An Empirical Study of a Direct Inter-relationship between Thanksgiving Day and Luxury Related Industry's Corresponding Stock Market

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ABSTRACT
This paper is dominantly studying about the size of effects on the luxury related stock markets when there is a special occasion, Thanksgiving days, taken place. An index call BK4202 related to apparel, accessories and luxury goods is used as the representation of accessories stock market. Mathematical models such as PMCC, hypothesis testing, and T test are applied to support the initial statement that a positive relationship is between Thanksgiving holidays and luxury goods's market performance and there is chance for investors to earn abnormal returns.

Keywords: *Abnormal Returns, Thanksgiving Day, Luxury's stock market*

1. INTRODUCTION

Black Friday normally happened at the first Friday after Thanksgiving, yet a beginning for Christmas. Most stores will release a alluring discount to stimulate consumption during Black Friday. Meanwhile, luxury brands are counting on the day to hit their biggest sale figures of the year [1]. As a sensible investor, it is worth exploring that whether investors can apply this phenomenon on stock market to increase the whole investment return.

This essay analyses the correlation between the Thanksgiving Day and the fluctuation in the stock market. The initial hypothesis is that the Black Friday would boost the consumption of Luxury goods which would have a consequence on the Luxury stock market, which will display a positive link between the week after the Thanksgiving Day and the luxury industry's corresponding stock market.

Data used are collected from the S&P500 and BK4202. BK4202 is a index related to apparel, Accessories and Luxury Goods, including Delta Apparel, Dogness, Vince and other thirty stocks in the USA stock market. These are both statistical data that helps us to correlate the rise and fall in the stock market to the thanksgiving.

2. DATA PROCESSING AND ANALYZING

2.1 Basic Data analysis

In the following sections, various methods including regression line method, hypothesis testing and so well the T test are applied to further analyzing the data, hence making a conclusion from the observation and research of the data with respect to the initial thought.

Firstly, a ten-years data for both market S&P500 shown in Table 1[2] and index figure BK4202 shown in Table 2 is collected through Tiger Trade [3], shown in the following table. To standardize the figure, the returned ratios on both Thanksgiving days and the week after are annualized in both. In the US, the trading days per year is approximately 252 [4], after dividing into weeks, it is turning out to be around 36 weeks which is the multiplier used in converting Thanksgiving weeks into annual percentage. To further illustrating the data, some scatter graphs had also been made.

Table 1 Stock Price of S&P500

S&P500	Annual return	Return on Thanksgiving week	Return the week afterward	Average return (Thanksgiving)
2009	23.45%	-13.68%	61.92%	24.12%
2010	12.78%	-30.96%	106.92%	37.98%
2011	0.00%	-168.84%	266.04%	48.60%
2012	13.41%	130.32%	18.00%	74.16%
2013	29.60%	2.16%	-1.44%	0.36%
2014	11.39%	7.20%	13.68%	10.44%
2015	-0.73%	1.44%	2.88%	2.16%
2016	9.54%	51.84%	-34.92%	8.46%
2017	19.42%	32.76%	12.60%	22.68%
2018	-6.42%	-136.44%	174.60%	19.08%
2019	28.80%	35.64%	5.76%	20.70%
weighted average for ten years	14.12%	-8.86%	62.60%	26.87%

Table 2 Stock Price of BK4202

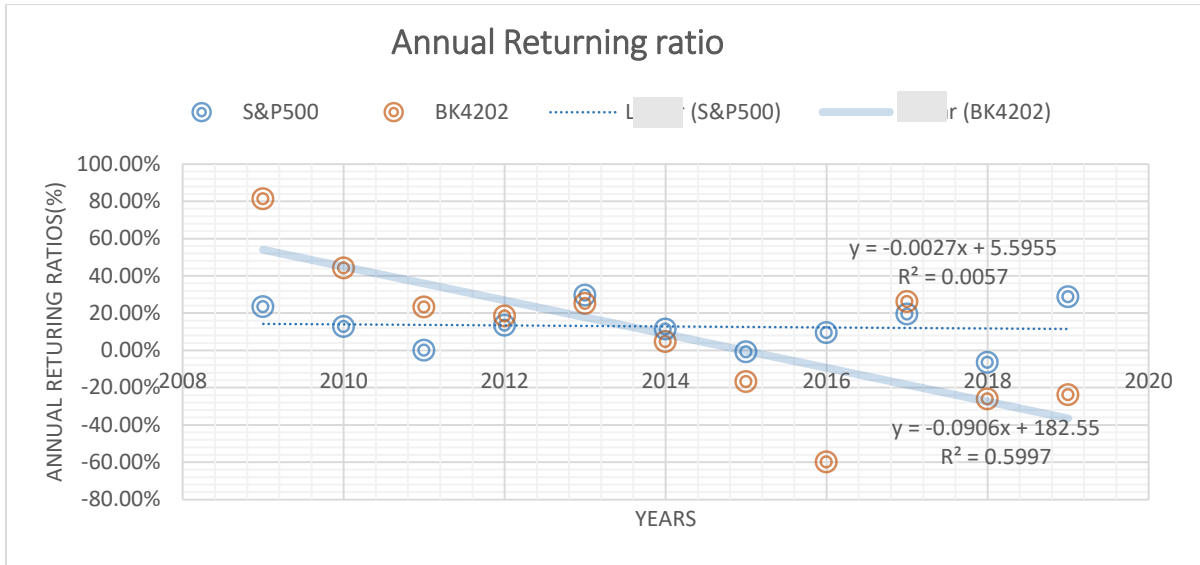| BK4202	Annual return	Return on Thanksgiving Day	Return the week afterward	Average return (Thanksgiving)
2009	81.38%	119.52%	16.20%	67.86%
2010	44.17%	119.16%	74.16%	96.66%
2011	23.19%	-153.72%	249.12%	47.70%
2012	18.48%	142.20%	19.44%	80.82%
2013	25.10%	47.52%	-40.68%	3.42%
2014	4.62%	88.92%	-102.96%	-7.02%
2015	-16.81%	42.84%	-81.36%	-19.26%
2016	-59.88%	-77.76%	-128.52%	-103.14%
2017	26.17%	122.76%	25.56%	74.16%
2018	-26.03%	23.40%	90.72%	57.06%
2019	-23.84%	101.52%	41.40%	71.46%
weighted average for ten years	9.66%	57.64%	16.31%	36.97%

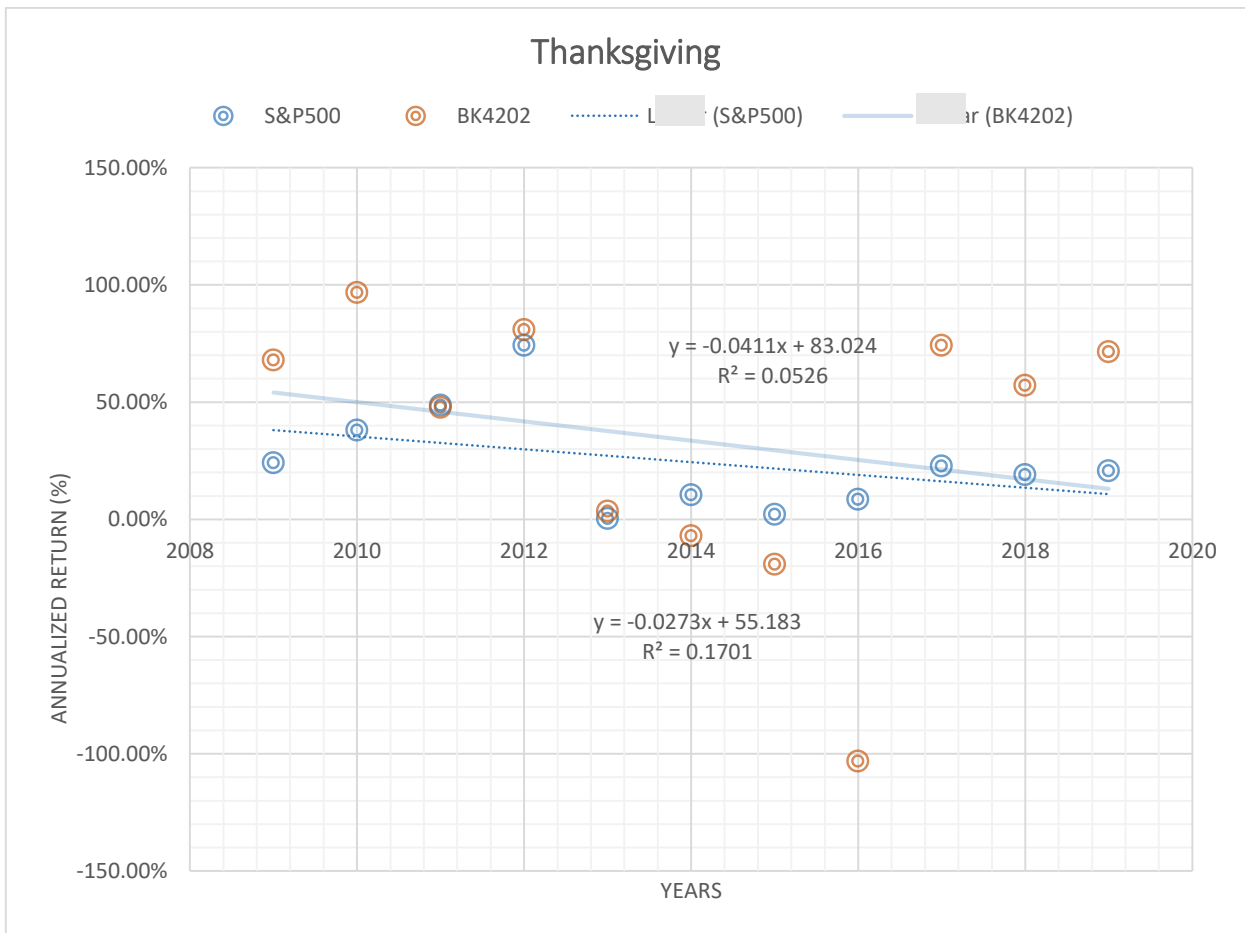**Figure 1** Annual Returning Ratios of S&P500 and BK4202

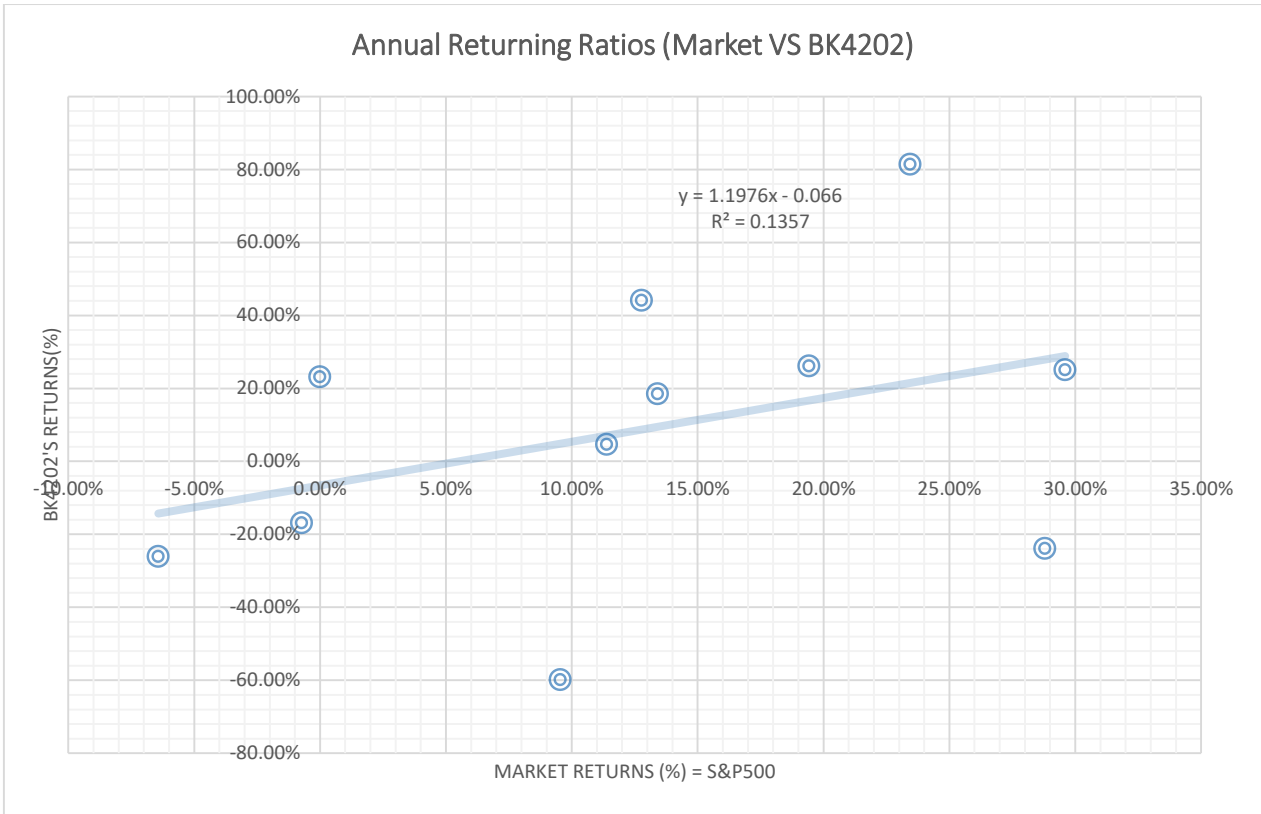**Figure 2** Annual Thanksgiving Day Returns of S&P500 and BK4202

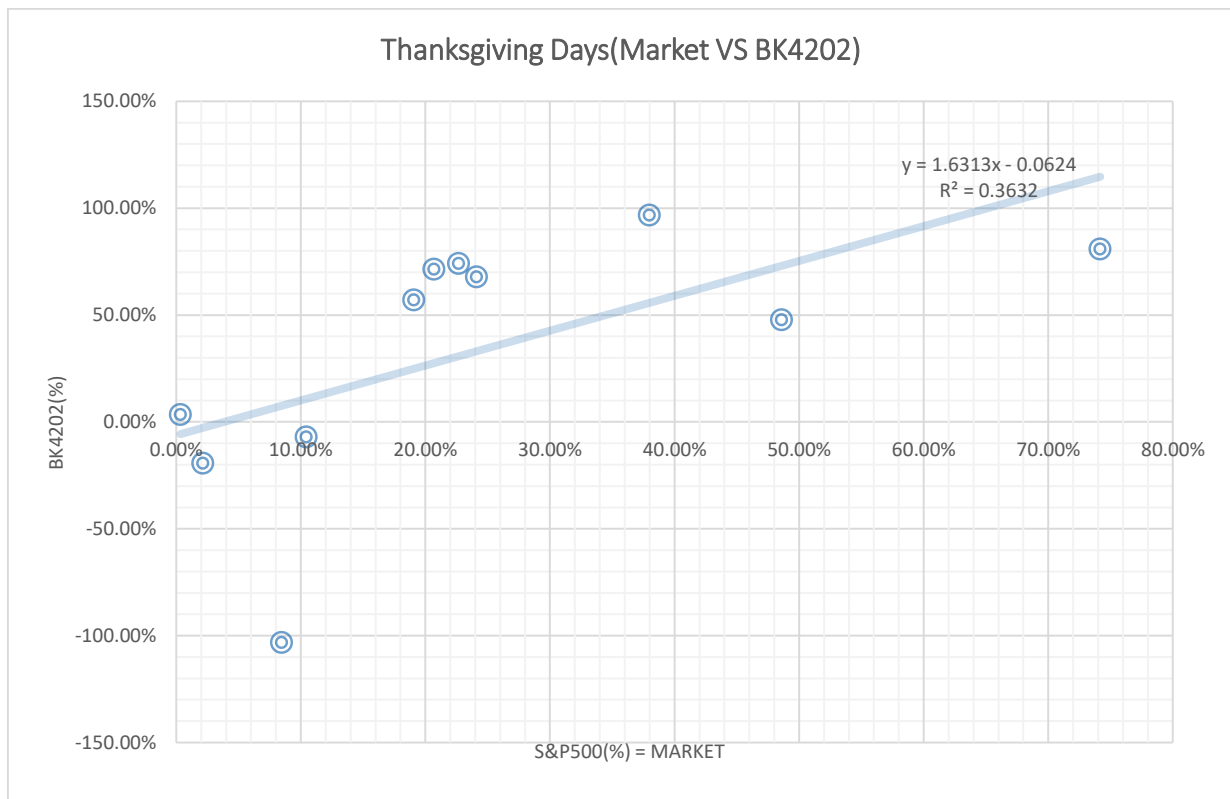**Figure 3** Annual Returning Ratios (Market VS BK4202)

Figure 4 Annual Thanksgiving Day Returns (Market VS BK4202)

It is discovered from Figure1 and Figure 2 that the trend of changes of BK4202 and S&P500 during two time periods. For the former, it has in the trend of decreasing for two period of time, while the latter has a downward trend during Thanksgiving period but not linear relationship during the whole year. With regard to Figure 3 and Figure 4, it is shown that there is a positive correlation between the market returns and BK4202's

return in both period of time. This represents that when the stock market is in the bloom, the index for luxuries goods' stock is also likely in a rising trend. R^2 in statistics represents the rate of variance between he dependent variable and independent variable, which will illustrates the strength of correlation.[5] Especially during the Thanksgiving days period of time, there is a stronger relationship regarding to the high R^2 value which is about 0.3632 compared to the annual data R^2=0.1357.

When it comes to individuals, the general

performance of BK4202 is not promising, acting downward as time passed. However, when it turns to the period of thanksgiving days, the rate of falling becomes weaker as well as a reduction in the correlation between annualized data, from a relatively stronger R^2 value of 0.5997 to merely 0.0526. The returns fluctuate sharply. This phenomenon gives an earlier indication of the possible existence of abnormal returns during the special period of time.

Therefore, it comes to the next session, the analysis of BK4202.

Table 3 Statistics calculated about BK4202

BK4202			
Yearly return (x)		Thanks giving period(y)	
$\bar{x}$	9.66%	$\bar{y}$	36.97%
$\sum x$	96.56%	$\sum y$	368.72%
$\sum x^2$	15903.6698%	$\sum y^2$	47687.1624%
σ_x^2	1368.731688	σ_y^2	3205.503372
σ_x	36.99637398	σ_y	56.61716499
S_{xx}	38.80212438	S_{yy}	59.3805836
S_{xy}	30.10784543		
PMCC	0.6272341494		
Regression line of best fit		y = 25.18487474 + 0.9598837807x	

The the product movement correlation coefficient (PMCC) is a statistic that approximate the strength of the linear relationship between two variables. It is between -1 to 1, representing the positive or negative correlation. [6] From the given result, it is pronounced that there is a positive strong relationship between the yearly return(x)and Thanksgiving period return (y), which the PMCC is greater than 0.5.[7] Therefore, when there is a growth in yearly return, the investor is most likely to also earn a considerable return during thanksgiving days. The following linear regression line of best fit " $y = 25.18487474 + 0.9598837808X$ " display the finding that there will be greater return or loss during the Thanksgiving. When x value is positive, the greater smart beta will make the y bigger, while x value is negative, the standard alpha number (25.18487474) will pull up the number to make the loss of y smaller. However, with respect to the significant number of variance and standard deviation of y in contrast to x, y value seems fluctuated largely, which during some years with not so well performance, investors may loss more during the special period of time.

2.2 About the Errors (standard error)

Before conducting the hypothesis test, it is necessary to refer back to the reality comparing the differences between the calculation result and reality. According to the models and real figures in 2019. The returning of givings day is taken as instances. For S&P500, the real

figure is -0.25%, the forecast figure is -0.08%. For BK4202, the real figure is 1.60%, the forecast figure is 0.09%. Therefore, the error for the former is 0.17%, for the latter, the error is 1.51%.

2.3 Hypothesis test

To find out whether the former statement is reliable, there will be a hypothesis testing hold in this section. It is the testing for the difference between means.With regard to the central limit theorem[8], the population for both normal returns(x) of BK4202 and abnormal returns(y) of BK4202 are approximately following a normal distribution. In order to make the answer more reliable, the μ for both x and y are calculated from the population (2008-2022), while the mean values come from the former calculation ($\bar{x}$and $\bar{y}$). By testing the possibility of whether or not the μ_y can exceeds μ_x, it is able to find out the existence of abnormal return

Significant Level α = 5%

$$H_0 = \mu_{normal} = \mu_{abnormal}$$
$$H_1 = \mu_{normal} \neq \mu_{abnormal}$$

Table 4 Necessary figures used in hypothesis testing of means

Yearly return(x)		Thanks giving Returns(y)	
μ_x	8.61%	μ_y	50.91%

σ_x	36.99637398	σ_y	56.61716499
$\bar{x}$	9.66%	$\bar{y}$	36.97%

Using the formula below to test the μ values.

$$Z = \frac{\bar{x} - \bar{y} - (\mu_x - \mu_y)}{\sqrt{(\sigma_x^2/n_x + \sigma_y^2/n_y)}}$$

Formula (1) calculation of z value

By substituting the numbers in

$$Z = \frac{0.0966 - 0.3697 - (0.0861 - 0.5091)}{\sqrt{(36.99637398^2/10 + 56.61716499^2/10)}}$$
$$Z = 7.008779446 \times 10^{-3}$$
$$P(z \leq 7.008779446 \times 10^{-3}) = 0.5398$$
$$0.5398 > 0.1$$

Therefore, there is no sufficient evidence to reject H_0 and accept H_1. The result didn't support the idea that there will be absolutely some abnormal returns during the Thanksgiving days period of time.

Thus, it is vital to conduct another test.

2.4 T test

To further finding the results, a T-test is conducted. A T-test is a statistical way of testing whether there is a significant different between the mean value of two groups of data. If the null hypothesis is rejected, then there is sufficient evidence to support the claim that two groups of data have different mean values, therefore, having an abnormal profit.[9]

To begin with, it is set that

$H_0 : \mu_0 = 0$

$H_1 : \mu_0 > 0$

In this way, it is believed that the returns from thanksgiving week will bring investors with more profits than in the other normal period of time. And for the significant level (α):

Let α=5%, which the confident level will be 95%

To find out the difference, using the return on Thanksgiving weeks (y) to subtract the annual return (x) in order to maintain a positive result. (Table 3, Table 4 and table 5)

Table 5 differences between annual return and thanksgiving days return

Years	Difference between x and y
2009	-13.52%
2010	52.49%
2011	24.51%
2012	62.34%
2013	-21.68%
2014	-11.64%
2015	-2.45%
2016	-43.26%
2017	47.99%
2018	83.09%
2019	95.30%

Hence, it can be got that: (from the given formula [10])

$$t = \frac{(\bar{d} - \mu_0)}{(s_d/\sqrt{n})}$$

Formula (2) calculation of t values

Table 6 necessary figures used in T-test

$\bar{d}$	24.83363636
σ^2	1946.65655
σ	44.12093098
n_d	11
$n_t = n_d - 1$	10
t	1.866775069

According to the t table as shown,

Table 7[11] T-test Value table

T- test Table							
Cum.prob	$t_{.50}$	...	$t_{.90}$	$t_{.95}$	$t_{.975}$	...	$t_{.9995}$
One-tail	0.5	...	0.10	0.05	0.025	...	0.0005
Two-tails	1.00	...	0.20	0.1	0.05	...	0.001
Df.							
1	0.000	...	3.078	6.314	12.71	...	636.62
...	...	...	...	...	...	...	...
10	0.000	...	1.372	1.812	2.228	...	4.587
...	...	...	...	...	...	...	...
1000	0.000	...	1.646	1.960	2.330	...	3.300

By substituting the number in Table 6 to the formula 2, the t value is able to be calculated, which is t =1.866775069.

With regard to Table 7, the corresponding critical region for t is

$$t_{.95} = 1.812 \text{ (When d.f =10)}$$

In that: $1.866(4s. f) > t_{.95} = 1.812$

Hence, t value is in the critical region and there is sufficient evidence to reject H0. In another words, after the T test, it can be proven that there is some abnormal profits earned during Thanksgiving weeks among the whole year.

3. CONCLUSION

From the basic data analysis, it can be concluded that although there are some abnormal profits that can be earn through the Thanksgiving, however, by analyzing the data of S&P500 regression line throughout the year, it had been found out that the is a weak negative correlation. Oppositely, the relationship of the market tends to be strong positive. Besides, the result for the hypothesis test does not perfectly support the initial statement. As a conclusion, although one of the data shows to be disobeying to the hypothesis, but the other data tends to support the hypothesis. Therefore, there is a chance that the Thanksgiving would bring a rise in the stock market of Luxury products.

To the investors who aims at speculation, the dream may work on the investment during Thanksgiving weeks -- investing first day during that week and sold in the next week's last trading day. However, it is more advisable suggestion that before the conducting the speculation, one should calculate and analyze the previous performance of the whole market by using either S&P 500 or Dow J. If the market performed badly, then, because of the leverage due to the great variance and smart beta value of BK4202, one may loss significantly on the investment of apparels, accessories and luxury goods related stock market.

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