

THEMATIC INVESTMENT STRATEGIES: COINTEGRATION RELATIONSHIP BETWEEN ROBOTIC INVESTMENT INDEX AND BIST100

İnci Merve ALTAN

Assistant Professor, Faculty of Health Sciences, Bandırma Onyedi Eylül University, Turkey

Abstract

Thematic investments are investments that emphasize a certain theme in their strategies. They have high return potential due to their nature, but they can also carry relatively high risk. Especially in periods of high uncertainty and fluctuations in the markets, the returns of investors investing in strong themes may diverge. When reviewing the literature on thematic investment, it is clear that only sector funds are considered, and no research on thematic investment funds has been undertaken in Turkey. Therefore, the study is the first on local thematic funds in Turkey. In the study, the relationship between MSCI ACWI IMI Robotics index and BIST100 index data was examined by the Johansen Cointegration method in order to help investors who turn to alternative investment instruments with the effect of the pandemic. As a result of the study, a significant long-term relationship was observed between the MSCI ACWI IMI Robotics index and the BIST100 index. It has been concluded that there is no possibility of earning extra income through portfolio diversification and arbitrage with these indices.

1. Introduction

Thematic investments emphasize a certain investment theme in their strategy. Thematic investing follows certain social, economic, institutional, demographic, or other themes popular in society. Similarly, thematic funds are funds that emphasize a certain investment theme in their strategy. The feature of thematic funds is that certain themes come to the fore in their strategies. Thematic funds are differentiated from sector funds. So much so that when compared to sector funds, the content they invest in can be defined much more comprehensively and broadly. When a sector fund only invests in existing sector stocks or instruments, thematic funds have a much wider range of instruments in their portfolio. The most important reason why theme funds attract attention is that they bring investors closer to new developments. Many areas, such as sustainability, artificial intelligence, renewable energy, and health, attract the attention of new investors.

Today, thematic mutual funds stand out as an alternative for investors. Especially in periods when uncertainty and fluctuations in the markets are high, the returns of investors who invest in strong themes may diverge. Thematic funds, by their nature, have a high return potential and may also involve relatively high risk. Returns on investment increase when the same themes are embraced by more people.

In 2020, the conjuncture and the increase in access to liquidity in Turkey, along with the pandemic period, increased the interest in investment products that offer alternative returns to deposits. Accompanied by financial literacy, an investor profile with high expectations and a demand for more sophisticated products has started to emerge in society. Technology and structural change trends, which penetrate more and more into all areas of life, bring along the need for alternative products. While there has been rapid growth in the mutual fund sector for the

last two years, a trend from conventional products to alternative funds is observed, especially in 2020. Hedge funds, which follow more flexible strategies and different themes, grew by 63% in 2020, reaching a size of approximately 36 billion TL, and mutual funds started to account for a quarter of the sector's size (MKK, 2020).

Recently, especially technology-themed funds, have attracted great attention. During the pandemic period, young investors' interest in technology-themed investment instruments has increased. As technology-themed funds focus on technological change processes, they also keep investors alive. Funds that invest in areas such as automation, digital infrastructure, robot technologies, and internet connections are included in the fund basket and attract funds.

When the studies on thematic investment are examined, it is observed that only sector funds are taken into account, and it has been seen that there is no study done with thematic investment funds in Turkey. This study is the first on thematic funds in Turkey. In the study, the relationship between MSCI ACWI IMI Robotics index and BIST100 index data was examined by the Johansen Cointegration method in order to help investors who turn to alternative investment instruments with the effect of the pandemic we are in today. For the analysis period, the period from 25.01.2021-31.03.2022 was taken into account.

In the following parts of the study, a conceptual framework was created in terms of thematic investment, the relationship between MSCI ACWI IMI Robotics index and BIST100 index data was examined by the Johansen Cointegration method, and the results were evaluated.

2. Literature

Thematic funds have a high return potential due to their nature and also contain relatively high risk. Thematic investing needs a fundamental understanding of the impact of long-term economic and social trends that create investable opportunities both on regions and sectors. In this direction, the studies related to thematic investment are briefly summarized below.

In their work, Bérubé, Ghai & Tétrault (2014) explain the basis of the thematic index and how to use it in portfolio creation.

Methling and Nitzsch (2019) improved basic categorization and proposed three heuristics for thematic core satellite investors. The first approach is concerned with stock amounts and the portfolio. Another approach uses the Herfindahl index to determine minimal concentration as an allocation rule. In out-of-sample experiments, heuristics were found to be more useful and competitive than minimal variance optimization for diversifying the volatility of portfolio returns. As a conclusion, this research provides pragmatic and truly useful assistance, particularly to investors with thematic portfolios.

Malladi (2019) created three child-focused indices based on equal weight (KIDSEW), price-weight (KIDSPW) and value-weighted (KIDSVW) techniques. All three indices consist of thirty-nine companies that appeal to children in some way. The performance of these three KIDS indices is compared to the performance of the S&P500 Index. As a result of the study, it was found that KIDS indices consistently outperform the traditional S&P500 market index.

Elsaesser, Gardin, Kolrep & Rosentritt (2020) showed how thematic investment has developed over the years and compared it with result-oriented strategies. They then developed a thematic approach to investing in innovation by combining the values of both approaches. Unlike many other thematic approaches, the theme they developed did not focus on technology but made use of different themes and innovative quantitative indicators to provide diversification by investing dynamically.

Phalippou (2021) exemplified the thematic investment practice through private equity. He concluded that the private equity index he created showed similar movements to the private equity fund.

In the literature review on thematic investment and thematic funds, it has been seen that there is no study done with thematic investment funds in Turkey. For this reason, the study is the first on thematic funds in Turkey. The methods and findings obtained in the study are explained in the next section.

3. Methods and Results

In recent years, there has been a great increase in interest in thematic funds. The thematic investment style is becoming one of the fastest growing investment categories. A great diversity is observed in the themes, ranging from artificial intelligence to energy and health. Investors need investment tools that can filter the social changes that will shape the world in the future, renew business models, and technological inventions in every field. One of the products that best meets these needs is thematic funds. Thematic funds are categorized as Transformative Technologies, Environment and Resources, Health-Healthcare, Society and Lifestyle and Multi-Themed (Msci, 2022). The MSCI ACWI IMI Robotics index, which is included in the category of Transformative Technologies announced by Msci, aims to represent the performance of companies with the potential to benefit from the increasing adoption and use of robots and automation. In this direction, in this study, the relationship between MSCI ACWI IMI Robotics index and BIST100 index data was examined by Johansen Co-integration method in the period 30.03.2018-30.03.2022 in order to help investors who turn to alternative investment instruments with the effect of the pandemic. The descriptive statistics of the MSCI ACWI IMI Robotics Index and BIST 100 Index, which are used as variables in the analysis, are given in Table 1.

Table 1. Descriptive Statistics of Variables

<i>MSCI ACWI IMI Robotics Index</i>		<i>BIST100 Index</i>
Mean	1917869	111409.5
Median	1715854	106525.0
Maximum	2978178	227855.0
Minimum	1157935	900.0000
Std. Dev.	0.522524	0.445815
Jarque-Bera	109.2276	56.72799
Probability	0.068770	0.076500

According to Table 1, since the probability value of the Jarque-Bera test statistic is greater than the significance level ($\alpha=0.05$), the error terms of both variables show a normal distribution. The standard deviation is 0.52 for the MSCI ACWI IMI Robotics Index and 0.44 for the BIST100 index.

In order to detect econometrically significant relationships between the series, the series must be stationary. Since the effect of shocks in stationary series is temporary, the series return to their average levels in the long run. On the other hand, the use of non-stationary series because it contains a trend will cause a non-existent relationship between the variables to be used in the model. Whether the variables to be used in the model are stationary or not, and at what level they are stationary, was determined by the Augmented Dickey-Fuller (ADF) test and the Philips- Perron (PP) unit root test (Dickey & Fuller, 1979; Hendry, Pagan & Sargan, 1993; Enders, 2004; Yılancı, 2009; Akel, 2015; Elmas & Polat, 2015; Benli & Yenisu, 2017). Accordingly, unit root test results of the series are given in Table 2.

Table 2. ADF and PP Unit Root Test Results

	<i>Variables</i>	<i>ADF</i>		<i>PP</i>	
		Intercept	Trend and Intercept	Intercept	Trend and Intercept
	MSCI ACWI	-0,3901	-2.2337	-0.4760	-2.3702
	IMI Robotics Index	(0,9083)	(0,4697)	(0,8932)	(0.3950)
	BIST100 Index	-3.6066	-7.7722	-32.5698	-33.62051
Level		(0,0058)	(0.0000)	(0,0000)	(0.0000)
First Difference	MSCI ACWI	-29.5198	-29.5121	-29.5198	-29.5121
	IMI Robotics Index	(0.0000)	(0.0000)	(0.0000)	(0.0000)
	BIST100 Index	-18.6890	-18.6815	-197.8475	-197.9854
		(0.0000)	(0.0000)	(0.0001)	(0.0001)

The test statistic obtained based on the results of the applied ADF and Philips-Perron tests is smaller than the absolute values of the MacKinnon critical values, indicating that the series are not stationary at their current levels (MacKinnon, 1996). At the first difference, the MSCI ACWI IMI Robotic Index and the BIST100 index series are made stationary.

Before starting the Johansen cointegration analysis, it is necessary to determine the appropriate lag number. Table 3 shows the result obtained for the appropriate lag length selection.

Table 3. Determination of Appropriate Lag Length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-23586.16	NA	1.40e+18	47.46108	47.47094	47.46483
1	-23443.52	284.4113	1.06e+18	47.18213	47.21172	47.19338
2	-23368.60	149.0793	9.20e+17	47.03944	47.08876	47.05819
3	-23340.71	55.39137	8.77e+17	46.99137	47.06041	47.01762
4	-23314.35	52.24565	8.39e+17	46.94638	47.03514	46.98012
5	-23288.02	52.08573	8.02e+17	46.90144	47.00993*	46.94268*
6	-23281.04	13.77355*	7.97e+17*	46.89545*	47.02366	46.94419

When the results obtained for the appropriate lag length selection in Table 3 are examined, all of the LR, FPE, SC and HQ criteria show that 6 lags is suitable. In the next analysis, the most appropriate delay time will be taken as 6.

The Johansen Cointegration test was used to determine the existence of a long-term relationship between the variables. The H_0 hypothesis used for the Johansen cointegration test is in the form of 'There is no cointegration relationship between the variables' (Johansen, 1988). Accordingly, the cointegration test results are given in Table 4.

Table 4. Cointegration Test Results

H_0	Trace	0.05 Critical	Max-Eigen	0.05 Critical Value
	Statistic	Value	Statistic	
$r=0$	783.629	12.320	568.017	11.224
$r \leq 1$	215.612	4.129	215.612	4.129

According to Table 4, since trace and maximum eigenvalue statistical values for $r=0$ at 5% significance level are greater than the table critical values, there is a cointegrating vector between the variables. So, according to the Johansen cointegration test, it can be mentioned that there is a significant relationship between the MSCI ACWI IMI Robotics index and BIST100 index in long term.

4. Conclusion

Nowadays, thematic mutual funds stand out as an alternative for investors. Thematic funds are funds that emphasize a certain investment theme in their strategies. There is a huge variety of themes. Thematic funds are categorized as Transformative Technologies, Environment and Resources, Health-Healthcare, Society and Lifestyle, and Multi-Themed.

Thematic funds, by their nature, have high return potential but also involve relatively high risk. The returns of investors investing in strong themes may diverge, especially in periods of high uncertainty and fluctuations in the markets. When investors prefer thematic funds, portfolio risks are quite high, and portfolio management is very important. In this case, in order for investors to reduce their risks, they need to know the factors that create investmentable opportunities in thematic investing.

When the studies on thematic investment in the literature are examined, it is seen that only sector funds are taken into account and there is no study conducted with thematic investment funds in Turkey. For this reason, the study is the first on local thematic funds in Turkey. In the study, the relationship between MSCI ACWI IMI Robotics index and BIST100 index data was examined by the Johansen Cointegration method in the period 25.01.2021-31.03.2022 in order to help investors who turn to alternative

investment instruments with the effect of the pandemic. According to the results of the Johansen cointegration test, it can be mentioned that there is a significant long-term relationship between the MSCI ACWI IMI Robotics index and the BIST100 index. Therefore, it has been concluded that there is no possibility of earning extra income by portfolio diversification and arbitrage with these indices.

In the literature, the number of studies with thematic investments and thematic funds is negligible. In future studies, the cointegration relations of thematic funds with other financial investment instruments can be examined and the earnings of thematic portfolios can be determined.

1. References

2. Akel, V. (2015). An Analysis of Cointegration Among the Fragile Five Equity Markets, Int. Journal of Management Economics and Business, 11(24), p.75-96.
3. Elsaesser, G., Gardin, F., Kolrep M. & Rosentritt, M. (2020). Thematic Innovation Investing with Textual Data Analysis. Risk & Reward Research and Investment Strategies, p. 19-27.
4. Bérubé, V., Ghai, S. & Tétrault, J. (2014). From Indexes to Insights: The Rise of Thematic Investing. McKinsey on Investing, 1(15), p. 51-56.
5. Dickey, D.A.& Fuller, W.A. (1979). Distribution of the Estimators for Autoregressive Time Series with a Unit Root, Journal of the American Statistical Association. 74(366), p. 427-431.
6. Elmas, B. & Polat, M. (2015). Cointegration and Causality Analysis on the Effect of Silver Prices and Dow Jones Index on Gold Prices. Bingöl University Journal of Social Sciences Institute,3(6), p. 33-48.
7. Enders, W. (2004). Applied Econometric Time Series, (2. Edition), John Wiley & Sons Inc.
8. Hendry, D. F., Pagan, A.R. & Sargan, D.J. (1993). Dynamic Specifications, Zvi Griliches, Michael D. Intriligator, der. Handbook of Econometrics, p.1-5.
9. Johansen, S. (1988). Statistical Analysis of Cointegration Vectors. Journal of Economic Dynamics and Control, 12(1), p. 231-254.
10. Keskin Benli, Y. & Yenisu, E. (2017). Economic Growth Effects of Foreign Direct Investments: Cointegration and Causality Analysis for Turkey. Journal of Gazi Economics and Business, 3(2), p. 49-71.
11. Mackinnon, J.G. (1996). Numerical Distribution Functions for Unit Root and Cointegration Tests. Journal of Applied Econometrics, (11), p. 601-618.
12. Malladi, R. (2019). KIDS Thematic Indices: Enabling Investors to Invest in Firms That Cater to Children. The Journal of Beta Investment Strategies, 10(3), p. 85-103.
13. Methling, F. & Nitzsch, R. (2019). Naïve Diversification in Thematic Investing: Heuristics for The Core Satellite Investor. Journal of Asset Management, 20, p. 568-580.
14. MKK, (2020).<https://www.mkk.com.tr/veri-depolama-hizmetleri/e-veri/yillik-istatistiki-veriler>
15. Msci, (2022). <https://www.msci.com/our-solutions/indexes/thematic-investing>
16. Phalippou, L. (2021). Thematic Investing with Big Data: The Case of Private Equity. Available at SSRN, p.1-21.
17. Yılancı, V. (2009). Testing the Fisher Hypothesis for Turkey: Nonlinear Cointegration Analysis. Atatürk University Journal of Economics and Administrative Sciences, 23(4), p. 205-213.