Exploring the Timing Stock Selection Ability of U.S. Active Index Fund ETF Based on T-M Model

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Abstract: Based on past research experiences, the passage briefly reviews the important tools used as an important tool for the analysis of stock selectivity ability and market timing ability, The T-M model. Results found that from 2022 to 2023, the funding groups selected do not have the effective ability of timing and stock selection, also the government policies and other external factors during the period affect the whole market trending. The Jensen model and the subsequent T-M model have been widely used to measure whether the return-on-investment index funding portfolio has achieved the expected effect, which has a strong correlation and provides a good calculation standard for investors and funding investment managers holding funding portfolios. The model provides an effective reference for following stakeholders to know the market trend and control their investment risks better.

Keywords: Index funding, NASDAQ Composite Index, stock selectivity ability, market timing ability

1. Introduction

Exchange Traded Funds (ETF), which is form of funds, uses publishing various amounts in the stock exchange to gather investors' cash and other operating details on daily exchange days and are managed by professional investment managers. The way of managing combines investing groups, professional managing, sharing of revenue within stakeholders, and risk sharing. In the level of operating, there are two ways of treading: Closed-end Index Funds and Open-ended Index Funds [1]. Closed-end Index Funds, the amount of funding in the periods of funding contracts is stable, and transactions between investors can be carried out on stock exchanges within the principle of law. Compared with the Closed-end Index Funds, Open-ended Index Funds are more flexible and Redeemable. The market and amounts of Open-ended Index Funds can be chosen. Plenty of investment managers are willing to increase or withdraw their investment after considering the whole market situation [2].

The passage reviewed related concepts and gave the important tools used for the analysis of stock selectivity ability and market timing ability at first. The development history of the T-M model. Secondly, by selecting two essential index funding portfolios in the NASDAQ Composite Index within the United States and comparing them with the standard market investment rate of returning and the benchmark index funding portfolio return. Last, drawing specific conclusions based on the relevant experimental data. So, investment managers who are holding such index funding portfolios

from 2022 to 2023 do not have a strong ability to select stocks at the right time and the impact of government macro policies and external related factors on the market is strong in this process.

2.   Literature Review

2.1.   Related Concepts

As a tool of investment, funding's return is tightly related to the investment manager's stock selectivity ability and market timing ability. Stock selectivity ability refers to investment managers' ability to stock identification and whole stock market moving judgments. Compared with the stock selectivity ability, market timing ability refers to have ability to get market timing [3]. To have this ability, it required investment managers to forecast the market moving and resent essential sectors' returning in the future.

2.2.   T-M and Other Terms Models

2.2.1.Relevant Theories

There are plenty of ways to calculate funding's return after ETF Investment-based open-ended index funds and their funding groups begin to sell on the stock exchange [4]. The earliest research on funding returning was published by Treynor and Mazuy, they created a Model containing binomials (T-M model) based on the traditional model of capital asset pricing model (CAPM) and used it to calculate the whole funding group returning which contained 57 basic funding and all of them were listed on U.S. stock market during 1953 to 1962 [5]. After considering other factors that may affect funding groups' returning, the experiment found few funding proved the ability of stock selectivity ability and market timing ability.

Jensen presented the most significant stock selectivity ability indicator- the Jensen Indicator based on the model of capital-related pricing, which is the CAPM model. The research gathered 115 United States mutual fundings from 1945 to 1964 and the aim is to find whether funding groups have stock selectivity ability and market timing ability [6]. The result of the experiment is excellent and the research found mutual funding couldn't give the ability of stock selectivity.

The research on the CAPM model effectiveness is proven by Fama and French, in the experiment, researchers created a three-factor model (F-F-3 model), which considered the factor of size and book-to-market ratio as the newest principal to improve the model of T-M and got TM-FF3 model [7].

Pascal Böni and Sophie Manigart used the lagged internal rate of return (PME) method introduced by Kaplan and Schoar to get the experiment which researched the return and performance of private debt (PD) funds [8]. during the measurement, not only did the experiment consider the relationship of investors' contribution, investment manager's professional ability of stock selecting, but also added the factors of non-bank private debt demanding and effective of essential crisis to the whole market, especially Global Financial Crisis in 2008 and COVID-19 pandemic during 2020 to 2022 [9]. With the development of society, the factor that must to considered is rising, so the policies and the governments' movement will be accepted to analyze the result and reason of the T-M model experiment.

2.2.2.Relevant Models

Jensen presented the selectivity ability indicator- the Jensen Indicator, which refers to whether investment managers can make excess earnings with the ability of professional and experiences of working career, especially within the risk of the whole market and different terms of funding

portfolios. The model makes the regression analysis between funding portfolios with excess returns on the market index.

$$R_i - R_f = \alpha_i + \beta_i(R_m - R_f) \tag{1}$$

Where $R_i - R_f$ is considered the comprehensive performance of investment fund managers, $R_m - R_f$ is referred to excess return on market benchmark portfolio and regression coefficient α_i is present the factor of stock selectivity ability.

Fama used stock selectivity ability and market timing ability to estimate funding portfolio performance, the risk of funding portfolios will abrupt growth if the experiment enhances the amount of index funds in which capital and investment shares are undervalued. The result is the investment manager must make a judgment and choose between excess return and risk, either gain a return or reduce risk, so the experiment added the identification of both timing and stock selection metrics.

The theory of the CAPM model is:

$$R_i = R_f + \beta(R_m - R_f) \tag{2}$$

Where $\beta(R_m - R_f)$ refers to the excess return of funding portfolios within systemic risk and:

$$R_p - R_i = (R_m - R_f) + (R_p - R_\beta) \tag{3}$$

Where R_p refers to the Real return on the fund's portfolio, R_f is the return of non-risk in the market, R_β respects returning of funding portfolio consists with β and R_m is the market benchmark rate of returning.

Pascal Böni and Sophie Manigart used the PME method introduced by Kaplan and Schoar which is widely used in estimating the performance of different funding levels and the system of asset management. The experiment considered the ratio between the present value of distributions with the contribution which cash flow consists of investment from limited partners. The discount rate is the realized market return (R_{ms}) which is given by the market benchmark index and the PME is calculated as:

$$\textbf{PME} = \left[\sum t \frac{\textbf{Distributions}_t}{\prod_{s=t_0}^{t}(1+\textbf{R}_{ms})} \right] \Big/ \left[\sum t \frac{\textbf{Contributions}_t}{\prod_{s=t_0}^{t}(1+\textbf{R}_{ms})} \right] \tag{4}$$

3.   Data

3.1.   Selecting Experiment Model

According to Section 2, the model of T-M is based on the most basic fund portfolio return measurement models, which is used as a standard principal for subsequent models that add more measurement factors. Hence, it has been widely used in the procedure of estimating a funds group's return, especially experiments in investment open-ended active index funds (OA-ETF). In this case, the experiment is based on theories of the T-M model to design and find out the results of ETF funds' groups. The Data collection period is from January 1, 2022, to December 31, 2023, with the following model.

$$\textbf{R}_i - \textbf{R}_f = \boldsymbol{\alpha} + \boldsymbol{\beta}_1(\textbf{R}_m - \textbf{R}_f) + \boldsymbol{\beta}_2(\textbf{R}_m - \textbf{R}_f)^2 + \boldsymbol{\eta}_i \tag{5}$$

Where $R_i - R_f$ is considered the comprehensive performance of investment fund managers, for which R_i is the real return of funding **i** and R_f is for the risk rate of return. α is for the stock selection ability indicator, β_1 is to estimate the system market risk of fund groups. R_m is for funding group's real return based on marketing, β_2 stands for choosing timing ability indicator, and η_i is residual value.

3.2. Relevant Measurement Factors

3.2.1. Annual Return of An Investment-Oriented Active Index Fund

The procedure for finding annual funds returning is:

$$R_i = \frac{[(NAR_{it} - NAR_{i,t-1}) + D_{it}]}{NAR_{i,t-1}} \tag{6}$$

Where NAR_{it} and $NAR_{i,t-1}$ are given the meaning of funding annual returning at the end of t year and the newest invest annual returning at t-1 year. D_{it} is the period dividend in t year because most ETF funds have not been given a dividend to stakeholders any more till 2022, so dividend will not be considered in the experiment.

3.2.2. Basic Marketing Returning

The basic marketing return in the experiment is chosen from the NASDAQ Composite Index from January 1, 2022, to December 31, 2023, which is -4.10%, and more detailed information is collected from the NASDAQ official website.

3.2.3. Risk-Free Rate of Returning

The risk-free rate of return was published by circular and its' explanatory documents, most institutes adopted 3% to 7% as the discount rates in most contexts. These data were too outdated to adapt to rapidly changing market conditions [10]. In recent years research which why investment managers misunderstand whole market trending and returning, the reasons for the non-positive (positive) correlation between the relationship of risk-returning and the overall market return are attributed to buying and selling overpriced(underpriced) investment index funds and misjudgment of market massages. A significant number of funding managers mistakenly use short-term risk-free market returns such three-month maturity of U.S. treasury bonds as a measure and add into the model [11]. They ignore unpredictable future risks and whether they will negate the gains already made.

In recent study, plenty of standard principals are considered non-risk returning ratings, including differential terms national treasury bills and one-year Bank Term Savings Deposit Interest Rate. After reading passages about these rating features and areas of application, the experiment chose returning of U.S. 10-to-30-year treasury bills as the risk-free rate of returning.

4. Results

4.1. Selecting A Basic Group

Until March 1, 2024, 31 separate funds are tracking the NASDAQ Composite Index, with the 13 independent industries, the financial sector, and the real estate sector popular for investment managers to hold, with 88 and 67 individual ETF funds tracking them. Therefore, the experiment chooses the factor of funds and divides them into different groups to find their reward and results of comparison.

Firstly, the 31 main factors are divided into four small groups, which are the Standard tracking index, Earnings tracking topics, Management & Environment, and Other benchmark indicators. Four

small groups which mentioned are labeled A1, B1, C1, and D1. Because of other two comparison groups have similar marking standards, the small labeled groups in Basic Benchmark Portfolio have the same tag.

Table 1: Results Of Benchmark portfolio yield

Group	Name	Rate	Group	Name	Rate
A1	Innovator Growth-100 Power Buffer ETF - April	14.75%		Double Long NASDAQ 100ETF	-14.05%
	Innovator Growth-100 Power Buffer ETF - January	-1.93%		First Trust NASDAQ-100 Equal Weighted Index Fund	0.54%
	Innovator Growth-100 Power Buffer ETF - July	14.41%		Direxion NASDAQ-100 Equal-Weighted Index Shares	1.03%
	Innovator Growth-100 Power Buffer ETF - October	13.13%		NEOS NASDAQ -100 High-Income ETF	-0.33%
	Pacer Trend Pilot 100 ETF	13.10%		Victory Shares NASDAQ Next 50 ETF	-19.45%
B1	NASDAQ 100ETF-ProShares	4.41%	B1(continued)	Defiance NASDAQ 100 Enhanced Options Income ETF	7.19%
	Global X NASDAQ 100 Covered Call ETF	-1.02%		Global X NASDAQ 100 Risk Managed Income ETF	-8.94%
	Calamos Alternative NASDAQ & Bond ETF	-0.41%		Global X NASDAQ 100 Tail Risk ETF	1.95%
	Goldman Sachs NASDAQ -100 Core Premium Income ETF	15.17%		Global X NASDAQ 100 Covered Call & Growth ETF	2.29%
	ProShares Short QQQ	-7.26%		Triple Short NASDAQ 100ETF	-51.86%
	Global X NASDAQ 100 Collar 95-110 ETF	4.56%		FT Cboe Vest Technology Dividend Target Income ETF	9.95%
	Double Short NASDAQ 100ETF	-28.80%		Triple Long NASDAQ 100ETF	-37.68%

Second, gather 31-factor funds into their small groups. So, the first small group, the Standard tracking index, has seven element funds. According to Table 1, results of benchmark portfolio yield, one of the funds, Innovator Growth-100 Power Buffer ETF - April, gets the largest rate of return, which is 14.75% from January 1, 2022, to December 31, 2023. Based on this rule, the next three small groups have their different element funds, which have 17, 5, and 2 factors in groups. Each of the small groups has its largest returning fund, which are Goldman Sachs NASDAQ -100 Core Premium Income ETF (15.17%), Global X NASDAQ 100 ESG Covered Call ETF (15.57%), and Victory Shares Dividend Accelerator ETF (3.93%).

Table2: The rest results of Benchmark portfolio yield

Group	Name	Rate	Group	Name	Rate
	Innovator NASDAQ -100 Managed Floor ETF	-0.29%			
	Invesco ESG NASDAQ Next Gen 100 ETF	-15.26%		First Trust NASDAQ-100 Ex-Technology Sector Index Fund	1.52%
C1	Invesco ESG NASDAQ 100 ETF	6.09%			
	First Trust NASDAQ-100-Technology Index Fund	0.50%	D1		
	Global X NASDAQ 100 ESG Covered Call ETF	15.57%		Victory Shares Dividend Accelerator ETF	3.93%

4.2. Calculation

Based on the equation, this study calculated three groups' funds returning with their t-test, F-test, and the goodness of fit R^2 index. When calculating every main group's α and β_2, the first step is to find out every small group's average returning in the period, which every small group's R_{m-i}. For example, according to Table 3, results of R_{m-31}, the average return of which Standard tracking index in Basic Benchmark Portfolio is 0.081, the experiment uses this method to calculate other small groups' average returns, which are -0.074, 0.013, and 0.027. Then, using every average returning minus NASDAQ benchmark yield R_t, then, get α; as the same method, the experiment also gets reads of β_2 using an average of returning minus Risk-free yield: the yield on US Treasury Bonds between 10 and 30 years.

Table 3: Results Of Rm-31

	Time	α	T of α	β2	T of β2	R2	F	Rm-i	Rm-31
A1		0.122		0.004				0.081	
B1	2022.1.1-2023.12.31	-0.033	-0.914	0.008	-0.437	0.767	7.984	-0.074	-0.018
C1		0.054		0.219*10-5				0.013	
D1		0.068		0.002*10-1				0.027	

Finally, the experiment in Table 4 t uses average returning and results of α and β_2 to calculate their data of t-test, F-test, and the goodness of fit R^2 index, after making a comparison between each of the groups, the experiment can gather conclusions with these numbers.

Table 4: Results Of Rm-88 And Rm-67

	Time	α	T of α	β2	T of β2	R2	F	Rm-i	Rm-88	Rm-67
A2		-0.005		0.010				-0.079		
B2		-0.069	2.132	0.005	-2.013	0.906	16.058	-0.056	-0.059	
C2		-0.130		0.017				-0.116		
D2	2022.1.1-2023.12.31	-0.031		0.004*10-1				-0.004		
A3		-0.010		0.010				-0.084		
B3		-0.101	0.708	0.011	-6.383	0.976	32.293	-0.088		-0.097
C3		-0.158		0.026				-0.145		
D3		-0.118		0.011				-0.090		

5. Discussion

Through calculating the average annualized composite return of the NASDAQ underlying tracking index funds and comparing returns of funds groups related to financial and real estate sectors, statistics show significant changes in basic items and comparison groups of index funds from 2022 to 2023. Here are some essential discussions in the following characteristics.

5.1. Group of Benchmark Portfolio

The group of Benchmark Portfolio included 31 ETF index funds in the pool of NASDAQ and tracked it in the experiment period. Therefore, the data collected from these factors reflect the basic situation of the overall market trend. The target is to use a standard of predicting the future situation and environment of the market, as well as holding the benchmark portfolio and using the relevant data for profitability, it also assesses investment managers whether it has the basic ability of stock selection and timing control in daily trading.

During the experiments and calculations, the average annual returns of the four benchmark portfolios were 8.12%, -7.41%, 1.32%, and 2.73%. After comparing the data from the basic results of the index groups with the annual average return of the NASDAQ Composite Index during the same period, it has shown that the return of the whole basic benchmark portfolio is significantly higher than the overall market benchmark return rating. The results not only reflect investment managers who decided to hold this group of funds in this period are correct, but also show the characteristic of tracking average market return and stability of holding the return of this portfolio through calculating factors of α and β2, which are 0.212 and 0.013.

In the process of calculating the other measurement factors, the t-tests of two main data are -0.914 and -0.437, indicating that the returns of the benchmark portfolios are higher than those of the comparators when comparing with the returns of the NASDAQ Composite Index and the yields of the U.S. 10-to-30-year treasury bills. The coefficient of the F-test is 7.98, indicating that the returns of the four benchmark portfolios are smoothly distributed with less difference from the total average,

these factors also prove the stability of the returns when investment managers are holding this fund's portfolio.

The benchmark portfolios, compared with important market key return indicators and the U.S. benchmark Treasury bond yield; both of them not only are important markable reference factors for the whole ETF investment market, but also provide an important reference object for the later study of ETF index fund portfolios based on industries, as well as comparability and ability to match with the market real-time trend are its characteristics, along with advantages.

A similar experiment method is used in volatility timing in mutual funds, according to Jeffrey A. Busse, when investigators found evidence from daily returns and considered four factors to estimate whether or not mutual fund managers are excellent market time controllers using daily mutual fund returns [12]. The following is the three and four-index volatility timing model.

$$R_{pt} = a_p + \sum_{j=1}^{k} \left[\beta_{0jp}R_{jt} + \beta_{1jp}R_{j,t-1} + \gamma_{jp}(\sigma_{jt} - \sigma_j)R_{jt} \right] + \varphi_{pt} \qquad (7)$$

Where α_p were presented the abnormal return of funds and experiment can calculate differential between small-zone stocks with large-zone stocks (STL), high book-market stocks with low book-market stocks (HML), also must considered bond returns as in Elton, Gruber, and Blake. When k =3 and 4, the equation will get results with all elements mentioned above [13].

When dividing 320 funds, the experiment used the principle of weighted factor, which is very similar to this testing. Simples were divided into market exposure, STL exposure, low-market stocks (HML) exposure, and other special random portfolios, and then calculated their return within the group of Max capital gains, Growth, Growth & Income, Surviving and Non-surviving during January 2, 1985 to December 29, 1995.

Fund groups' results from 1985 to 1995 are similar to this testing. In single-index, returns of Max capital gains, Growth, Growth & Income, Surviving and Non-surviving are -0.0088%, -0.0066%, -0.0032%, -0.0035% and -0.0240%. Also, the goodness of fit R^2 index is high. For example, the group of Growth & Income in the three-index and four-index models are 0.871 and 0.874 related to whole fund elements.

5.2. Group of Financial Sector Portfolio

Benchmark portfolio is to reflect whether the return of all ETF index fund portfolios meets the standard set before, the data was calculated based on different classification standards, different industry limits, various regions, and regional divisions. Therefore, when studying the return of ETF index fund portfolios based on the financial industry separately, it is more testing for the professionalism and ability of the investment manager to catch the market timing, the mobilization of specific factors in the stock pool, along with the price of each group in portfolios. It is important to acknowledge that to more clearly represent the trends in the distribution of these data and the final results, the portfolio's total return needs to be considered as a whole, labeled by the number of samples in the portfolio. For example, the benchmark portfolio has thirty-one samples of ETF index funds, which comprise an overall return labeled Rm-31, so the annual average returns of the Financial Sector Portfolio, which has eighty-eight samples, and the Real Estate Sector Portfolio, which has sixty-seven samples, are noted as Rm-88 and Rm-67.

Compared with the benchmark portfolio, investment managers who use the financial sector index fund portfolio as their primary investment strategy cannot achieve higher investment returns in the 2022 to 2023 interval due to several factors from politics. By calculating the α and β_2 indices for this portfolio, they are -23.51% and 3.14%, respectively, which is a lower overall return. However, due to the impact of policy events related to the U.S. stock market during the statistical interval, it is not

objective to determine whether the investment manager holding this portfolio can efficiently and professionally hold the index funds and capitalize on the opportunities only within the industry.

The t-tests for the α and β_2 indices are 2.13 and -2.01, which shows an overall correlation trend under the comparison with the major market yields and the treasury benchmark yields, but a positive correlation trend with the major market yields and a negative correlation trend compared with the treasury benchmark yields, which indicates the average yield of the collected sample data is lower than the benchmark yield of treasury bonds in the same period. In this portfolio, the goodness of fit R^2 index is approximately 0.90, reflecting a strong correlation between the actual portfolio returns and the market benchmark theme returns in a realistic situation with a strong fit. At the same time, the F-index of the sample funds passes the test at the 5% significance level, with a specific value of 16.06, reflecting the intra-group fluctuations are more tightly clustered together, with little distance between the means compared with random errors in groups.

5.3. Group of Real Estate Sector Portfolio

As a key investment sector in the U.S. stock market, the average annual return of the ETF-related index fund portfolios represented by the real estate sector is an important assessment of the timing of selection and type of trades made by the underlying investment managers who master this sector. Within the statistical interval from 2022 to 2023, the returns of ETF index fund portfolios in the real estate sector, which are divided into four subcategories by yield, sector, region, and other select standards, which were 8.40%, -8.75%, -14.50%, and -9.04%, for an overall average annual return of -9.66%. Consistent with the financial sector portfolio return, the statistical range in the loss, cannot reflect the master of this portfolio investment manager's ability to decide the time and stock selection because results are affected by many other elements, including politics publishing, and whole market situation during the experiment period.

The index fund portfolio divided by industry has a very significant correlation between its relevant calculation index and the overall market's underlying rate of return. It can be seen from the R^2 data of this portfolio, which reached 0.98, reflects the unique nature of the ETF index fund itself: tracking the market development trend closely, it is basically in line with the actual direction of the Nasdaq Composite Index and is essential for the related treasury bonds issued by the U.S. government and their yields match less well, as can be seen from the t-test data for this portfolio, which are 0.71 and -6.38.

It is worth mentioning that by calculating the α and $\beta2$ indices of this portfolio, they were -0.37 and 0.07, which indicates that within the statistical interval, the investment manager who holds this portfolio is unable to maintain their rate of return under the bad market environment. Therefore, reasonable adjustment of the samples within the portfolio can maintain its real rate of return which not lower than the benchmark treasury bond yield. This result provided valuable experience for investors and investment managers in subsequently minimizing portfolio losses and accumulating their own experience and ability to invest in index funds.

6. Conclusion

The experiment texted three groups totaling 169 index funds' stock selectivity ability and market timing ability from 2022 to 2023. The following is the conclusion. With the ability of stock selectivity, most terms of funding and their small groups have shown its ability, however, this ability is not obvious. At the same time, the standard deviation of funding selectivity is small and it proved that different investment managers' stock selective ability has not much difference. The gain of all funding groups is not satisfied.

In terms of market timing ability, both funding groups, which financial sector portfolio and the real estate sector portfolio, cannot get the ability of market timing ability. When the whole market return is rising, the lag of marketing message lets most investment managers have not enough time to transform their investment strategy, when the overall market investment environment has entered a cycle of adjustment, investment managers haven't withdrawn their capital and let whole funding groups' returning stay above the overall market returning. At the same time, the standard deviation of the timing ability of all types of funds is large, and the difference in timing ability is still very obvious from an individual investor of view, apparently, the performance level of different funding managers fluctuates greatly.

Last, both of whole market return and funding portfolio are influenced by macro government policies and major foreign events, especially the events of the Russia-Ukraine conflict and the Federal Reserve raising interest rates against U.S. inflation [14]. The threat of war and the possibility of international military conflict have intensified, this situation lets rising prices of safe-haven products such as oil and gold and made it more difficult to predict the market's expected future yields. Moreover, the interest rate of housing will increase after the Federal Reserve raises interest rates, and there is no doubt that the purchase cost of buyers will increase unless it is the full payment, so the real estate market will also lose a lot of potential buyers, this action will bring unstable factors to investment managers who holding funding of real estate market.

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