The Profitability of Chartist Analysis: Case of the Bollinger Bands Indiator

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Abstract*— Today, technical analysis is a big sucker for many theorists, it allows you to choose the optimal decision in a financial market, it is not based on external factors other than the evolution of the market (the price, volumes and curve), but considers that all the factors that intervene in the market are represented by the evolution of the latter. Among the most famous indicators of technical analysis, we will talk about the oscillator indicator "Bollinger bands" which represents an effective indicator of volatility (al, Minket.V, 2003)*
Index Terms*— Bollinger bands, technical analyses, profitability, Chartism, stock market.*

I. 1Introduction

Technical analysis or chartism is considered to be one of the earliest, if not the earliest, form of investment analysis whose origins date back to the 1800s. Charts look for a series of past prices (and volumes) for patterns recognizable which may have the ability to predict future price movements. Based on the price trends, various trading rules have been developed, one of which is Bollinger Bands (BB). BBs were created by John Bollinger in the 1980s and feature trade bands plotted against two standard deviations above and below a 20 day moving average. When the market price touches or exceeds any of the trading bands, the market is considered overstretched and prices should revert to the moving average. This article is motivated by the popularity of the BB approach and a lack of academic research on its effectiveness. There are a number of studies on trading rules in general.

Among the articles that indicate the informational content of transactions and technical models, we can mention Brock et al. (1992), Karjalainen (1999), Gencay (1999), Lo et al. (2000) and Lento (2006). The results suggest that the BB cannot consistently outperform the buy-and-hold trading strategy and fail to provide market timing information. However, some interesting implications flow from using the contrarian approach. After adjusting for transport costs, 8 out of 12 tests outperform the traditional BB.

II. Description Of Data

Data sets are for the period May 9, 1995 through December 31, 2004. There are a total of 2421 daily prices for the TSX, DJIA and the Canada / US dollar spot exchange rate and a total of 2196 observations for the NASDAQ. Daily returns are calculated as the return of each day's holding period. Analysis indicates that the TSX has the highest coefficient, 0.59, the result of the negative outliers. The DJIA, NASDAQ, and the spot exchange rate between Canada and the US dollar have a coefficient of 0.14, 0.16 and 0.03, respectively.

Daily returns are calculated as each day's detention return as follows:
$$ri = log\ (pt) - log(pt-1)$$
Where (Pt) denotes the spot price (stock market indices or exchange rate).

III. Methodology

The BB is traditionally calculated on the basis of a 20-day average, +/- denoted by the BB (20.2).

This traditional definition is tested with two variables: 30-day moving average, and 20-day average. The reason for using 30 days is to determine if a longer time frame can generate more informative signals. Conversely, this is used to determine if the narrower band can generate more accurate signals. The profitability of the BB is determined by the competition of returns generated by the trading signals against the buy-and-hold trading strategy. Like Gencay (1998), the returns generated by trading rules are adjusted for transaction costs. The gap between offers and brokerage transactions is taken into account. The bid-ask spread for an index exchange-traded fund is used as a proxy for the actual index. The robustness is determined by calculating the returns and the Sharpe ratio on the subsets of the data. Statistical significance is determined by the bootstrap approach developed by Leuch and Thomas (1993)

TABLE 1
PROFITABILITY OF BB

	(BB) MA (days) 20/2 20/1 30/2		
TSX (N=2415)			
Annual return	*(2.4)*	*(8.1)*	*(5.1)*
P-value	*0.75*	*8.1*	*8.9*
Buy-and-hold return	*(10.5)*	*(12.5)*	*(11.4)*
Over/ under performance	*43*	*62*	*52*
No of trades			
DIJA (N=2415)			
Annual return	*(3.3)*	*(4.8)*	*(4.8)*
P-value	*0.52*	*0.49*	*0.53*
Buy-and-hold return	*9.1*	*8.8*	*7.9*
Over/ under performance	*(15.5)*	*(17.5)*	*(18.4)*
No of trades	*72*	*123*	*89*
NASDAQ (N= 2080)			
Annual return	*(11.4)*	*(10.1)*	*(9.1)*
P-value	*0.82*	*0.85*	*0.74*
Buy-and-hold return	*6.4*	*7.1*	*5.8*
Over/ under performance	*(14.5)*	*(16.5)*	*(10.4)*
No of trades	*78*	*72*	*74*
CDN/US $ (N= 2042)			
Annual return	*(0.95)*	*(3.4)*	*(0.9)*
P-value	*0.78*	*0.65*	*0.74*
Buy-and-hold return	*3.6*	*4.5*	*5.6*
Over/ under performance	*(2.3)*	*(2.5)*	*(3.4)*
No of trades	*89*	*111*	*89*

IV. Results

The profitability of BB is shown in Table 1.The BB performed the best in the forex market because two of the three rules generated excessive overruns. The BB underperformed the buy and hold strategy by 5.8% for the TSX, DJIA or NASDAQ. Table 1 show that no bb variant has always proven to be the most profitable. The BB (20.1) generated no excess return, while the BB (20.2) and BB (30.2) generated surpluses only in the forex market. Bootstrap simulations reveal that only 1 of 12 reversals is statistically significant at the 10% significance level. The returns generated on the Toronto Stock Exchange are significantly lower than any of the returns calculated by the randomly generated time series. The results on NASAQ are also weak. Table 2 shows the results of the sub-period analysis and indicates that BB returns are not results. Positive excess returns were noted in the three lower periods for only the BB (30.2) rule on the Canada-US exchange rate. Additionally, the sharpe ratio is not stable and changes connect across sub-periods. The inconsistent reward / risk ratios between the underselling periods are consistent with previous studies such as Dooley and Shafer (1983) .1 The percentage of correct trading signals and the daily percentage returns given a lag of 1 and 10 days are shown in Table 3. Overall, 14 of 48 (27.1%). Buy signals were correct more often than sell signs because 11 of the 14 significant signals were buy signals. Given the 1 and 10 day delays, all buy signals generated by the BB.

TABLE 2: SUB-PERIOD RETURNS (TSX, CDAN/US, DJIA, NASDAQ)

	2014-2015		2016-2017		2018-2029	
	Excess return	*Sharp ratio*	*Excess return*	*Sharp ratio*	*Excess return*	*Sharp ratio*
TSX						
BB (19,5)	(17.5)	-0.01452	(12.6)	0.0153	(13.6)	-0.025
BB (19,4)	(20.5)	-0.0561	(14.8)	-0.0235	(12.6)	-0.0145
BB(18,6)	(22.5)	-0.0412	(10.3)	-0.0062	(14.6)	-0.0302
CDAN/US						
BB (19,5)	(2.5)	0.01452	(11.3)	0.0175	9.6	-0.0852
BB (19,4)	(4.5)	0.0561	(10.9)	-0.0078	4.1	-0.0089
BB(18,6)	3.5	0.0412	(9.6)	0.0251	5.6	-0.0412
DJIA						
BB (19,5)	(12.2)	-0.0452	5.4	0.0245	(9.6)	- 0.1896
BB (19,4)	(18.7)	0.0562	6.4	0.0352	(9.2)	-0.0253
BB(18,6)	(23.5)	0.0452	(22.5)	0.0454	(3.6)	-0.0965
NASDAQ						
BB (19,5)	(10.3)	0.023	(9.5)	-0.0452	(5.2)	-0.01452
BB (19,4)	(11.2)	0.014	(11.9)	-0.0561	(3.2)	-0.00645
BB(18,6)	(14.6)	0.062	22.5	-0.0172	9.45	-0.4582

TABLE 3
SYNCHRONISATION CAPACITY OF THE BB MARKET

	20/2	20/1	30/2
TSX			
Buy			
Correct indicator % (Lag 1/10)	25.3/27.9	27.6/42.3	23.7/32.5
Return after signal (Lag 1/10) Sell	-0.0015/-0.0017	-0.00782/-0.0065	-0.00154/-0.0032
Correct indicator % (Lag 1/10)			
Daily % return after signal (Lag 1/10)	25.4/43.8	25.3/35.4	47.6/52.9
	0.0014/0.0078	0.0045/0.0062	0.0045/0.0075
CDAN/US			
Buy			
Correct indicator % (Lag 1/10)	43.6/45.7	27.6/42.3	27.6/42.3
Return after signal (Lag 1/10) Sell	0.0045/0.0056	-0.00782/-0.0065	-0.00782/-0.0065
Correct indicator % (Lag 1/10)	25.4/43.8	27.6/42.3	27.6/42.3
Daily % return after signal (Lag 1/10)	0.0014/0.0078	-0.00782/-0.0065	-0.00782/-0.0065
DJIA			
Buy	23.6/28.7	19.6/20.2	23.9/30.6
Correct indicator % (Lag 1/10)	0.00125/0.0045	0.0080/0.010	-0.0004/0.0027
Return after signal (Lag 1/10)	22.5/30.5	32.6/40.9	42.3/45.4
Sell	0.0045/0.0075	0.0006/0.0009	-0.005/0.007
Correct indicator % (Lag 1/10)			
Daily % return after signal (Lag 1/10)			
NASDAQ			
Buy	31.5/35.9	30.2/42.6	36.9/38.9
Correct indicator % (Lag 1/10)	-0.0015/0.00125	-0.0012/-0.0015	-0.0015/0.0018
Return after signal (Lag 1/10)	48.3/52.6	42.2/52.9	31.6/33.6
Sell	-0.0012/0.0016	-0.0014/-0.0019	-0.0015/-0.0016
Correct indicator % (Lag 1/10)			
Daily % return after signal (Lag 1/10)			

TABLE 4
PROFITABILITY OF THE CBB TRADING RULE

	20/2	20/1
TSX		
Annual return	14.69	12.5
Buy and hold return	13.2	13.2
Over/under performance	4.1	6.6
No of trades	193	222
CDAN/US		
Annual return	4.3	5.6
Buy and hold return	11.6	15.5
Over/under performance	(6.6)	(9.0)
No of trades	189	215
DJIA		
Annual return	20.5	16.8
Buy and hold return	7.9	4.6
Over/under performance	14.6	3.5
No of trades	165	215
NASDAQ		
Annual return	(2.5)	3.5
Buy and hold return	(2.3)	(4.6)
Over/under performance	0.78	0.0
No of trades	225	265

The disasters of Enron, Nortel, WorldCom, etc., this research can be very risky if used blindly and without any fundamental analysis. The BB would be a signal to sell the stocks on their incredible up momentum and buy the stocks as they came crashing down. As a result of this argument, it appears that a more rational approach to BB would be more effective. This approach, a contrarian Bollinger Band (CBB), would use essentially the same parameters and method of calculation. However, an investor would sell when the moving average reaches (or exceeds) the lower band and buy when the movement reaches (or exceeds) the upper band. The rules generated by the CBB are essentially similar to momentum-based rules, such as a filter rule. The CBB assumes that the upward or downward trends will continue. The profitability of BB is dramatically increased by taking an approach contrary to traditional rule trading signals. Table 4 shows the performance of the CBB with respect to buy and hold. CBB outperforms traditional BB and increases the profitability of TSX, DJIA and NASAQ. Eight of the twelve CBB rules tested highlighted the traditional BB. The CBB Rules set the traditional rules of 16.6% to 32.0% on the NASDAQ and TSX dataset. However, the CBB performs similar to its traditional counterpart in the forex market.

V. Conclusion

The empirical study is conducted to determine whether the BB conveys information about the investment. Profitability was defined as returns greater than the returns of the buy-and-hold trading strategy, after adjusting for transaction costs. This study reveals that the BB is not profitable. The various signals are consistently underperforming the buyer's trading strategy and the hold. After adjusting for transit costs, the BB is only cost effective for 2 out of 12 tests. Furthermore, no particular BB variant indicates robust and superior performance. In addition, interesting and new evidence has been presented. Although the raison d'être of the BB oscillator (i.e. to sell when the market is overbought tainted when the market is oversold), the profitability of the BB has been greatly improved when a contrary approach was used (i.e. buy on a sell signal and sell on a buy signal). Since there is no related research conducted on BB to allow comparisons, the results obtained in this study may provide the impetus for more academic research into the ineffectiveness of BB.

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