Detecting the Influence of ETF Performance - A Case Study of China

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ABSTRACT
As international capitals keep flowing into Asia, in particular China, it experienced rapid development on both economy and financial market during the last three decades. While more and more financial products are introduced, the government also loosens the leash on investment, so that the approaches to investment in the Chinese market are diversified enough to attract more and more investors to invest in it. This study will thus explore in depth what have affected Chinese ETF performance. For empirical analysis, the daily data on total ETF transactions and related economic indices during a period from February 24, 2005 to December 31, 2015 were used with multiple regression models. Our findings indicated that the amount of international capital inflow to China, the stock market, and interest rates affected the investment performance of Chinese ETFs.

KEYWORDS: *ETF, international capitals, China, stock market.*

JEL CLASSIFICATION: *E10, E19, E60.*

1. INTRODUCTION

Of all the kinds of mutual funds, the only one that tracks the trend of index instead of gaining by operating against the index situations is the Exchange Traded Funds, ETF. ETFs originate from TIPs (Toronto Index Participation Units), the world's first ETF. Regarding its birth, Chow (2005) stated that TIPs were created by Andrew Clademenos for the purpose of tackling the inferior status of Toronto to Chicago and New York in futures trade. On their introduction in the market, TIPs immediately appealed to investors, particularly retail investors. Yet, it was when ETF was first unveiled in U.S. that ETFs really caught wide attention. That was what is now known as the very first exchange-traded fund of the world's largest market value, the SPDR (Standard & Poor's Depository Receipts), introduced in 1993. After the success in the introduction of ETFs in U.S., the financial markets in the world followed suit. China, however, did so much later. Regarding the time of creation of the first Chinese ETF, according to the records of Shanghai Stock Exchange (2015), the first Chinese ETF, namely the SSE 50ETF, was established on December 30, 2004. The formal listing of SSE 50ETF on February 23, 2005 also sparked the development of ETFs in China.

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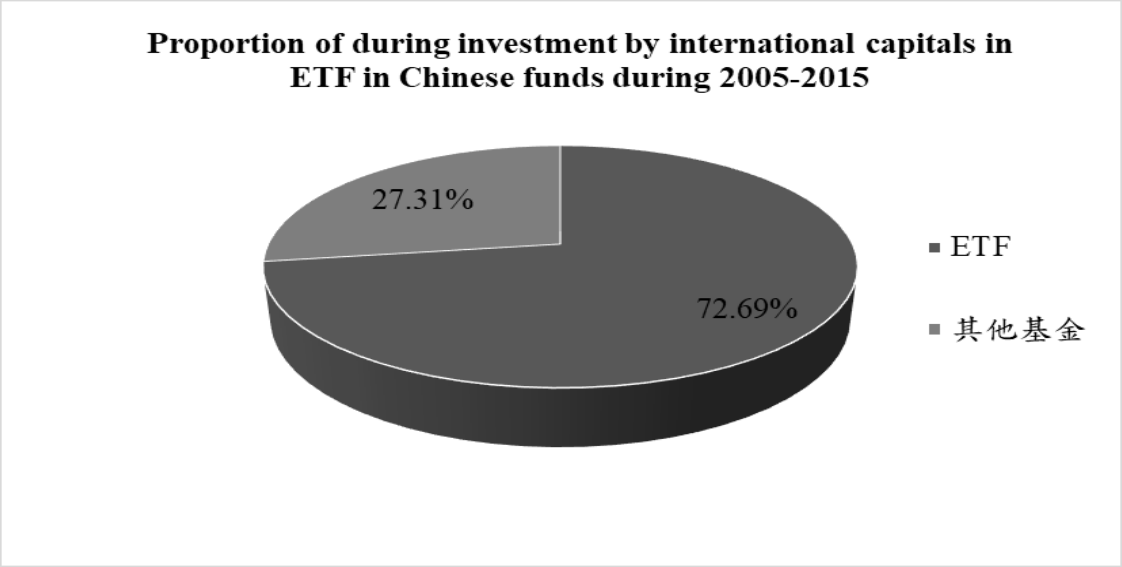

Figure. 1 Proportion of ETF in Chinese funds invested in 2006-2015
Source: (EPFR, 2016), Wind, and the Author's sorting.

Until the end of 2015, the percentage of fund investing in Asia's emerging market, China stood at the first place, and India stood at the second place, and South Korea and Taiwan stood at the third and fourth place, respectively (EPFR, 2016). From the above statement, it can be seen that today in Asia, China was the main investment target of the emerging market fund. As ETFs already had a substantial place in China stock market, as shown in Fig. 1, this study will aim to explore the factors affecting the investment performance of Chinese ETFs. Additionally, it is clear from Fig. 2 that as of June 2017, there were various ETFs developed in China stock market, of which the scale ETFs had the largest share; hence, it is one of the objectives of this study to investigate the factors that affected the investment performance of Chinese scale ETFs.

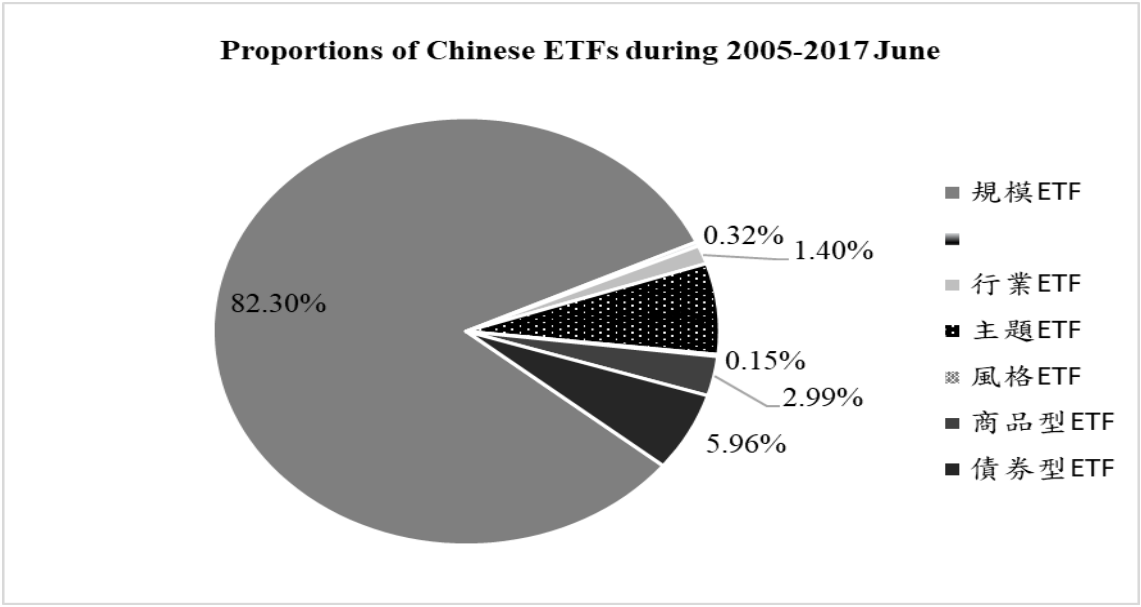

Figure 2. Proportions of Chinese ETFs during 2005-2017 June
Source: (EPFR, 2016) and the Author's sorting.

ETF for the last three decades since its invention, and there are documents probing its investment performance, study started with the exploration of ETF investment performance from stock price and index (leading indicator that measures supply), ETF exceeded portfolio in performance and liquidity, had lower volatility and lower exchange cost than portfolio, had less obvious information asymmetry than portfolio, and caused excess return on its component stocks (Chan, 2006; Liaw, 2012; Wu et al., 2011). As time goes by, ETF research and other related economic indicators such as PMI (macroeconomic leading indicator), interest rates, exchange rates (all domestic macroeconomic indicators), etc., as Chu (2011) analysed the factors of ETF tracking errors using the tracking errors, scale, and cost rates of 18 Hong Kong ETFs as variables and employing simple regression model and multiple regression model. His study revealed that the larger the ETF scale, the smaller the amplitude of the ETF tracking error, and that the higher the cost rate, the greater the ETF tracking error. However, Chen (2011) used the variables of interest rate, exchange rate and total investment proportion of foreign capitals to study the relationship between them and the return rate of Taiwan 50ETF. In the selection of variables, exchange rate-wise, he used those of USD, JPY, and EURO to NTD, and the empirical results indicated that if the exchange rate rose (NTD depreciated) throughout the entire period and in the second half, then the return rate of Taiwan 50ETF dropped, and that if the interest rate rose in the first half period, then the return rate of Taiwan 50ETF rose (Lee and Yu, 2015; Liu, 2011).

Furthermore, Li (2012) studied the relationships between Taiwan ETFs and American ETFs and the stock index and interest rate of the respective listing place in the bull and bear markets. During the bullish period, when interest rate rose, the ETF return increased in the Taiwan and in US as well. But, during bearish period, when interest rate rose, the ETF returns all decreased in US while not affected by interest rate so apparently. Finally, Chiang (2015) analysed the relation between PMI, new PMI (modified by the researcher) and Vanguard-VTI ETF by using these in the period from end of 1997 December to end of 2014 December, and building OLS linear regression model, further employing unit root test, principal components analysis, optimal delay test, root mean squared error, and Granger causality test. He discovered that the new PMI approximated the Vanguard-VTI ETF.

It can be found from the above-mentioned documents that the STUDY of ETF implying the stock market has been in a mature stage and the time was no longer guaranteed to be profitable for investments. In the meantime, a mature market changes with macroeconomic development, implying that it requires specialised knowledge for investors to gain more in investment market. Using ETF as an investment tool helps reducing information interference and strengthening investment decisions so as to arrive at better analysis of investment decision. Hence, this study will take PMI, interest rate, exchange rate and stock market as variables, as well as the international capitals that went into Chinese and its foreign reserve (both being economic indicators measuring international economic performance), as such capitals are a financial account. Multiple regression will also be used to empirically analyse the factors that affected the investment performance of Chinese ETFs as a whole and its scale ETFs.

2. INFORMATION

2.1 Database

For use, the data on Chinese ETFs as a whole and Chinese-scale ETFs were extracted from the Wind Database. In addition to ETF, this study also extracted Chinese official data (stock market exchange volume, PMI, spot exchange rate, and foreign reserve) from the Wind

Database, as it is a known economic database in China. The data on the amount of international capitals inflow to China were obtained from EPFR (Emerging Portfolio Fund Research), which possesses the data on the flow of mutual funds in the world. And, interest rate-wise, historical data published by People's Bank of China, PBC were used. All of these data were sorted for analysis of whether the relevant economic indicators affected the investment performance of Chinese ETFs as a whole and Chinese scale ETFs.

2.2 Description of Variables

2.2.1 Dependent variables

As dependent variables in this study, the daily data on total exchange amount of Chinese ETFs as a whole and Chinese scale ETFs were used and, to accommodate the need of the empirical models herein, were converted to changes by equations as follows:

$$ETFMC_t = ETFM_t - ETFM_{t-1} \quad (1)$$

where, $ETFMC_t$ is the total exchange amount of Chinese ETFs as a whole, $ETFM_t$ the total exchange amount of Chinese ETFs as a whole in Period t, and $ETFM_{t-1}$ the total exchange amount at in Period t-1.

$$SETFMC_t = SETFM_t - SETFM_{t-1} \quad (2)$$

where, $SETFMC_t$ is the change of total exchange amount of Chinese scale ETFs in Period t, $SETFM_t$ the total exchange amount of Chinese scale ETFs in Period t, and $SETFM_{t-1}$ the total exchange amount of Chinese scale ETFs in Period t-1.

2.2.2 Independent variables

As independent variables in this study, the amount of international capitals inflow to China, the exchange amount in China stock market, PMI (this measurement was of Chinese official version), interest rate of one-year deposit, spot exchange rate (USD to RMB), and foreign reserve were used. These variables were converted to changes using equations to meet 3.2.2.1. The amount of international capitals inflow to China.

The amount of capital inflow into China by international capital was originally monthly data, and, to satisfy the need of this study, converted to daily data. They were originally in US$ million, but, were converted to CNY million at spot exchange rate, in RMB. Also, to use their changes, they were put under the equation as follows:

$$EPFRMC_t = EPFRM_t - EPFRM_{t-1} \quad (3)$$

where, $EPFRMC_t$ is the change of the amount of international capitals inflow to China in Period t, $EPFRM_t$the amount of international capitals inflow to China in Period t, and $EPFRM_{t-1}$The amount of international capitals inflow to China in Period t-1.

2.2.2.2 Stock market

Regarding the China stock market, the amount of exchange was used in this study. As in this study, the changes of the amount of exchange were used, they were treated by the following equations in respect to the entire China stock market, SSE A and B shares, and SZSE A and B shares:

$$STOCKMC_t = STOCKM_t - STOCKM_{t-1} \quad (4)$$

where, $STOCKMC_t$ is the change of exchange amount in the entire China stock market in Period t, $STOCKM_t$ the exchange amount in the entire China stock market in Period t, and $STOCKM_{t-1}$ the exchange amount in the entire China stock market in Period t-1.

$$SA\_AMC_t = SA\_AM_t - SA\_AM_{t-1} \quad (5)$$

where, SA_AMC_t is the change of exchange amount in SSE A shares in Period t, the exchange amount in SSE A shares in Period t, and SA_AM_{t-1} the exchange amount in SSE A shares in Period t-1.

$$SA\_BMC_t = SA\_BM_t - SA\_BM_{t-1} \quad (6)$$

where, SA_BMC_t is the change of exchange amount in SSE B shares in Period t, SA_BM_t the exchange amount in SSE B shares in Period t, and SA_BM_{t-1} the exchange amount in SSE B shares in Period t-1.

$$SE\_AMC_t = SE\_AM_t - SE\_AM_{t-1} \quad (7)$$

where, SE_AMC_t is the change of exchange amount in SZSE A shares in Period t, SE_AM_t the exchange amount in SZSE A shares in Period t, and SE_AM_{t-1} the exchange amount in SZSE A shares in Period t-1.

$$SE_{BMC_t} = SE_{BM_t} - SE_{BM_{t-1}} \quad (8)$$

where, SE_BMC_t is the change of exchange amount in SZSE B shares in Period t, SE_BM_t the exchange amount in SZSE B shares in Period t, and SE_BM_{t-1} the exchange amount in SZSE B shares in Period t-1.

2.2.2.3 Purchasing Managers Index (PMI)

There are two Purchasing Managers Indices (PMI) in China, one being of the official version and the other created by Caixin Media, a private Chinese corporation. The former is used in this study, as it involves samples of more categories and in larger numbers than the latter. The PMI data were originally on monthly basis and were converted to daily data to cater to the need of this study. Also, as the value of change was used in this study, the data were treated by the following equations:

$$PMIC_t = PMI_t - PMI_{t-1} \quad (9)$$

Eq. 9 estimates the changes of PMIs in China, where $PMIC_t$ is the change of PMI in Period t, PMI_t the PMI in China in Period t, and PMI_{t-1} that in Period t-1.

2.2.2.4 Interest rate

In this study, the interest rate of the one-year deposit was used as a variable of an empirical model. The data was on daily basis and were put into the equation below, as the value of their changes was used.

$$DBR\_OYC_t = DBR\_OY_t - DBR\_OY_{t-1} \quad (10)$$

where, DBR_OYC_t is the change of interest rate of one-year deposit in China in Period t, DBR_OY_t the interest rate of one-year deposit in China in Period t, and DBR_OY_{t-1} the interest rate of one-year deposit in China in Period t-1.

2.2.2.5 Exchange rate

The spot exchange rate (USD to RMB) in China was used in this study. The data were on daily basis and were put to the following equation for estimating their changes to be used here:

$$EXC_t = EX_t - EX_{t-1} \tag{11}$$

where, EXC_t is the change of spot exchange rate in China in Period t, EX_t the spot exchange rate in China in Period t, and EX_{t-1} that in Period t-1.

2.2.2.6 Foreign reserve

The monthly data on foreign reserve were converted to daily data to cater to the need of this study. The unit was originally US100 million and was converted to CNY100 million at the spot exchange rate. The data were further put to the following equation to estimate the changes for use in this study:

$$FERC_t = FER_t - FER_{t-1} \tag{12}$$

where, $FERC_t$ is the change of China foreign reserve in Period t, FER_t the China foreign reserve in Period t, and FER_{t-1} that in Period t-1.

2.3 Methodology

In this study, multiple regression models are designed to test the factors that affected the investment performance of Chinese ETFs as a whole and that of Chinese scale ETFs. There are four empirical models here. Model 1 explores the factors affecting the investment performance of Chinese ETFs as a whole; Model 2 explores the factors affecting the investment performance of Chinese ETFs as a whole, with independent variables of stock market divided in SSE A and B shares, and SZSE A and B shares. Model 3 explores the factors affecting the investment performance of Chinese scale ETFs, with the independent variable of the stock market being the China stock markets as a whole; Model 4 explores the factors affecting the investment performance of Chinese scale ETFs by dividing one of the independent variables, the stock market, into SSE A and B shares, and SZSE A and B shares.

$$ETFMC_{i,t} = \alpha_0 + \beta_1 EPFRMC_{i,t} + \beta_2 STOCKMC_{i,t} + \beta_3 PMIC_{i,t} + \beta_4 DBR\_OYC_{i,t} + \beta_5 EXC_{i,t} + \beta_6 FERC_{i,t} + \varepsilon_{i,t} \tag{13}$$

Model 13 empirically estimates the effects of the international capitals that went to China, the stock market, PMIs, interest rates, exchange rates and foreign reserves on the investment performance of Chinese ETFs as a whole. $ETFMC_{i,t}$ is the change, i, of total exchange amount of Chinese ETFs in Period t, $EPFRMC_{i,t}$ is the change, i, of the international capitals went to China in Period t, $STOCKMC_{i,t}$ is the change, i, of exchange amount in China stock markets as a whole in Period t, $PMIC_{i,t}$ is the change, i, of PMI in Period t, $DBR\_OYC_{i,t}$ is the change, i, of one-year interest rate in Period t, $EXC_{i,t}$ is the change, i, of spot exchange rate in Period t, $FERC_{i,t}$ is the change, i, of foreign reserve in Period t, α_0 is a constant,

β_1,β_2,β_3,β_4,β_5 and β_6 are coefficients for independent variables, and $\varepsilon_{i,t}$ is error term, i, in Period t.

3. EMPIRICAL RESULTS

3.1 Analysis of collinearity and Variance Inflation Factor

With the basics of data structure examined, we will now examine the issue of collinearity between independent variables to ensure the correctness of the empirical results. According to Grewal et al. (2004), the maximum critical value of collinearity is 0.95 where the collinearity problem exists between independent variables. Also, according to Cooper and Schindler (2003), when the value of collinearity reaches 0.8, the same problem exists. To be rigorous about the research variables, 0.8 is used here as the benchmark to determine whether a collinearity problem exists between our independent variables.

The independent variables herein are the changes in the amount of international capitals inflow to China, foreign reserve, spot exchange rate, total exchange amount in China stock markets as a whole (including those in SSE A shares, SSE B shares, SSZE A shares, SSZE B shares), PMI, and interest rate for one-year deposit. The testing of collinearity problem between the independent variables herein comprises two parts. One is the testing of China stock markets as a whole and all the other independent variables, as Table 1 shows; the other is of the China stock markets, namely SSE A shares, SSE B shares, SZSE A shares and SZSE B shares, and all the other independent variables, as Table 2 shows. In the results of collinearity test, it is clear from Table 2 that the greatest measurement of the correlation coefficient between China stock markets as a whole and all the other independent variables was 0.6916, which was smaller than the critical value, 0.8. And, Table 2 indicates that of the relations between China stock markets and other independent variables, the change in total exchange in SSE A shares (SA_AMC) and that in SZSE A shares had a correlation coefficient at 0.9199, which was greater than the critical value of test, 0.8. In order to recheck whether collinearity problem exists between the independent variables, a Variance Inflation Factor (VIF) analysis was further conducted to determine the collinearity more accurately. When the VIF is greater than 10, that means there is collinearity problem between independent variables, and those variables with such problem will be excluded from empirical analysis. It is clear from Table 3 that by VIF analysis, the changes of exchange amount in SSE A shares and in SZSE A shares are 6.87 and 7.45, respectively, neither exceeding the critical value, 10, which means these two variables had no collinearity issue and thus did not affect the empirical analysis.

Table 1. Analysis of correlation coefficients between China stock markets as whole and other independent variables

	EPFRMC	FERC	EXC	STOCKMC	PMIC	DBR_OYC
EPFRMC	1					
FERC	0.4922	1				
EXC	0.0002	0.0004	1			
STOCKMC	0.0156	-0.0111	0.0073	1		
PMIC	0.3584	0.6916	0.0006	-0.0014	1	
DBR_OYC	0.0130	0.0450	-0.0004	-0.0443	0.0229	1

Source: author's own computation.

Note:
1. EPFRMC is the change in the amount of international capitals inflow to China; FERC is the change in foreign reserve; EXC is the change in the spot exchange rate; STOCKMC is the change in the total exchange amount in China stock markets as a whole; PMIC is the change in PMI; DBR_OYC is the change in interest rate for one-year deposit.
2. Period of study was from February 24, 2005 to December 31, 2015.

Table 2. Analysis of correlation coefficients between China stock markets and other independent variables

	EPFRMC	FERC	EXC	SA_AMC	SA_BMC	SE_AMC	SE_BMC	PMIC	DBR_OYC
EPFRMC	1								
FERC	0.4922	1							
EXC	0.0002	0.0004	1						
SA_AMC	0.0261	-0.0001	0.0020	1					
SA_BMC	0.0145	0.0013	0.0276	0.7425	1				
SE_AMC	0.0254	-0.0012	0.0082	0.9199	0.7651	1			
SE_BMC	0.0183	-0.0196	0.0266	0.6948	0.7549	0.7232	1		
PMIC	0.3584	0.6916	0.0006	0.0013	-0.0011	-0.0075	-0.0184	1	
DBR_OYC	0.0130	0.0450	-0.0004	0.0207	0.0107	0.0213	-0.0113	0.0229	1

Source: author's own computation.

Note:
1. EPFRMC is the change in the amount of international capitals inflow to China; FERC is the change in the foreign reserve; EXC is the change in the spot exchange rate; SA_AMC is the change in the total exchange amount in SSE A shares; SA_BMC is the change in the total exchange amount in SSE B shares; SE_AMC is the change in the total exchange amount in SZSE A shares; SE_BMC is the change in the total exchange amount in SZSE B shares; PMIC is the change in the PMI; DBR_OYC is the change in interest rate for one-year deposit.
2. Same as Table 1.

Table 3. Table of VIFs between China stock markets and other independent variables

Variable	VIF	1/VIF
EPFRMC	1.32	0.7555
FERC	2.21	0.4518
EXC	1.00	0.9980
SA_AMC	6.87	0.1457
SA_BMC	3.10	0.3228
SE_AMC	7.45	0.1343
SE_BMC	2.66	0.3760
PMIC	1.92	0.5208
DBR_OYC	1.01	0.9932
Mean VIF	2.86	

Source: author's own computation.

Note: Same as Table 2.

3.2 Empirical Results

Having examined the basics of data structure and verified the data without collinearity problem, we will now analyse the empirical results of the multiple regression models in this paper. These results will be analysed one by one by the objectives of this study.

First, in Objective 1, exploration was made with Model (13) in whether the whole stock markets and other independent variables are the factors affecting the investment performance of Chinese ETFs, before analysis was made with Model (14) in the effects of each of the stock markets (SSE A shares, SSE B shares, SZSE A shares and SZSE B shares) on the investment performance of Chinese ETFs. In the empirical results of Model (13), as Table 4 clearly indicates, the change in the amount of international capitals inflow to China and the change in the total exchange amount in the China stock markets as a whole had a positive and significant relation to the change in the total exchange amount of Chinese ETFs as a whole, while the change in interest rate for one-year deposit had a negative and significant relation to the change in total exchange amount of Chinese ETFs as a whole; none of the other independent variables had a significant relation to the change in total exchange amount of Chinese ETFs as a whole. That implies that when the change in the amount of international capitals inflow to China increases and the change in total exchange amount in China stock markets as a whole goes up, the exchange amount of Chinese ETFs as a whole goes up, whilst the change in interest rate for one-year deposit goes up, the exchange amount of Chinese ETFs as a whole drops.

Table 4. Relationship of China stock markets as whole and other independent variables to Chinese ETFs as a whole

	ETFMC
EPFRMC	1337533*** (441271.7)
FERC	-745355.9 (622108.2)
EXC	-4.40E+7 (1.09E+8)
STOCKMC	1386913*** (59863.9)
PMIC	1.12E+9 (1.75E+9)
DBR_OYC	-2.23E+9*** (8.48E+8)
R-squared	0.1764
Observations	2641

Source: author's own computation.

Notes:

1. ETFRMC is the change in total exchange amount of Chinese ETFs; EPFRMC is the change in the amount of international capitals inflow to China; FERC is the change in foreign reserve; EXC is the change in spot exchange rate; STOCKMC is the change in total exchange amount in China stock markets as a whole; PMIC is the change in PMI; DBR_OYC is the change in interest rate for one-year deposit.
2. Same as Table 1.
3. *, **, *** stand for the level of significance at 10%, 5%, and 1%, respectively.

As it is clear from the empirical results of Model (13) that the stock markets had a significant influence on the performance of Chinese ETFs, we employed Model (14) to further analyse the effects of the individual stock markets and other independent variables on Chinese ETFs. In Model (14), the stock markets as variables are further divided into SSE A shares, SSE B shares, SZSE A shares and SZSE B shares. In the empirical results of Model (3.14), it is clear from Table 5 that the change in the amount of international capitals inflow to China, that in total exchange amount in SSE A shares, and that in SSE B shares had positive, significant relation to the change in total exchange amount of Chinese ETFs as a whole. That implies that when the change in the amount of international capitals inflow to China increases and the change of exchange amount in SSE A and B shares increases, the change in exchange amount of Chinese ETFs as a whole increases, but when the change in interest rate for one-year deposit increases, the change in exchange amount of Chinese ETFs as a whole decreases.

Table 5. Relationship of China stock markets and other independent variables to Chinese ETFs as a whole

	ETFMC
EPFRMC	1323425*** (439084.1)
FERC	-731879.6 (618913.6)
EXC	-5.54E+7 (1.08E+8)
SA_AMC	1652513*** (106047.7)
SA_BMC	3.32E+7*** (1.13E+7)
SE_AMC	387953.1 (250625)
SE_BMC	3.71E+7 (3.41E+7)
PMIC	1.00E+9 (1.75E+9)
DBR_OYC	-2.20E+9*** (8.44E+8)
R-squared	0.1859
Observations	2641

Source: author's own computation

Note:

1. ETFRMC is the change in the total exchange amount of Chinese ETFs; EPFRMC is the change in the amount of international capitals inflow to China; FERC is the change in the foreign reserve; EXC is the change in the spot exchange rate; SA_AMC is the change in the total exchange amount in SSE A shares; SA_BMC is the change in the total exchange amount in SSE B shares; SE_AMC is the change in the total exchange amount in SZSE A shares; SE_BMC is the change in the total exchange amount in SZSE B shares; PMIC is the change in PMI; DBR_OYC is change in interest rate for one-year deposit.
2. Same as Table 1
3. Same as Table 4

Also in this study, exploration was made with Model (15) in whether the stock markets as a whole and other independent variables are the factors affecting the investment performance of Chinese scale ETFs, before in-depth analysis was made with Model (16) in the effects of the individual stock markets (SSE A shares, SSE B shares, SZSE A shares and SZSE B shares) on the investment performance of Chinese scale ETFs. In the empirical results of model (15), Table 6 indicates that the change in the amount of international capitals inflow to China and the change in the total exchange amount in the China stock markets as a whole had a positive, significant relation to the change in the total exchange amount of the Chinese scale ETFs as a whole, and the change in interest rate for one-year deposit had a negative, significant relation to the change in total exchange amount of the Chinese scale ETFs, with the other independent variables having no significant relation to the change in total exchange amount of Chinese scale ETFs. That implies when the change in the amount of international capitals inflow to China increases and when the change in total exchange amount in China stock markets as a whole goes up, the change in exchange amount of Chinese scale ETFs goes up, whilst, when the change in interest rate for one-year deposit had negative goes up, the change in exchange amount of Chinese scale ETFs goes down.

Table 6. Relationship of China stock markets as whole and other independent variables to Chinese scale ETFs

	SETFMC
EPFRMC	1204381*** (423580.7)
FERC	-778803.2 (597167.2)
EXC	-3.62E+7 (1.04E+8)
STOCKMC	1281498*** (57463.89)
PMIC	1.04E+9 (1.68E+9)
DBR_OYC	-2.03E+9** (8.14E+8)
R-squared	0.1654
Observations	2641

Source: author's own computation.

Notes:
1. SETFRMC is the change in the total exchange amount of Chinese scale ETFs; EPFRMC is the change in the amount of international capitals inflow to China; FERC is the change in foreign reserve; EXC is the change in spot exchange rate; STOCKMC is the change in the total exchange amount in China stock markets as a whole; PMIC is the change in PMI; DBR_OYC is the change in interest rate for one-year deposit.
2. Same as Table 1
3. Same as Table 4.

As it is clear from the empirical results of Model (15) that stock markets had significant effects on Chinese-scale ETFs, this study further analysed, with Model (16), how each of the market sectors and other independent variables affected Chinese scale ETFs. In Model (16),

as an independent variable, the stock market is further divided in SSE A shares, SSE B shares, SZSE A shares and SZSE B shares. In the empirical results of Model (16), it is clear from Table 7 that the change in the amount of international capitals inflow to China, the change in the total exchange amount in SSE A shares, that in SSE B shares and that in SZSE A shares had a positive significant relation to the change in the total exchange amount of Chinese scale ETFs; that the change in interest rate for one-year deposit had a negative significant relation to the change in total exchange amount of Chinese scale ETFs; and that the other independent variables did not have a significant relation to the change in total exchange amount of Chinese scale ETFs. When the change in the amount of international capitals inflow to China increases and the change of exchange amount in SSE A and B shares and SZSE A shares increases, the change in exchange amount of Chinese scale ETFs increases, but when the change in interest rate for one-year deposit increases, the change in exchange amount of Chinese scale ETFs decreases.

Table 7. Relationship of China stock markets and other independent variables to Chinese scale ETFs

	SETFMC
EPFRMC	1185561***
	(422096)
FERC	-773689.3
	(594968)
EXC	-4.70E+7
	(1.04E+8)
SA_AMC	1412064***
	(101944.7)
SA_BMC	3.52E+7***
	(1.09E+7)
SE_AMC	664042.1***
	(240928.4)
SE_BMC	3.59E+7
	(3.28E+7)
PMIC	9.60E+8
	(1.68E+9)
DBR_OYC	-2.01E+9**
	(8.11E+8)
R-squared	0.1726
Observations	2641

Source: author's own computation.

Notes:

1. SETFMC is the change in total exchange amount of Chinese scale ETFs; EPFRMC is the change in capitals that went into Chinese funds; FERC is the change in foreign reserve; EXC is the change in the spot exchange rate; SA_AMC is the change in total exchange amount in SSE A shares; SA_BMC is the change in total exchange amount in SSE B shares; SE_AMC is the change in total exchange amount in SZSE A shares; SE_BMC is the change in total exchange amount in SZSE B shares; PMIC is the change in PMI; DBR_OYC is the change in interest rate for one-year deposit.
2. Same as Table 1
3. Same as Table 4.

4. CONCLUDING REMARKS

Objective 1 of this study, which is to identify what factors would affect the investment performance of Chinese ETFs, was tested with Models 13 and 14; the empirical results indicated that the amount of international capitals inflow into China, the exchange in stock markets and interest rate would affect the investment performance of Chinese ETFs. Also, of the total amount of exchange in stock markets, the SSE A shares and the SSE B shares are the main factors that affect the performance of Chinese ETFs. In addition, Objective 2 of this study, which is to identify what factors would affect the investment performance of Chinese-scale ETFs, was tested with Models 15 and 16. And the empirical results indicated that the amount of international capitals inflow to China, the exchange in stock markets, and interest rate would affect the investment performance of Chinese-scale ETFs. In the amount of exchange in stock markets, SSE A and B shares and SZSE A shares are the main factors affecting the performance of Chinese scale ETFs. Besides the interest rate that has a negative, significant influence on the investment performance of Chinese ETFs and Chinese scale ETFs, there are other independent variables like: The amount of international capitals inflow to China and the stock markets has a positive, significant influence on the investment performance of Chinese ETFs and Chinese scale ETFs.

Therefore, this study makes contribution to academic research and the industry. When the investing public general and fund managers are choosing to invest in Chinese ETFs, they can determine the strategies for investment in those ETFs based on the tendency of the amount of international capitals inflow to China, the total exchange amount in SSE A and B shares, and the interest rate for one-year deposit. Or, when choosing to invest in Chinese scale ETFs, they can determine the strategies for investment in those ETFs based on the tendency of the amount of international capitals inflow to China, the total exchange amount in SSE A and B shares, the total exchange amount in SZSE A shares and the interest rate for one-year deposit.
Finally, regarding the direction of follow-up research, since this study only briefly explores the factors that affect the investment performance of mainland ETFs and scale ETFs, this study recommends that follow-up research be extended to study the effects of other types of ETFs (strategy ETFs, industry ETFs, theme ETFs, style ETFs, commodity ETF, bond ETF) factors of investment performance. In addition, mainland industry ETFs have only been established for a short period of time. This study did not explore the factors that affect the investment performance of industry ETFs. Therefore, it is recommended that over time, we can conduct in-depth research on the factors that affect the investment performance of industry ETFs or conduct an in-depth analysis of important stages of national development from industry ETFs. In addition, the results of this study show that interest rates have a negative and significant impact on the investment performance of Chinese ETFs and Chinese-scale ETFs. Therefore, it is also recommended that relevant variables such as interest rates and exchange rates be used to explore the corresponding monetary policies with ETFs.

REFERENCES

Chan, Y. T. (2006). The market performance of Taiwan 50 ETF, their underlying securities and portfolio. (Unpublished master thesis, National Kaohsiung First University of Science and Technology, 2007). Retrieved from https://ndltd.ncl.edu.tw/cgi-bin/gs32/gsweb.cgi/login?o=dnclcdr&s=id=%22094NKIT5305013%22.&searchmode=basic.

Chen, M. E. (2011). The Relationship between Taiwan 50 Index Returns and exchange rate, interest rate, the total rate of foreign investment. (Unpublished master thesis, Soochow University, 2011). Retrieved from https://ndltd.ncl.edu.tw/cgi-bin/gs32/gsweb.cgi/login?o=dnclcdr&s=id=%22099SCU05121048%22.&searchmode=basic.

Chiang, C. C. (2015). A study on the relationships between modified purchase management index and vanguard ETF. (Unpublished master thesis, National Sun Yat-Sen University, 2015). Retrieved from https://ndltd.ncl.edu.tw/cgi-bin/gs32/gsweb.cgi/login?o=dnclcdr&s=id=%22103NSYS5305041%22.&searchmode=basic.

Chow, K. Victor (2005). An economic interpretation of ETF evolution: suggestions for China ETF innovation. Retrieved from http://www.sse.com.cn/aboutus/research/workstation/c/station20050930.pdf.

Chu, P. K. K. (2011). Study on the tracking errors and their determinants: evidence from Hong Kong exchange traded funds. *Applied Financial Economics, 21*(5), 309-315.

EPFR (2016). Retrieved 2016, from https://epfr.com/

Grewal, R., Cote, J. A. & Baumgartner, H. (2004). Multicollinearity and measurement error in structural equation models: Implications for theory testing. *Marketing Science, 23*(4), 519.

Lee, T. S., & Yu, T. H. (2015). An Investigation of ETF Tracking Errors in Taiwan, Hong Kong and Mainland China. Cross-Sreait Banking and Finance, *3*(1), 1-22.

Li, Y. J. (2012). ETF Researching for Bull and Bear Market of Taiwan and U.S.A. Example of Taiwan 50 ETF and SPDR. (Master's thesis). TamkangUniversity, New Taipei City, Taiwan, ROC.

Liaw, C. Y. (2012). Tracking effect and determinants of listed ETF. (Unpublished master thesis, Fu Jen Catholic University, 2012). Retrieved from https://ndltd.ncl.edu.tw/cgi-bin/gs32/gsweb.cgi/login?o=dnclcdr&s=id=%22100FJU00214023%22.&searchmode=basic.

Liu, K. Y. (2011). The performance vvaluation and determinants of American actively-managed ETFs. (Unpublished master thesis, National Kaohsiung University of Applied Sciences 2011). Retrieved from https://ndltd.ncl.edu.tw/cgi-bin/gs32/gsweb.cgi/login?o=dnclcdr&s=id=%22099KUAS8320036%22.&searchmode=basic.

Shanghai Stock Exchange (2015). Historical Events. Retrieved 2015, from http://english.sse.com.cn/aboutsse/sseoverview/historical/.

Wu, M. J., Chiou, K. C., Huang, P. R., & Hsu, P. W. (2011). A study on the performance of Taiwan ETF. *Journal of Financial Review*, *15*, 70-79.