

The profitability of Bollinger Bands: Evidence from the constituent stocks of Taiwan 50

Akira Matsue

Nakatsuma Seminar
Keio University

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Thesis Information

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- Author: Yensen Ni, Min-Yuh Day, Paoyu Huang, Shang-RuYu
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Abstract

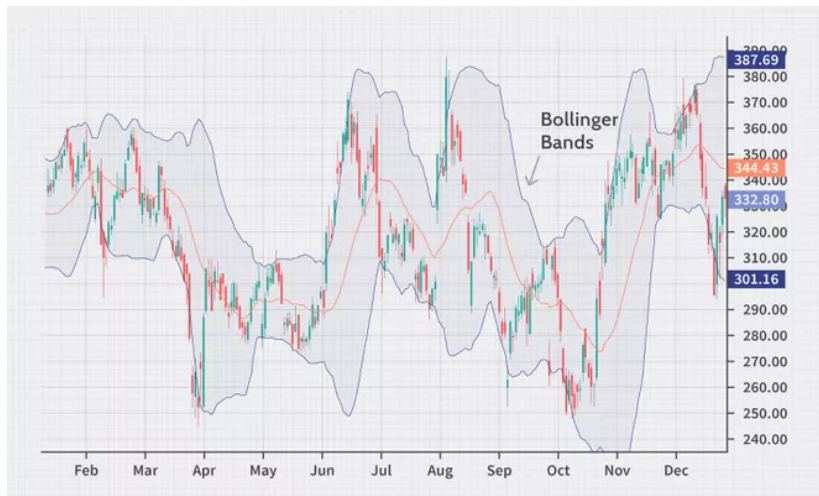
We employ the constituent stocks of Taiwan 50 as our sample and explore if investors can beat the market by trading them as trading signals emitted by Bollinger Bands (BBs).

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Bollinger Bands

A technical analysis tool defined by a set of trendlines plotted two standard deviations (positively and negatively) away from a moving average (MA) of a security's price.



1. Introduction

Background

Bollinger Bands (BBs) are one of the most prevalent strategies among numerous technical indicators. Presently, most financial websites, such as Bloomberg, provide technical analysis charts for BBs.

Purpose

Exploring if investors might beat the market by trading any of these constituents' stocks as the trading signals emitted by Bollinger Bands (BBs) trading rule instead of investing an index fund.

Sample

The constituent stocks of Taiwan 50 over the period of 2007–2016

2. Literature review

Market efficiency

- The degree to which market prices reflect all available, relevant information.
- If markets are efficient, then all information is already incorporated into prices, and so there is no way to "beat" the market because there are no undervalued or overvalued securities available.

2.1. The literature related to market efficiency and inefficiency

The stock market becomes more and more efficient over time.

2. Literature review

2.2. The literature related to technical analysis

- Stock markets may not be fully rational since technical analysis may exploit the valuable information.
- Technical analysis is profitable in stock markets and has value for investors.

2.3. The literature related to investing strategies

Profitability of momentum strategies and contrarian strategies

Momentum strategy: An investment strategy that aims to capitalize on the continuance of an existing market trend

Contrarian strategy: An investment strategy that involves bucking against existing market trends to generate profits

2. Literature review

Overreaction:

An extreme emotional response to new information.

It causes the security to become either overbought or oversold.

Herding behavior:

A behavior wherein people join groups and follow the actions of others

2.4. The literature related to overreaction and herding behavior

- Investors benefit from purchasing the stock as dead crosses emerge due to stock price overreaction.
- Investors' behaviors like herding behaviors might be one of the essential factors affecting investment performance.

3. Data and methodology

3.1. Data and variable

- The constituent stocks of Taiwan 50 over the period 2007–2016 from Taiwan Economic Journal (TEJ)
- By employing the event study approach, we attempt to examine if employing the trading rule emitted by BBs are able to generate abnormal profits.

Event Study

An empirical analysis that examines the impact of an event on the value of a security, such as company stock.

The aim is to assess returns around the time of an event became abnormal.

3. Data and methodology

3.2. Bollinger bands introduced

The regular: Trend-following version of this rule assumes that prices will continue to move in the direction of the penetration

Market contrarians: A penetration of the upper (lower) BBs indicates an overreaction price with a strong possibility of an impending trend reversal

→ Exploring whether investors are able to beat the markets by employing the trading signals emitted by BBs technical trading rules

3. Data and methodology

3.3. Hypotheses proposed

If no significant abnormal returns (ARs) and cumulative abnormal returns (CARs) are revealed, the results might be in accordance with market efficiency hypothesis.

→ We test whether the average ARs and average CARs would be different from 0.

- 1 The ARs and CARs would be significantly positive as the buying signals emitted by BBs due to the concern of overreaction.
- 2 The ARs and CARs would be significantly negative as the selling signals emitted by BBs owing to the concern of overreaction.

3. Data and methodology

3.4. Event study methodology

- 1 Deciding on the event that we wish to investigate, and collecting data of companies that had gone through such an event
- 2 Identifying the event window
- 3 Making estimations of the important parameters that will give us the expected returns during the event period
- 4 Estimating α and β by employing the market model (i.e. $R_i = \alpha + \beta R_m$) using the data within the estimation window
- 5 Adding up the abnormal return over the entire period of time to get the cumulative abnormal return

3. Data and methodology

Market model (Single index model)

The return on a security depends on the return on the market portfolio and the extent of the security's responsiveness as measured by β .

$$R_i = \alpha + \beta R_m$$

R_i : Return on a security

R_m : Return on the market portfolio

4. Empirical results and analyses

4.1. Descriptive statistics

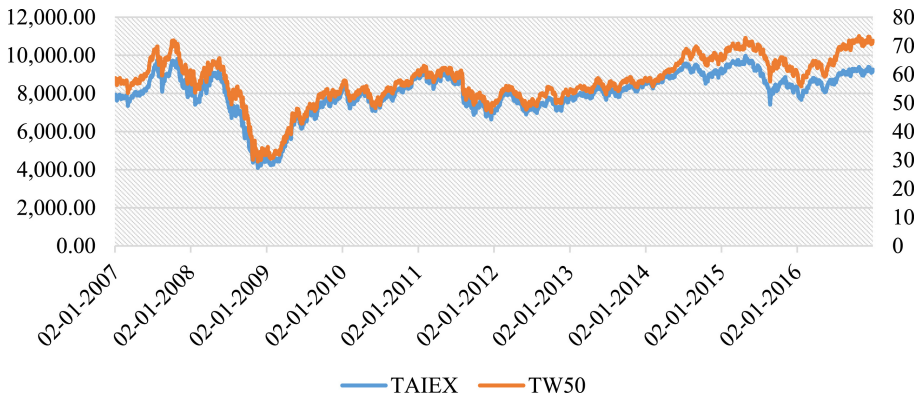
The data including the constituent stocks of Taiwan 50 (TW 50) index and Taiwan stock weighted (TAIEX) index over the period 2007–2016

→ Taiwan stock markets are rather volatile

Table 1. Summary statistics.

Variable	Obs.	Mean	Std. Dev.	Min	Max
TAIEX index	2477	8032.91	1108.081	4089.93	9973.12
TW 50 index	2477	57.42228	8.548108	29.5	73.4

Fig.1. Trends of the indices of TAIEX and TW 50 from 2007 to 2016.



2007 ~ 2009

the downward trends ← the stock market crisis occurred in 2008

2009 ~

the upward trend ← Quantitative Easing

4. Empirical results and analyses

4.2. Samples selected and employed

the samples of touching either BB upper band or BB lower band according to the definition of BBs

Table 2.

	TW50
	No.
Panel A: Upper BBs	
Daily data	3994
Weekly data	908
Panel B: Lower BBs	
Daily data	2997
Weekly data	528

4. Empirical results and analyses

4.3. Empirical results

4.3.1. The results of upper BBs

CARs are positive

→ The results indicate that investors might not be able to beat the market as trading signals emitted.

→ On the contrary, investors might employ the momentum instead of contrarian strategy as the trading signals emitted by upper BBs.

Table3.

Holding days	TW50					
	ARs	p-test		CARs	t-test	
Panel A: Daily data						
1	0.11%	0.002	***	0.11%	3.001	***
2	-0.01%	0.781		0.10%	2.065	**
3	0.06%	0.104		0.16%	2.689	***
4	0.02%	0.563		0.18%	2.647	***
5	0.00%	0.911		0.18%	2.426	**
Panel B: Weekly data						
1	-0.03%	0.842		-0.03%	0.842	
2	0.14%	0.296		0.11%	0.620	
3	0.35%	0.009	**	0.48%	2.147	**
4	0.41%	0.001	**	0.89%	3.598	***
5	0.12%	0.413		0.99%	3.598	***

Fig.2. CARs and ARs for upper BBs for daily data.

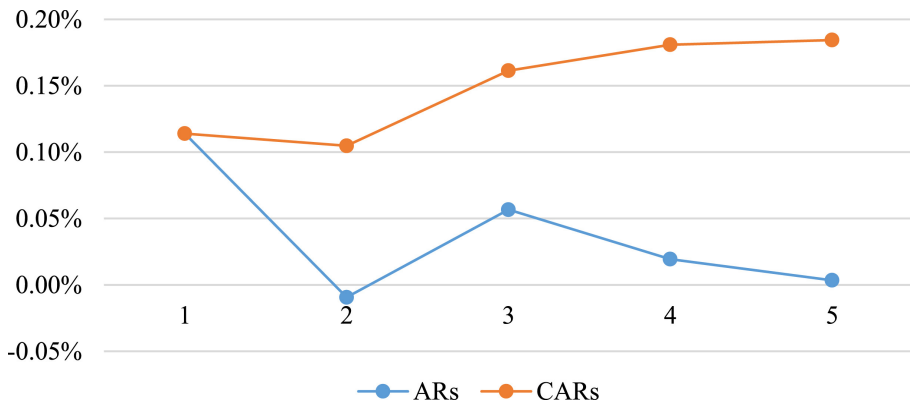
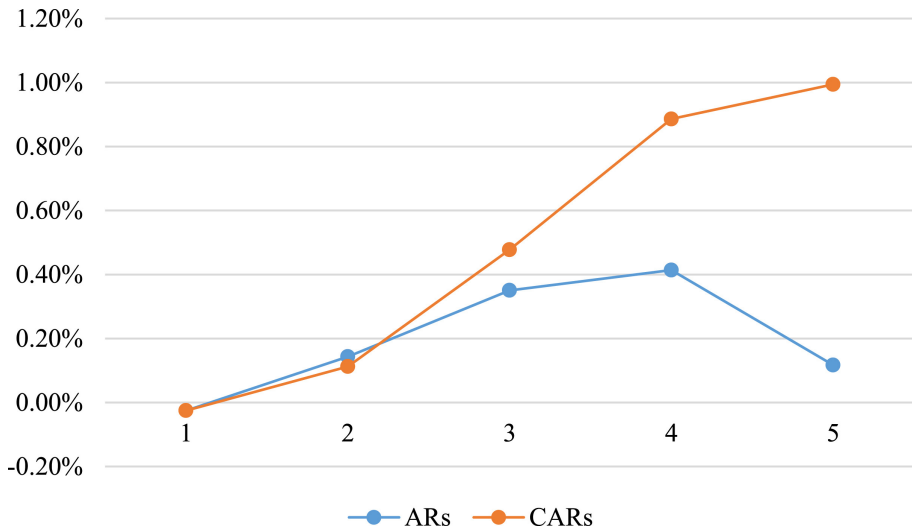


Fig.3. CARs and ARs for upper BBs for weekly data.



4. Empirical results and analyses

4.3. Empirical results

4.3.2. The results of lower BBs

CARs are positive

→ The results indicate that investors had better buy instead of sell or short-selling stocks.

Table4.

Holding days	TW50					
	ARs	p-test		CARs	t-test	
Panel A: Daily data						
1	0.11%	0.002	***	0.11%	3.001	***
2	-0.01%	0.781		0.10%	2.065	**
3	0.06%	0.104		0.16%	2.689	***
4	0.02%	0.563		0.18%	2.647	***
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Panel B: Weekly data						
1	-0.03%	0.842		-0.03%	0.842	
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4	0.41%	0.001	**	0.89%	3.598	***
5	0.12%	0.413		0.99%	3.598	***

Fig.4. CARs and ARs for lower BBs for daily data.

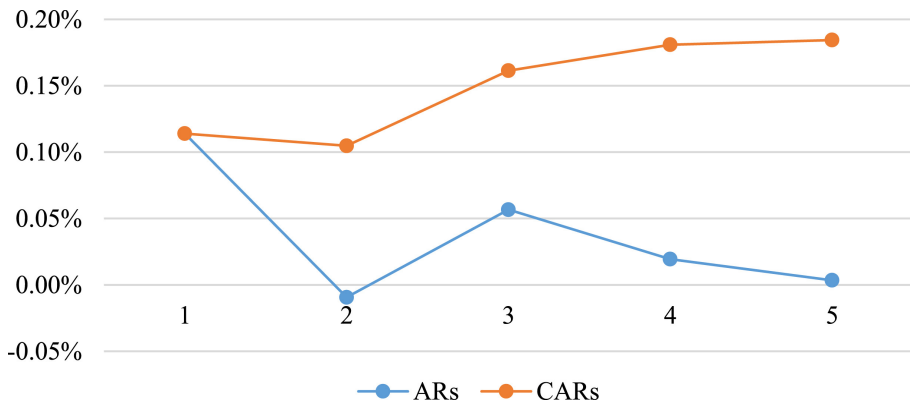
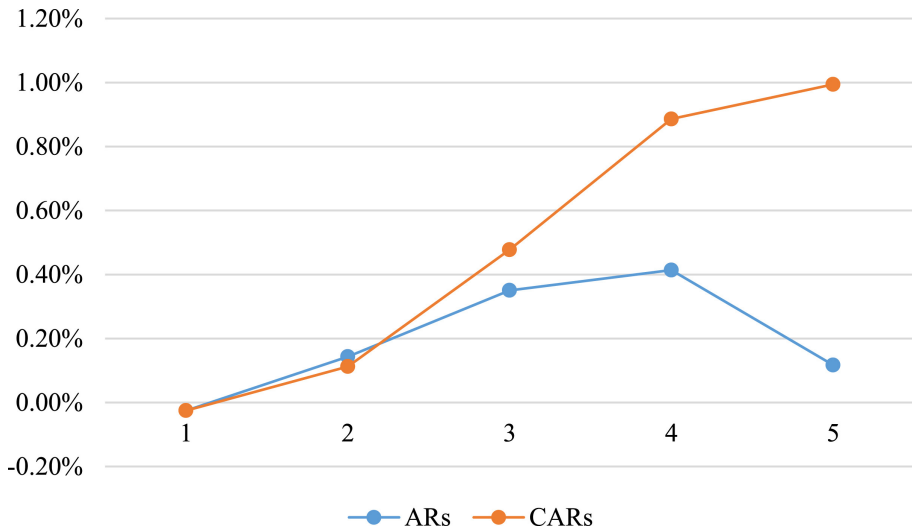


Fig.5. CARs and ARs for lower BBs for weekly data.



5. Conclusion

Hypotheses

In accordance with the trading signals emitted by BBs

- Investors might be able to profit by buying stocks as the share prices hit the lower BBs.
- Investors might be able to profit by short-selling stocks as the share prices reach the upper BBs.

5. Conclusion

Result - as the share prices hit the lower BBs

Investors might be able to beat the market by buying stocks as revealed significantly positive abnormal returns.

→ Contrarian strategies are proper as share prices hit the lower BBs.

Result - as the share prices hit the upper BBs

Investors might be able to beat the market by buying stocks as revealed significantly positive abnormal returns.

→ Momentum strategies are proper as share prices hit the upper BBs.