0.127663 (0.7996)	-0.614424 (0.1249)	0.741203
Tourism & Leisure	0.544064	-1.665250 (0.2919)	0.796961 (0.1825)	0.180988 (0.7022)	0.297397
Transportation & Logistics	1.037809	2.423944 (0.0942)	0.840554 (0.1244)	-0.452187 (0.2967)	0.649535

Note: Bolded for sectors with statistically significant coefficient from author's calculation based on monthly sector returns data in The Stock Exchange of Thailand from Thomson Reuters Datastream.

Discussion

The methodologies in defining stages of the business cycle are different among studies. DeStefano (2014); Song and Qian (2017) used a similar method by using NBER defined peak and trough dates then divided expansion into early expansion (recovery) and late expansion (prosperity) and divided contraction into early contraction (recession) and late contraction (depression) by using middle point of the span.

This study used real GDP growth path to divide inclining growth phase and declining growth phase between local minima and local maxima, then used a horizontal steady zero-growth line of real GDP growth as a cut point between positive and negative output growth to separate inclining growth phases into recovery and expansion stages. Finally, the business cycle was defined with 3 stages; namely, recovery, expansion, and contraction. The methodology was modified from Talthip and Sukcharoensin (2021).

Table 5 demonstrates the comparison of sectoral allocation recommendations along the different stages of the business cycle between this study and literature.

As the methodology in defining stages of the business cycle was different, stage to stage comparison between this study and other studies cannot be made directly.

From this study, construction material is the only sector that has significant positive Jansen's alpha in the recovery stage. This is indirectly aligned with previous recommendations by Song and Qian (2017) and Fidelity (2020) in that industrial and material sectors perform well in the recovery stage. The explanation is possibly the anticipation of increasing demand for production and construction when the economy moves from the bottom-out to the expansion stage. Theoretically, the banking and finance sector should also grow with economic recovery due to increasing demand for investment and business operations as suggested by Song and Qian (2017) and Fidelity; however, the Jansen's alpha value in our study was not significant in the recovery stage but significantly positive in the following expansion stage instead. Recommendations of sectoral investment in the expansion or prosperity stage are different among different data sources, reflecting the different business and economic structures of the markets. The results from different sources of recommendations including this study conclude that consumer products (or commerce) and health care services perform better than other sectors in the contraction stage. In this study, automotive and finance & securities sectors have significant negative Jansen's alpha in the contraction stage suggesting avoiding for investment. This is possibly due to a decrease in demand in the automotive sector in the contraction economy as it represents luxury or non-basic living goods. Besides, demand for business finance also decreases in the contraction stage of the economy.

This study helps the investor to understand which stock sector to focus on or avoid in each stage of the business cycle. Despite the peak and trough of the business cycle, stages can be confirmed only when we observe the real GDP growth curve crossing the

Table 5 Comparison of portfolio management recommendations between Song & Qian (2017), investment website (fidelity.com) and this study

Source	Recovery	Prosperity	Recession	Depression
Song & Qian (2017)	**Financials** Oil & Gas Industrials **Consumer**	Oil & Gas Health care Utilities US market	Estimated parameters of all stock sectors have a negative sign.	**Estimated parameters of all stock sectors have a negative sign**
Source	Early cycle (Rebounds)	Mid-cycle (Peaks)	Late cycle (Moderates)	Recession (Contracts)
Investment website (fidelity.com, 2020)	**Financials** **Real estate** **Consumer** ICT Industrials Materials	Communication Services	Materials **Consumer** **Health Care** **Energy** **Utilities**	**Consumer** **Health Care**
Source	Recovery	Expansion	Contraction	
This Study	Construction Materials	Commerce Finance & Securities Paper & Printing Materials	**Commerce** **Healthcare** (Negative sign for Automotive and Finance & Securities)	

Note: Bolded sectors represent at least two-third of the comparison provide recommendations to invest in each particular stage of the business cycle.

horizontal steady zero-growth line twice backward. We can still be aware of the following stage when we notice the confirmation. Many attempts to identify peak and trough before confirmation of real GDP growth curve crossing the horizontal steady zero-growth line, such as observing changes of the incline or decline slope of real GDP growth curve or using the moving average line, is still a challenge.

Conclusion and Recommendation

From the empirical results, implications for investment and portfolio management across the different stages of the business cycle can be summarized as:

1. Construction material performs best in the recovery stage of the business cycle compared with other stock sectors.

2. The recommendations for strategic sectoral investment in the expansion or prosperity stage of the business cycle vary. This is possibly due to different characteristics of business and economy in each market. From this study, which analyzed the data in Thailand, it was found that commerce, finance & securities, and paper & printing materials perform better than other stock sectors in the expansion stage.

3. In the contraction stage, commerce and health care sectors perform better than other stock sectors. Automotive and finance & securities have significant negative Jansen's alpha; therefore, should be avoid in this stage.

Conflict of Interest

There is no conflict of interest.

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