



Measuring Asymmetric Information With Technical Analysis

Mehmet Harun Songün

İstanbul Aydın Üniversitesi, Sosyal Bilimler Enstitüsü, İstanbul mhs1978@hotmail.com

Çiğdem Özari

İstanbul Aydın Üniversitesi, İstanbul cigdemozari@aydin.edu.tr

Abstract

In spite of the tremendous amount of academic study and individual work that has been produced on stock markets trading topic all over the world in the last decade, big losses, uncertainty, and right timing difficulties on trading on stock market still exist. Trading on stock markets globally is an important subject for investment companies and professional traders may be even for governments. Most of the work done on these problems did not include the global effect, technical analysis, and fundamental analysis give limited information about the direction of stock market most of the time. This article checks the correlation between four big indices from all over the world, which are BIST30, NIKKEI225, DOW JONES, and SOXX50 also three technical analysis EMA, Moving Average Convergence/Divergence (MACD) and Relative Strength Index (RSI) results tested for these indices for better perspective. To check the correlation between indices of different regions from east to west and to test the effects of correlation on technical analyses is the main focus of this study.

Keywords: Financial Markets, Relative Strength Index, Moving Average Convergence/Divergence, Exponential Moving Average.

1.Introduction

Understanding different country indices as complex related systems is beneficial for the traders in all over the world. It has been accepted among the economists that major indices plays important role in global economy and also considered that there is a correlation between financial markets, and if there is a correlation, the other research topic would be if financial market correlation is also related with indices movements. Cai et al investigates the correlation between 52 financial markets from July 2004 and June 2011 and the most important result that they found to be closely associated with the inherent economic drivers of price change in financial index, global market and global geographical factors (Cai, 2017). Correlations of stock market returns have been studied (Abell, 1991; Atchinson et al., 1987; Bollerslev, 1990; Badrinath et al., 1995; Chan, 1993; Yu and Wu, 2001; Kumar and Dhankar, 2009; and many others) for years to learn trends and market behavior to determine hints for trade decisions. In addition; by the help of cluster analysis, for the financial and commodity markets short term and long term dynamics are examined in linkages between world major markets by Lahmiri et al. and they found strong evidence of instability of the world economy system after international financial crisis and also they found new clusters after the financial crisis.

In the light of these studies, in our study we decided to answer couple important questions such as; Does a change in the index x cause a change in index y? Does a technical analysis results in one country index at time period x similar to another country index technical analysis results at the same time period? If so, what about with different technical analysis. In



this study; to answer these type of questions, four big financial market indices are chosen, those of which are BIST30, NIKKEI225, DOW JONES, and SOXX50. The EURO STOXX 50 Index represents the performances of large companies across the components of the 19 Europe countries. The Index captures approximately 60% of the free-float market capitalization of the EURO STOXX Total Market Index, and 95% of the free float market capitalization of the represented countries. Another major index is the DOW JONES. The DOW JONES Industrial Average (DJIA) is a price-weighted average of 30 significant stocks traded on the New York Stock Exchange (NYSE) and the NASDAQ. The DJIA is one of the oldest, single most-watched indices in the world. The other chosen index is Nikkei225. This index can considered as the leading and most-respected index of Japanese stocks. It is a price-weighted index comprised of Japan's top 225 blue-chip companies traded on the Tokyo Stock Exchange. Last, index represents Turkish Stock Market and named as BIST30. The BIST 30 Index is a capitalization-weighted index composed of National Market companies except investment trusts. Table 1.1 and Table 1.2 illustrates the descriptive statistics of four financial markets. To compare the volatility of these four financial markets, it is better to calculate the variation coefficient because of the huge differences in their means. From Table 1.1 and Table 1.2, one can easily calculate the value of variation of coefficient because it is the ratio of standard deviation over expected return. SOXX50 has the greatest value with the 6.49 and BIST 30 has the lowest value 3.68. In other words, a lower coefficient of variation indicates a higher expected return with less risk.

Table 1. Descriptive Statistics of DOW JONES and NIKKEI225

DOW JONES	Value	NIKKEI225	Value
Mean	13136.17	Mean	12308.00
Standard Error	66.32	Standard Error	80.67
Median	12650.36	Median	10638.88
Mode	9509.28	Mode	17450.77
Standard Deviation	2977.07	Standard Deviation	3584.34
Sample Variance	8862963.79	Sample Variance	12847472.10
Kurtosis	-1.02	Kurtosis	-0.56
Skewness	0.10	Skewness	0.76
Range	11765.34	Range	13813.05
Minimum	6547.05	Minimum	7054.98
Maximum	18312.39	Maximum	20868.03
Sum	26469375.94	Sum	24296000.64
Count	2015.00	Count	1974.00
Largest (5)	18285.40	Largest (5)	20771.40
Smallest (5)	6763.29	Smallest (5)	7198.25
Confidence Level (95.0%)	130.07	Confidence Level (95.0%)	158.22

**Table 2.** Descriptive Statistics of SOXX50 and BIST30

SOXX50	Value	BIST30	Value
Mean	2873.18	Mean	76065.97
Standard Error	9.97	Standard Error	461.56
Median	2831.88	Median	77512.88
Mode	2648.53	Mode	#N/A
Standard Deviation	449.43	Standard Deviation	20688.13
Sample Variance	201985.05	Sample Variance	427998796.06
Kurtosis	-0.27	Kurtosis	-0.61
Skewness	0.37	Skewness	-0.46
Range	2529.25	Range	88279.09
Minimum	1809.98	Minimum	27062.22
Maximum	4339.23	Maximum	115341.31
Sum	5835423.74	Sum	152816527.65
Count	2031.00	Count	2009.00
Largest(5)	4270.53	Largest(5)	113614.87
Smallest(5)	1882.79	Smallest(5)	29289.15
Confidence Level (95.0%)	19.56	Confidence Level (95.0%)	905.19

To assess the relation among the four big well-known financial market indices' correlation coefficient were used. For this purpose, the daily closing price movements checked to see the existence of asymmetric correlation. The results of the asymmetric correlation between BIST30, SOXX50, NIKKEI225, and DOW JONES can be seen in Table 1.3.

Table 3. Correlation Coefficient

	BIST30	SOXX50	NIKKEI225	DOW JONES
BIST30	1			
SOXX50	-0.3031	1		
NIKKEI225	-0.7100	0.7127	1	
DOW JONES	-0.8496	0.5308	0.8565	1

From Table 1.3, one can easily figure out the negative correlation between BIST30 and the other indexes. Negative correlation means one variable increases as the other decreases, and vice versa. The highest positive correlation is between DOW JONES and NIKKEI225, which is equal to 0.8565, which is also very high value for two different countries market relation. Our main hypothesis is to figure out if any two financial markets are highly correlated, same technical indicators can be used to predict the right buy-sell decision or signal. To prove the hypothesis basic technical indicators are chosen and explained in next part.

Technical Analysis and frequently Used Technical Indicators

Technical analysis is the process of analyzing a security's historical prices in an effort to determine probable future prices. This is done by comparing current price action with comparable historical price action to predict a reasonable outcome. Technical analysis is also visual and largely disregards the fundamental introduction of free market activity, accepting rather that current value patterns manage future value development. The technical analysis results help in outlining the low and high support levels apparent. These levels are taken from an investigation of a stock's current value changes. In 1960's and 70's believed that in an efficient market, the return of



technical analysis decisions could not even cover transactions costs, Mr. Farma was from one of those economists. But later on technicians understand that some stocks slow to reflect the trend and investors can catch these stocks to make profit. After a while we can see as per an overview done by Euro money in 1990, there is an additional move from the fundamentals to technical analysis. All the more as of late, Lo et al. (2000) examined the commonness of different technical patterns in American stock prices over the period of 1962–1996 and observed that the patterns to be unusually repetitive This study shows that risk is higher excepted rate of return The devout technician might define this process as the fact that history repeats itself while others would suffice to say that we should learn from the past (Achelis, 2000)

Many to too many different type of technical indicators being used by investors and professional traders, be that as it may we can list them under two significant categories, one of them is counter-trend indicators, and the other one is trend followers. In this study, the most settled trend followers as Exponential Moving Average (EMA), Moving Average Convergence/Divergence (MACD) and the most much of the time utilized counter-trend indicator Relative Strength Index (RSI) are explained and their buy-sell decisions are calculated for four financial markets to show whether or not the same technical indicators can be used if there is existence of highly positive or negative relation.

EMA is a stock or index chart tool, which investors use to follow trends in the value of a stock or index. EMA works similar to simple MA, except the most recent values are given more weight in the average than the older values. This makes EMA more closely reflective of the changes in prices. In this study, a standard EMA formula that uses the industry standard exponential function $2/(1+\text{number of periods in MA})$ has been used.

Table 4. EMA Results: Buy-Sell Decisions

EMA	Sell	Buy
BIST30	904 (45.27%)	1093 (54.73%)
NIKKE225	852 (43.43%)	1110 (56.57%)
DOW JONES	776 (38.74%)	1227 (61.26%)
SOXX50	912 (45.17%)	1107 (54.83%)

In the sample for all indexes, the percentage of the sell decision is greater than the buy decision. The minimum percentage for the buy decision is from the DOW JONES index. For the other three indexes, the percentages are approximately close. From EMA indicator, we cannot say that in highly correlated financial markets, better to take buy-sell decisions by the help of this indicator.

Table 2.2 illustrates the buy-sell decisions for the MACD. The MACD is in category of trend indicators, which shows relationship between prices and moving averages. Gerald Appel introduced the MACD, in 1970s. It is the different between exponential moving averages for 26 and 12 days. There is a plot of another exponential average for 9 days, which is placed on top of the MACD to indicate long/short opportunities; it is called “trigger” or “signal” Appel (2008)

Table 5. MACD Results: Buy-Sell Decisions

MACD	Sell	Buy
BIST30	944 (47.27%)	1053 (52.73%)
NIKKE225	868 (44.24%)	1094 (55.76%)
DOW JONES	728 (36.35%)	1275 (63.65%)
SOXX50	907 (45.92%)	1112 (55.08%)



The MACD decision results are approximately similar to the results of the EMA indicator. The minimum percentage for the buy decision is again from the DOW JONES index and all sell decisions are greater than buy decisions. When we only mention the results of the MACD indicator, we can conclude the structure of the indexes, which are representatives of different markets, follow the same trend. In addition, negatively correlated financial markets' percentage of buy-sell decisions are approximately closer than the positively correlated financial markets.

RSI is an oscillator, introduced by J. Welles Wilder, Jr., is based upon the difference between the average gain vs. the average loss over a given period. The RSI compares the magnitude of a stock's recent gains to the magnitude of its recent losses and can be calculated by using following formula. $RSI = 100 - [100 / (1 + RS)]$, where $RS = (\text{Average Gain of n-day up}) / (\text{Average Loss of n-day down})$. A high RSI occurs when the market has been rallying sharply and a low RSI occurs when the market has been selling off sharply. It is the most popular over bought/oversold indicator Klassen (2007). Table 2.3 illustrates buy-sell-do nothing decisions for the RSI indicator.

Table 6. RSI Results: Buy-Sell-Do Nothing Decisions

RSI	Buy	Sell	Do Nothing
BIST30	388 (19.43%)	201 (10.07%)	1408 (70.51%)
NIKKE225	160 (8.15%)	330 (16.82%)	1472 (75.03%)
DOW JONES	213 (10.63%)	406 (20.27%)	1384 (69.10%)
SOXX50	176 (8.72%)	258 (12.78%)	1585 (78.50%)

The percentage of do nothing decisions is greater than the percentage of both buy and sell decisions. In addition, the percentage of do nothing decisions is greater than the total percentage of the buy and sell decisions. For this indicator, the percentage of the do nothing decision for all four indexes are between the ranges of 69% and 79%, and the percentage of buy for all four indexes are between 8% and 20%. The most important result from RSI, the highest buy decision financial market is negatively correlated to other three financial markets.

Conclusion

Technical indicator can be used to predict future prices or their changes, and then question will be whether this technical indicator is accurate for all financial markets or if it is accurate for the markets that are positively or negatively correlated. In order to be able to accurately answer the questions stated above, we used the three most popular technical indicators – EMA, RSI and MACD – and we calculated all the decisions that were found by the help of these indicators for four financial markets. The outputs of the three given oscillators were different from each other most of the time for a given period.

These results bring mind different questions, if these technical analyses generate different or same buy or sell signals at the same time and which technical indicators' signals support the other technical analysis signal. If these technical analyses results positively correlated with indices correlation results Also, we will able to compare the results of each index to other indexes' results to check for similarities.



REFERENCES

- Abell, J. D., & Krueger, T. M. (1991). Serial Correlation in the Single Market Model. *Journal of Economics & Finance*, 15(2).
- Aityan, S. K., Ivanov-Schitz, A. K., & Izotov, S. S. (2010). Time-shift asymmetric correlation analysis of global stock markets. *Journal of International Financial Markets, Institutions and Money*, 20(5), 590-605.
- Atchinson, M., Butler, K., Simonds, R., 1987. Nonsynchronous security trading and market autocorrelation. *Journal of Finance* 42, 111–118.
- Badrinath, S. G., Kale, J. R., & Noe, T. H. (1995). Of shepherds, sheep, and the cross-autocorrelations in equity returns. *The Review of Financial Studies*, 8(2), 401-430.
- Bollerslev, T. (1990). Modelling the coherence in short-run nominal exchange rates: a multivariate generalized ARCH model. *The review of economics and statistics*, 498-505.
- Cai, Y., Cui, X., Huang, Q., & Sun, J. (2017). Hierarchy, cluster, and time-stable information structure of correlations between international financial markets. *International Review of Economics & Finance*, 51, 562-573.
- Chan, K. (1993). Imperfect information and cross-autocorrelation among stock prices. *The journal of finance*, 48(4), 1211-1230.
- Dourra, H., & Siy, P. (2002). Investment using technical analysis and fuzzy logic. *Fuzzy sets and systems*, 127(2), 221-240.
- Gerald Appel, E. D. (2008). Understanding MACD (Moving Average Convergence Divergence). 2008.
- Kumar, R., & Dhankar, R. S. (2009). Asymmetric volatility and cross correlations in stock returns under risk and uncertainty. *Vikalpa*, 34(4), 25-36.
- Lahmiri, S., Uddin, G. S., & Bekiros, S. (2017). Clustering of short and long-term comovements in international financial and commodity markets in wavelet domain. *Physica A: Statistical Mechanics and its Applications*, 486, 947-955.
- Lo, A. W., Mamaysky H. and Wang, J. (2000) Foundations of technical analysis: computational algorithms, statistical inference, and empirical implementation, *Journal of Finance*, 55, 1705–64.
- Myungsook Klassen World Academy of Science, Engineering and Technology International Journal of Computer, Electrical, Automation, Control and Information Engineering Vol:1, No:5, 2007.
- Steven Achelis is the author of *Technical Analysis from A to Z, 2nd Edition 2000*)
- This article created from “Measuring Asymmetric Information and error with Technical Analysis Indicator Based on Fuzzy Logic Mehmet Harun Songyn thesis in İstanbul Aydın University. (2017)