Mutual Fund Flow and the Real Economy

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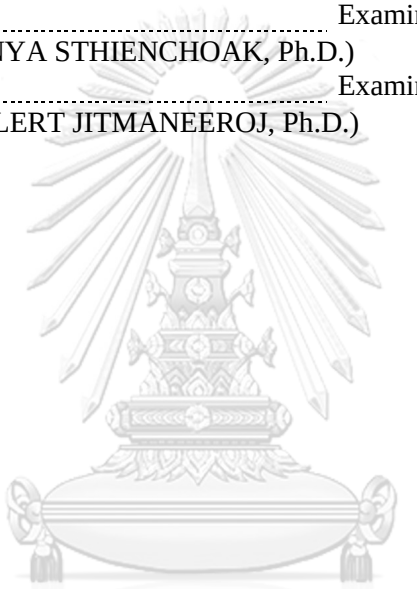

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This paper empirically examines the comparative relationship between flow of equity and bond fund with the expected and real economy among US, UK and Japan market. Two objectives are set in according to the implication of information-response theory. The first objective is to study the relationship between mutual fund flow and the expectation in the future economic conditions capturing by predictive variable. Due to investors' sensitivity to economic conditions, the second objective is to study the ability of mutual fund flows to predict the real economic conditions. The analytical period covers from 2001: Q1 to 2020: Q4.

The study found a potential correlation between mutual fund flows with both the expected and real economy. Mutual fund flows seem to have a bidirectional relation with predictive variable. The result indicate that mutual fund flows not only react to an anticipated change in economic condition but mutual fund flows also affect investors' expectation about the future economy. Good future economic expectation tends to lead the flow into bond fund while deteriorated future economic expectation is likely to bring up bond fund flows. Furthermore, the findings suggest that mutual fund flows could help predict predictive variables. The study evidence also suggest that mutual fund flows and macroeconomic condition are likely to be related. Mutual fund flows themselves contain information about the real economy. An improvement in the real economy is possibly predicted by an increase in equity fund flows whereas an increase in bond fund flows is likely to be a signal of a poor economic state. Also, mutual fund flows could possibly be affected by the real economic condition.

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1. Introduction

Mutual funds can be considered as one of the key economic drivers. One dimension is on household saving. A variety of advantages provided by mutual funds support household sector to become the major owners of mutual funds. The published report from ICI demonstrated that nearly 90% of US mutual funds' total net asset at the year end of 2019 held by US household. Another dimension of mutual fund role to the economy is on investment sector. By using money collected from many investors to invest in other assets, mutual funds create money supply to the capital market.

Several studies use the movement of mutual fund flows to represent investor sentiment and analyze the relationship of the mutual fund flow movement with other variables in implication of asset reallocation. Warther (1995) conducts the first study on the relationship between mutual fund flow and market returns at the macro level. The study has made a significant contribution to the area of fund flow analysis. The result shows a strong correlation of security return and mutual fund flows. Several following studies (Edelen and Warner, 2001; Rakowski and Wang, 2009; Ben-Rephael et al., 2011; Jank, 2011) extend the study of Warther (1995) by considering a different dataset. Their results are consistent. Security return and mutual fund flows are contemporaneously correlated.

All most researches of the mutual fund flow relationship (Warther, 1995; Edelen and Warner, 2001; Rakowski and Wang, 2009) focus on the co-movement between equity fund flows and stock market returns. Jank (2011), therefore, adopts a new approach to test the relationship between mutual fund flow and proxies of macroeconomic news. The results suggest that the co-movement between mutual fund

flow and market return can be explained by predictive variables. Furthermore, he highlights that predictive variables have a better ability to describe mutual fund flows than stock market returns.

However, the studies of the mutual fund flow relationship are major conducted in US market. The study of the link between mutual funds and economy at the macro level (Jank, 2011; Qureshi et al., 2019; Fong et al, 2018) is both scarce and geologically limited. With a worldwide growth in mutual fund and the importance of mutual fund to the real economy, it is useful to examine the relationship of mutual fund flow and macroeconomic variables in more geographical markets. Additionally, the study of the relationship between mutual fund flow and macroeconomic variables would provide an insight of how individual investor from different countries react to a change in future economy by using mutual fund investors to represent retail investors.

This paper aims to study the relationship between flow of equity and bond fund with both expected and real economy among US, UK and Japan market. All data is collected in quarterly basis in order to link with the real economic activities. The collected period is from 2001: Q1 to 2020: Q4. Dummy variables are used to capture the effect of 2 crises covered in the analytical period. Vector Autoregressive (VAR) is applied to analyze the movement of mutual fund flow with predictive variables and economic indicators.

US, UK and Japan are main focus countries of this paper due to their mutual fund market size and developed-country classification. Investor's rationality in the way of how they react to the change in economy is another key of the study in the relationship between mutual fund flow and macroeconomic variables. Several studies concluded that in developed countries, mutual fund investors are likely to be more

sophisticated (Ferreira et al., 2010; Alexakis et al., 2013; Thomas et al., 2014). As a result, sophistication of investors can lead to sensitiveness in the change of economic conditions (Chalmers et al., 2010).

The study relies on the information hypothesis. Which is that new information concerning with equity market affect stock return as well as mutual fund flow (Ben-Rephael et al., 2011; Jank, 2011). There are two main objectives to test the implication of the information hypothesis (Jank, 2011).

First objective is to test the relationship between mutual fund flows and predictive variables. Predictive variables represent new information about the real economy (Jank, 2011) and the variables also contain investors' prospection toward the future economy (Qureshi et al., 2019). For this study, dividend yield (DY), term spread (TS) and default spread (DS) are used as predictive variables. The study of Jank (2011), Qureshi et al (2019) and Chalmers et al (2010) indicate that these three variables are associated with the movement of mutual fund flows. When predictive variables change to indicate a good future economy, a positive aggregate net flow from equity funds but a negative aggregate net flow from bond funds should be observed. On the contrary, when a change in predictive variables gives a sign of bad future economy, equity funds could have a negative aggregate net flows and bond funds could result in a positive aggregate net flow. All implies that mutual fund investors reallocate their funds in response to anticipated changes in economy (Qureshi et al., 2019; Chalmers et al., 2010).

Second objective is to test the ability of mutual fund flows to predict the real economic conditions. This study uses GDP growth rate (GDP), unemployment rate (UE) and monetary policy (MS) to measure the real economic condition. It is an

alternative test of information hypothesis (Jank, 2011; Qureshi et al., 2019) due to highly link between predictive variables and the real economy (Fama and Schwert, 1977; Fama and French, 1989). Jank (2011) develops the test under the idea that if mutual fund flows on the average response rightly to an anticipated change in the real economy, mutual fund flows should also predict the future economic conditions. The real economy should improve after observing a positive aggregate net flow from equity funds or after observing a negative aggregate net flow from bond funds.

The contribution of this paper is to shade further light on more major market which is UK and Japan. The study has an intension to examine the movement of mutual fund flow with the country's specification separately among US, UK and Japan. Most the prior studies about mutual fund flow analyzed funds focusing on US market or a group of countries such as BRICS and G7. Moreover, this paper seeks to provide distinct evidence between equity fund flows and bond fund flows to a change in the expected and real economic conditions. Almost the previous literatures concerning with determinants of mutual fund flows movement devoted to analyze the relationship between mutual fund flows and market returns. And only equity funds are bought to the analysis of those literatures.

The rest of the paper is organized as follows: Section 2 discuss related literature. Section 3 presents the data and variables. Section4 describes the model and the estimation techniques is provided. Section 5 proceeds with the empirical analysis and a discussion of the results. Section 6 concludes the paper.

2. Related literature

A large number of studies have been devoted determining the relationship of mutual fund flows and other various variables for decades. Warther (1995) is the first researcher who published the study on flows at macro level. He studied the relationship between aggregate mutual fund flow and security return. The 19 different investment-objective funds in US were examined from the period of 1984 to 1993. The flows were separated into expected and unexpected flows. The results were consistent for all fund categories. Which were unexpected fund inflows had a high correlation with the return of the asset hold by the mutual funds in monthly basis. For example, flow into equity funds increased when stock return increased. Flow into bond funds also increased at the time of increasing bond return. Flow into precious metal funds increased when gold return increased. Especially in weekly basis, Warther (1995) found that there were a positively correlation between return and past fund flows. Moreover, there was no evidence showing that aggregate mutual fund flows had a positive correlation with past security return. Therefore, Warther (1995) concluded that mutual fund flow and security return moved together. However, the result could not provide clear evidence to support whether the co-movement is explained by price pressure theory or by information response theory.

Edelen and Warner (2001) used daily data of mutual fund flows and market returns to analyze their co-movement in order to find a strong result for the explained theory. The study only examined one category of funds. That is equity funds in US from 1994 to 1998. They also found the positive relationship between aggregate flow and market returns. Aggregate equity fund flows had a positive correlation with concurrent

stock returns. Nevertheless, there was no evidence showing that fund flows were related with early return. Which is consistent with the work of Warther (1995). However, Edelen and Warner (2001) concluded that the co-movement either could support by feedback trading theory or information response theory

Due to high frequency data gave ambiguous evidence to explain the causality between flows and returns, recent literatures applied a new approach to study the co-movement of mutual fund flow at macro level. Jank (2011) focused on the analyze of information response hypothesis. He examined quarterly data relationship between fund flows and the real economy by using both of predictive variables and real economic variables. The study period was from 1984 until 2009. Jank (2011) applied Vector Autoregressive (VAR) to study bi-directional relationship between mutual fund flows and real economic variables. The result is that the flows are related to macroeconomic news and real economic conditions. In addition, he found that mutual fund flows are better described by future macroeconomic conditions than market returns alone. Jank (2011), therefore, concluded that mutual fund flows are forward-looking and can predict real economic conditions. However, the scope of work on the study (Jank, 2011) is limited in only US market and only flows of equity funds are taken to the analysis.

Moreover, the studies of Jank (2011) also provided another important implication of mutual fund flows and macroeconomic conditions on asset allocation decision of investors. The findings of the study showed that when the time of bad economy, mutual fund investors switch their investment from risky assets to less risky asset classes. The results are consistent with the work of Chalmers et al (2010) who evaluated asset allocation decision of US mutual fund investors on the effect of

economic conditions. They used monthly data to examine the flow of equity fund, bond funds, money market funds and foreign equity funds with future economic proxies from 1991 to 2008. The result indicated that anticipated change in economic condition can lead mutual fund investors to adjust their holding assets.

Ben-Rephael et al (2012) also used mutual fund flows to study investor sentiment. They examined the monthly shift of US mutual fund flows between equity fund and bond fund. The equity mutual fund was represented a group of domestic equity, international equity and mixed funds. Likewise, the bond fund consisted of bonds and money market funds. They analyzed monthly aggregate net exchanges of each fund groups with S&P500 volatile index and excess market returns from 1984 to 2008. The finding supports that aggregate net exchanges to equity funds in US are a proxy for the shifts between bond funds and equity funds.

Most of the studies on mutual fund flow movement at macro level in US market demonstrate a consistent result. The finding is that mutual fund flows and predictive economic variables move together. However, the expanded researches to other geological areas outside US provided a confounded result.

Qureshi et al (2019) extended the study of Jank (2011) into BRICS economies which are Brazil, Russia, India, China and South Africa from the period of 1996 to 2017. In addition, Qureshi et al (2019) examined not only flows of equity funds but also examined flows of bond funds, balance fund and money market funds. The study implemented method of panel Vector Autoregressive (PVAR) to examine cross-sectional time-series data. The finding on developing countries is also consistent with the study in developed markets like US (Jank, 2011). Which is that mutual fund flows are forward-looking and can predict real economy.

The study in Japan expresses the different result in comparison to US. Paek and Ko (2014) studies investment behaviors between US and Japan investors by using mutual fund flows. They examine the effect of change in market volatility and return on the movement of equity fund flow in monthly basis. Reduced-form VAR models (SVAR) are applied to analyze the data from 2001 to 2012. The finding demonstrates that US mutual fund investors react a largely difference from Japan investors. Shocks on market volatility affect aggregated flows of US equity funds but have no any impact on flows of Japan equity funds. Paek and Ko (2014) conclude that cultural and economic environment contributes investment behaviors.

The result from the study in Hong Kong also demonstrates a different result in comparing to US market. Fong et al (2018) studied the movement of Hong Kong equity funds in both macro and micro level. The data is collected in quarterly basic from 2001 to 2016. The study at macro level examines the relationship between aggregate flow and domestic macroeconomic variables whereas the study at individual level analyzes the movement of fund inflows and outflows with US and China market's factors. The study found that domestic economy plays a little role in Hong Kong equity funds.

To provide another aspect of investors' perception, this study applies low frequency data to capture the macroeconomic situation in the evaluation. Moreover, the study includes the analysis of fund flow in crises to emphasize the flow relationship with the real economic conditions.

3. Data

This study has 2 main objectives to support the implication of information hypothesis. The first objective is to analyze the relationship between flows of equity funds and bond funds with predictive variables. The second objective is to study the ability of equity and bond fund flows to predict the real economy. The studied sample and variables are described below.

3.1 Sample

This study investigates the flow relationship in US, UK and Japan separately. The analytical period among these three countries covers from 2001:Q1 to 2020:Q4. All data are collected in quarterly basis in order to capture the link between the change in economic variable and the real economic activities (Jank, 2011). The study of Fama (1990) also support that quarterly data of equity premiums have a substantial explanatory power to the real economic activities.

The study further emphasizes an impact of major financial crises to mutual fund flow movement. The crises are defined as a variable which is equal to 1 during the determined crisis periods and 0 in other periods. Subprime crisis and COVID-19 crisis are 2 global crises occurred in the studied period. Subprime crisis is defined as the period of 2008: Q3 to 2009: Q2 and the period of COVID-19 is specified as 2020: Q1 and 2020: Q2. Almost all companies in US are affected by both crises (Choi, 2021; Chen and Yen, 2021) and these suffering spreads over the world. Chen and Yen (2021) find that during the determined period, daily excess return of S&P500 are negative and significant.

3.2 Variables

The first key step to investigate the movement of mutual fund flows to economic conditions is to calculate flows of each fund categories. Then, to provide evidence to support the information hypothesis, predictive variables and real economic measures are taken into the account.

3.2.1 Aggregated Fund Flow

Net retail flow is defined as new purchase minus redemption. More than 80% of new purchase account for fund inflow and redemption expresses fund outflow by the same amount percentage as of new purchase. Although the change in asset under management is not fully represent net retail flow (Cumming et al., 2019), Sirri and Tufano (1998) found that total net asset (TNA) after accounting for return grows at the same proportion of fund inflow. Several previous studies (Sirri and Tufano, 1998; Ferreira et al., 2010; Ferson and Kim, 2012; Qureshi et al., 2019) calculate fund flow growth as the growth of TNA deduced out return. New flows are calculated through Eq (1):

$$New\ Flow_{i,c,t} = \frac{TNA_{i,c,t} - TNA_{i,c,t-1}(1+R_{i,c,t})}{TNA_{i,c,t-1}} \quad (1)$$

where $TNA_{i,c,t}$ is the total net asset in local currency c of fund i in country c at the end of quarter t and $R_{i,t}$is fund i's raw return in local currency from country c in quarter t. The aggregated fund flows are used to test the implication of the information hypothesis. The new flows of each period from all individual funds in the same category for each country are summed up to obtain aggregated fund flows.

Following the study of Ben-Rephael et al (2012), the aggregated fund flows are normalized by the total net asset of all those funds in the previous period due to the increase in the volume of flows.

$$EQUITY_{c,t} = \frac{\sum New\ Flow_{i,c,t}}{\sum TNA_{i,c,t-1}} \quad (2)$$

$$BOND_{c,t} = \frac{\sum New\ Flow_{i,c,t}}{\sum TNA_{i,c,t-1}} \quad (3)$$

where $EQUITY_{c,t}$ is the normalized aggregate net flows of all equity funds in country c at the end of quarter t and $BOND_{c,t}$ is the normalized aggregate net flows of all bond funds in country c at the end of quarter t

Both new flows and TNAs data are available on Morning Star. Therefore, all data concerning with equity funds and bond funds in US, UK and Japan are drawn from Morning Star

3.2.2 Predictive Variables

Predictive variables represent investors' view to the future economic conditions. They can also be considered as macroeconomic news. Predictive variables are applied to examine how mutual fund investors reallocate their funds to response with new information (Jank, 2011; Qureshi et al, 2019). If new information affects mutual fund investors' decision, there is an observation on the co-moment between fund flows and the first difference of predictive variables.

The dividend yield (DY), the term spread (TS) and the default spread (DS) are used as predictive variables. The 3 financial market proxies not only link with business condition but also connect to real economic conditions (Fama and French, 1989; Fama, 1990; Jank, 2011; Chalmers et al., 2010). The dividend-price ratio or dividend yield represents future stock returns. Wu and Lee (2015) found that the relationship between

stock return and market risk premium has a positive relation in bull market. In a good economic condition, high dividend yield can predict high subsequent stock returns (Park, 2010; Wu and Lee, 2015). Next, the term spread capture maturity premium. Fama and French (1989) state that term spread is the compensation for an exposure to discount-rate shocks in long-term assets. It is high near times of bad economy whereas the variables are low near good economic conditions. Finally, the default spread captures expected-return variation increasing from high-grade bonds in corresponds to business risk (Fama, 1990). The default spread has negative correlations with macroeconomic measurement. The default spread is high in times of bad economy and the variable is low in good economic conditions.

Data on dividend yield and spread calculation are obtained from Thomson DataStream. The dividend yield defines as ratio of average annual dividends and the end of quarter prices. The dividend yield of S&P500 is used for US. The dividend yield of FTSE 100 is used for UK and the dividend yield of NIKKEI 225 is used for Japan. The term spread is computed as the difference between the 10-year and the 3-month maturity treasury rates. The difference in 10-year and 3-month maturity rate is used because it has historically been viewed as a predictor of a recessionary period. The default spread is calculated as the difference between Moody's BAA and AAA Seasoned Corporate Bond Yield for US. As of Japan and UK, the default spread is represented by the difference between yield-to-maturity of S&P 5-to-7-year maturity investment-grade cooperate bond index and yield-to-maturity of 5-to-7-year maturity government bond index of each country.

3.2.3 Real economic indicators

Real economic indicators are used for a robustness check. If mutual fund flows contain a prospect of investors to the future economic conditions, the movement of mutual fund flows could predict real economic states.

GDP growth, monetary policy rate and unemployment rate are used as macroeconomic variables for this study. GDP is mainly used to measure the real macroeconomic actives. Monetary policy is a tool for government to promote economic growth. Short-term nominal interest rate is used as a representative of monetary policy rate (Assenmacher and Gerlach, 2008). Unemployment rate is an important factor that express the state of economy. It is the indicator of recession. High GDP and high monetary policy rate are a signal for good economy while high unemployment rate indicates a time of sluggish economy.

All macroeconomic data are retrieved from Federal Reserve Bank of St. Louis. GDP is seasonally adjusted Gross Domestic Product (GDP) in domestic currency. Unemployment rate is the rate of unemployment people classified by age group of all genders between 15 years old to 64 years old. Monetary policy rate is substituted by a three-month Treasury bill rate for US, a three-month interbank rate for UK and a three-month commercial paper rate for Japan.

3.3 Data Descriptive

3.3.1 Summary statistics

Table 1 demonstrate the summary statistics of raw data for each variable of all US, UK and Japan. During 2001 to 2020, the mean of the percentage growth in aggregate net equity flows for US is 0.11% annually while the annual mean of the

percentage growth in aggregate net equity flows for UK and Japan are 1.40% and 3.44% respectively. For bond funds, the mean of the percentage growth in aggregate net flows are 1.52% for US, 3.73% for UK and 2.12 for Japan annually.

3.3.2 Unit root test

The important step before VAR analysis is to test stationary of each variable. The augmented Dickey-Fuller (ADF) unit root test with a drift term and a time trend is applied to examine the stationary properties for all variables.

Table 2 illustrate the stationary test result for all variables. The t-stat in Table 2 confirms that the normalized aggregate net flows of both equity and bond funds are stationary at level (I(0)). For predictive variables and macroeconomic indicators, the variables are stationary at I(1). Therefore, all of predictive variables and macroeconomic indicators are applied to VAR model with the first difference. This approach is in line with the methodology of Qureshi et al. (2019). The first difference of predictive variables and macroeconomic indicators is use to represent new information about the real economy (Jank, 2011).

Table 3 presents the definition for each tested variables in the VAR analysis.

Table 1 Summary statistics for raw data of variables among US, UK and Japan

The table presents the summary statistics of each variable's raw data. The analytical period starts from 2001: Q1 to 2020: Q4. The data are presented in percentage. EQUITY is the normalized aggregate net equity flows. BOND is the normalized aggregate net bond flows. DY is the dividend yield. TS is the change in the term spread. DS is the default spread. GDP is the gross domestic product growth rate. MS is the short-term nominal interest. UE is the unemployment rate.

Country	Quarterly	EQUITY	BOND	DY	TS	DS	GDP	UE	MS
US	Mean (%)	0.0265	0.3808	0.0009	0.0050	0.0001	0.9197	0.0093	-0.0181
	Median (%)	-0.0053	0.4886	0.0000	-0.0100	-0.0025	1.0428	-0.0204	-0.0013
	Maximum (%)	0.5744	2.6217	0.1325	0.3500	0.3825	8.4535	2.3536	0.1425
	Minimum (%)	-0.4135	-5.4193	-0.1700	-0.3125	-0.3150	-9.4662	-1.1878	-0.4950
	Std. Dev. (%)	0.2622	1.0166	0.0458	0.1302	0.0803	1.5921	0.3107	0.1150
UK	Mean (%)	0.3501	0.9330	0.0048	0.0043	0.0002	0.8759	-0.0001	-0.0188
	Median (%)	0.3043	0.5623	-0.0025	-0.0161	-0.0035	0.9653	-0.0084	-0.0007
	Maximum (%)	2.5068	10.7825	0.3550	0.6422	0.4052	13.0490	0.1818	0.1495
	Minimum (%)	-1.7194	-4.6597	-0.3225	-0.2642	-0.4075	-13.4638	-0.1195	-0.6240
	Std. Dev. (%)	0.6884	2.1241	0.0929	0.1294	0.1206	2.2625	0.0592	0.0954
Japan	Mean (%)	0.8605	0.5301	0.0027	-0.0034	0.0004	0.0416	-0.0056	-0.0017
	Median (%)	0.8002	0.4239	-0.0025	-0.0047	0.0001	0.0917	-0.0083	-0.0002
	Maximum (%)	7.4856	3.7951	0.1300	0.1426	0.1010	5.4715	0.1333	0.0621
	Minimum (%)	-2.3843	-1.3122	-0.1175	-0.1231	-0.1390	-7.9477	-0.0750	-0.0788
	Std. Dev. (%)	1.5101	1.0483	0.0479	0.0463	0.0305	1.4874	0.0406	0.0169

Table 2 Stationary test results

The table presents the t-statistic result from ADF test with constant and trend. EQUITY is the normalized aggregate net equity flows. BOND is the normalized aggregate net bond flows. DY is the dividend yield. TS is the change in the term spread. DS is the default spread. GDP is the gross domestic product growth rate. MS is the short-term nominal interest. UE is the unemployment rate. ***, **and * indicate the significant level at the 1%, 5% and 10% respectively.

Country	Variables	I(0)		I(1)	
US	EQUITY	-4.55	***	-7.62	***
	BOND	-8.15	***	-5.46	***
	DY	-0.90		-5.44	***
	TS	-2.51		-8.27	***
	DS	-4.33	***	-7.37	***
	GDP	-10.74	***	-8.11	***
	UE	-2.13		-5.99	***[1]
	MS	-3.19	*	-3.62	**
UK	EQUITY	-4.11	***	-4.80	***
	BOND	-6.00	***	-5.78	***
	DY	-4.42	***	-9.47	***
	TS	-2.54		-6.99	***
	DS	-2.71		-8.48	***
	GDP	-7.64	***	-4.25	***
	UE	-1.98		-4.28	***
	MS	-2.83		-4.59	***
Japan	EQUITY	-5.71	***	-8.81	***
	BOND	-3.62	**	-12.45	***
	DY	-2.36		-8.63	***
	TS	-3.73	**	-7.48	***
	DS	-3.15		-9.20	***
	GDP	-9.64	***	-6.29	***
	UE	-2.54		-6.64	***[1]
	MS	-3.55	**	-7.45	***

[1] The variable is stationary at first difference when capturing out the effect of Subprime crisis and COVID-19 crisis

Table 3 Tested variable description

The units are in percentage, except for the dummy variable.

Variable	Definition
$EQUITY$	The normalized aggregate net equity flows.
$BOND$	The normalized aggregate net bond flows.
ΔDY	The change in the dividend yield
ΔDS	The change in the default spread
ΔTS	The change in the term spread
GDP	The growth of rate gross domestic product growth (GDP)
ΔUE	The change in unemployment rate
ΔMS	The change in short-term nominal interest
D_1	Dummy variable capturing the effect of Subprime crisis taking value 1 if the period is in 2008: Q3 to 2009: Q2
D_2	Dummy variable capturing the effect of COVID-19 pandemic taking value 1 if the period is in 2020: Q2 to 2020: Q3

4. Methodology

To investigate the relationship between mutual fund flow and the real economy, this study applies Vector autoregressive (VAR) method. VAR model is a multivariate time-series model in which each endogenous variable in the equation is explained by the past values of itself and the lagged values of all other endogenous variables. The model becomes one of widespread used models in macroeconomic researches since it was first proposed by Sims (1980). Moreover, several useful following structural analyses can be taken into an account for the analyzation by applied VAR model. This paper includes an examination on granger causality test and forecast error variance decomposition (FEVD).

Granger causality test is implemented to support VAR results and examine the causal direction links between variables. Granger–Sims causality which is known as Granger Causality/ Block Exogeneity Wald Tests is used in this study. The procedure analyzes whether only mutual fund flow could be predicted by predictive variables or predictive variables are also affected by mutual fund flows. On the other hand, granger causality test help to identify whether the movement of mutual fund flows could only forecast the real economic conditions or mutual fund flows are impacted by economic indicators as well.

FEVD is taken into the analysis in order to study the impacts of unexpected shocks or innovations to specified variables on the variables in the model. FEVD provide the expression on the contribution of each variable's shock to the model.

Two VAR models are applied for this paper. The first model is to study the relationship between flow of equity funds and bond funds with the three predictive

variables and the second model is to examine the ability of equity funds and bond funds to predict the real economy. Fourth-lag order is applied both VAR models in order to allow the series repetition within one year. The models are described as below.

4.1 Model for the measurement of mutual fund flow and predictive variables

One method to provide support for the information theory is to examine the movement of mutual fund flow and new information using predictive variables. Different mutual fund classes are analyzed in a separate equation. The relationship between equity fund flows and predictive variables is evaluated through equation (4) while the relationship between bond fund flows and predictive variables is evaluated through equation (5).

$$\begin{bmatrix} EQUITY_{c,t} \\ \Delta DY_{c,t} \\ \Delta TS_{c,t} \\ \Delta DS_{c,t} \end{bmatrix} = \begin{bmatrix} \alpha_{c,01} \\ \alpha_{c,02} \\ \alpha_{c,03} \\ \alpha_{c,04} \end{bmatrix} + \sum_{p=1}^{4} \begin{bmatrix} \beta_{c,11}(p) & \beta_{c,12}(p) & \beta_{c,13}(p) & \beta_{c,14}(p) \\ \beta_{c,21}(p) & \beta_{c,22}(p) & \beta_{c,23}(p) & \beta_{c,24}(p) \\ \beta_{c,31}(p) & \beta_{c,32}(p) & \beta_{c,33}(p) & \beta_{c,34}(p) \\ \beta_{c,41}(p) & \beta_{c,42}(p) & \beta_{c,43}(p) & \beta_{c,44}(p) \end{bmatrix} \begin{bmatrix} EQUITY_{c,t-p} \\ \Delta DY_{c,t-p} \\ \Delta TS_{c,t-p} \\ \Delta DS_{c,t-p} \end{bmatrix} + \begin{bmatrix} \gamma_{c,11t} \\ \gamma_{c,12t} \\ \gamma_{c,13t} \\ \gamma_{c,14t} \end{bmatrix} D_1 + \begin{bmatrix} \gamma_{c,21t} \\ \gamma_{c,22t} \\ \gamma_{c,23t} \\ \gamma_{c,24t} \end{bmatrix} D_2 + \begin{bmatrix} \varepsilon_{c,1t} \\ \varepsilon_{c,2t} \\ \varepsilon_{c,3t} \\ \varepsilon_{c,4t} \end{bmatrix} \quad (4)$$

$$\begin{bmatrix} BOND_{c,t} \\ \Delta DY_{c,t} \\ \Delta TS_{c,t} \\ \Delta DS_{c,t} \end{bmatrix} = \begin{bmatrix} \alpha_{c,05} \\ \alpha_{c,06} \\ \alpha_{c,07} \\ \alpha_{c,08} \end{bmatrix} + \sum_{p=1}^{4} \begin{bmatrix} \beta_{c,51}(p) & \beta_{c,52}(p) & \beta_{c,53}(p) & \beta_{c,54}(p) \\ \beta_{c,61}(p) & \beta_{c,62}(p) & \beta_{c,63}(p) & \beta_{c,64}(p) \\ \beta_{c,71}(p) & \beta_{c,72}(p) & \beta_{c,73}(p) & \beta_{c,74}(p) \\ \beta_{c,81}(p) & \beta_{c,82}(p) & \beta_{c,83}(p) & \beta_{c,84}(p) \end{bmatrix} \begin{bmatrix} BOND_{c,t-4} \\ \Delta DY_{c,t-4} \\ \Delta TS_{c,t-4} \\ \Delta DS_{c,t-4} \end{bmatrix}$$

$$+ \begin{bmatrix} \gamma_{c,15t} \\ \gamma_{c,16t} \\ \gamma_{c,17t} \\ \gamma_{c,18t} \end{bmatrix} D_1 + \begin{bmatrix} \gamma_{c,25t} \\ \gamma_{c,26t} \\ \gamma_{c,27t} \\ \gamma_{c,28t} \end{bmatrix} D_2 + \begin{bmatrix} \varepsilon_{c,5t} \\ \varepsilon_{c,6t} \\ \varepsilon_{c,7t} \\ \varepsilon_{c,8t} \end{bmatrix} \qquad (5)$$

where $EQUITY_{c,t}$ is the normalized aggregate net flows of all equity funds in country c at the end of quarter t and $BOND_{c,t}$ is the normalized aggregate net flows of all bond funds in country c at the end of quarter t, $\Delta DY_{c,t}$ is the change in the dividend yield between previous quarter t-1 and current quarter t of country c, $\Delta TS_{c,t}$ is the change in the term spread between previous quarter t-1 and current quarter t of country c, $\Delta DS_{c,t}$ is the change in the default spread between previous quarter t-1 and current quarter t of country c, D_1 is a dummy variable capturing the effect of Subprime crisis, D_2 is a dummy variable capturing the effect of COVID-19 pandemic, ε_c is the error term or innovation that is uncorrelated over time in country c. US, UK and Japan are the focus countries which evaluated in the different equation.

From equation (4), β_{12}, β_{13} and β_{14} capture the effect of ΔDY, ΔTS and ΔDS respectively to the aggregated net equity flows. Whereas in equation (5), β_{52}, β_{53} and β_{54} capture the effect of ΔDY, ΔTS and ΔDS respectively to the aggregated net bond flows. Higher DY but lower TS and DS indicate a good future economy. Based on the assumption that rational investors quickly reallocate their funds in accordance with the anticipated change in future economy, ΔDY should have a positive correlation with the aggregated net equity flows but have a negative correlation with the net bond flows (Ben-Rephael et al., 2012). On the other hand, ΔTS and ΔDS should have a negative

correlation with the aggregated net equity flows but have a positive correlation with the net bond flows (Qureshi et al., 2019). Therefore, β_{12}, β_{53} and β_{54} should be observed to be positively significant while β_{13}, β_{14} and β_{52} should be observed to be negatively significant. The interpretation is that higher DY but lower TS and DS are perceived as news for good future economy. Mutual fund investors then move the flow into equity funds or they then move the flow out from bond funds. Table 4 expresses the testable hypotheses between mutual fund flows and predictive variables.

Table 4 Testable hypotheses: mutual fund flows and predictive variables.

The table demonstrate the coefficient correlation of VAR system from equation (4):
$EQUITY_{c,t} = \alpha_{c,01} + \sum_{p=1}^{4} \beta_{c,11}(p) EQUITY_{c,t-p} + \sum_{p=1}^{4} \beta_{c,12}(p) \Delta DY_{c,t-p} + \sum_{p=1}^{4} \beta_{c,13}(p) \Delta TS_{c,t-p} + \sum_{p=1}^{4} \beta_{c,14}(p) \Delta DS_{c,t-p} + \gamma_{c,11t} D_1 + \gamma_{c,21t} D_2 + \varepsilon_{c,11t}$
and the coefficient correlation of VAR system from equation (5):
$BOND_{c,t} = \alpha_{c,05} + \sum_{p=1}^{4} \beta_{c,51}(p) BOND_{c,t-p} + \sum_{p=1}^{4} \beta_{c,52}(p) \Delta DY_{c,t-p} + \sum_{p=1}^{4} \beta_{c,53}(p) \Delta TS_{c,t-p} + \sum_{p=1}^{4} \beta_{c,54}(p) \Delta DS_{c,t-p} + \gamma_{c,15t} D_1 + \gamma_{c,25t} D_2 + \varepsilon_{c,1t}$
$EQUITY$ is the normalized aggregate net equity flows. $BOND$ is the normalized aggregate net bond flows. ΔDY is the change in the dividend yield. ΔTS is the change in the term spread. ΔDS is the change in the default spread.

	Dependent Variables	
	EQUITY	***BOND***
ΔDY	$(+)\beta_{12}$	$(-)\beta_{52}$
ΔTS	$(-)\beta_{13}$	$(+)\beta_{53}$
ΔDS	$(-)\beta_{14}$	$(+)\beta_{54}$

4.2 Model for the measurement of mutual fund flow and real economic indicators

The second method to test the implication of the information hypothesis is to investigate the ability of mutual fund flows in predicting the real economy. Different mutual fund classes are analyzed in a separate equation. The movement between equity fund flows and macroeconomic indicators is evaluated through equation (6) while the

movement between bond fund flows and macroeconomic indicators is evaluated through equation (7).

$$\begin{bmatrix} EQUITY_{c,t} \\ GDP_{c,t} \\ \Delta UE_{c,t} \\ \Delta MS_{c,t} \end{bmatrix} = \begin{bmatrix} \alpha_{c,01} \\ \alpha_{c,02} \\ \alpha_{c,03} \\ \alpha_{c,04} \end{bmatrix} + \sum_{p=1}^{4} \begin{bmatrix} \beta_{c,11}(p) & \beta_{c,12}(p) & \beta_{c,13}(p) & \beta_{c,14}(p) \\ \beta_{c,21}(p) & \beta_{c,22}(p) & \beta_{c,23}(p) & \beta_{c,24}(p) \\ \beta_{c,31}(p) & \beta_{c,32}(p) & \beta_{c,33}(p) & \beta_{c,34}(p) \\ \beta_{c,41}(p) & \beta_{c,42}(p) & \beta_{c,43}(p) & \beta_{c,44}(p) \end{bmatrix} \begin{bmatrix} EQUITY_{c,t-p} \\ GDP_{c,t-p} \\ \Delta TS_{c,t-p} \\ \Delta DS_{c,t-p} \end{bmatrix} + \begin{bmatrix} \gamma_{c,11t} \\ \gamma_{c,12t} \\ \gamma_{c,13t} \\ \gamma_{c,14t} \end{bmatrix} D_1 + \begin{bmatrix} \gamma_{c,21t} \\ \gamma_{c,22t} \\ \gamma_{c,23t} \\ \gamma_{c,24t} \end{bmatrix} D_2 + \begin{bmatrix} \varepsilon_{c,1t} \\ \varepsilon_{c,2t} \\ \varepsilon_{c,3t} \\ \varepsilon_{c,4t} \end{bmatrix} \quad (6)$$

$$\begin{bmatrix} BOND_{c,t} \\ GDP_{c,t} \\ \Delta UE_{c,t} \\ \Delta MS_{c,t} \end{bmatrix} = \begin{bmatrix} \alpha_{c,05} \\ \alpha_{c,06} \\ \alpha_{c,07} \\ \alpha_{c,08} \end{bmatrix} + \sum_{p=1}^{4} \begin{bmatrix} \beta_{c,51}(p) & \beta_{c,52}(p) & \beta_{c,53}(p) & \beta_{c,54}(p) \\ \beta_{c,61}(p) & \beta_{c,62}(p) & \beta_{c,63}(p) & \beta_{c,64}(p) \\ \beta_{c,71}(p) & \beta_{c,72}(p) & \beta_{c,73}(p) & \beta_{c,74}(p) \\ \beta_{c,81}(p) & \beta_{c,82}(p) & \beta_{c,83}(p) & \beta_{c,84}(p) \end{bmatrix} \begin{bmatrix} BOND_{c,t-p} \\ GDP_{c,t-p} \\ \Delta UE_{c,t-p} \\ \Delta MS_{c,t-p} \end{bmatrix} + \begin{bmatrix} \gamma_{c,15t} \\ \gamma_{c,16t} \\ \gamma_{c,17t} \\ \gamma_{c,18t} \end{bmatrix} D_1 + \begin{bmatrix} \gamma_{c,25t} \\ \gamma_{c,26t} \\ \gamma_{c,27t} \\ \gamma_{c,28t} \end{bmatrix} D_2 + \begin{bmatrix} \varepsilon_{c,5t} \\ \varepsilon_{c,6t} \\ \varepsilon_{c,7t} \\ \varepsilon_{c,8t} \end{bmatrix} \quad (7)$$

where $EQUITY_{c,t}$ is the normalized aggregate net flows of all equity funds in country c at the end of quarter t and $BOND_{c,t}$ is the normalized aggregate net flows of all bond funds in country c at the end of quarter t, $GDP_{c,t}$ is the growth rate of GDP in country c at the end of quarter t, $\Delta UE_{c,t}$ is the change in unemployment rate in country c at the end of quarter t, $\Delta MS_{c,t}$ is short-term nominal interest change in country c at the end of quarter t, D_1 is a dummy variable capturing the effect of Subprime crisis, D_2 is a dummy variable capturing the effect of COVID-19 pandemic, ε_c is the error term

or innovation that is uncorrelated over time in country c. US, UK and Japan are the focus countries which evaluated in the different equation.

From equation (6), β_{21}, β_{31} and β_{41} capture the effect of the aggregated net equity flows to GDP, ΔUE and ΔMS respectively. Whereas in equation (7), β_{61}, β_{71} and β_{81} capture the effect of the aggregated net bond flows to GDP, ΔUE and ΔMS respectively. When there is good news about economy, investor is more willing to hold equity funds (Jank, 2011; Chalmers et al., 2010). Following the implication of information theory (Jank, 2011), if future economy prediction on the average is right, the aggregated net equity flows should have a positive correlation with GDP and ΔMS but have a negative correlation with ΔUE. On the contrary, the aggregated net bond flows should have a negative correlation with GDP and ΔMS but have a positive correlation with ΔUE. As a result, the coefficients should be significant and have a sign of correlation in accordance with Table 5 Testable hypotheses: mutual fund flows and real economic indicators. The interpretation is that the economic state gets better after flow into equity funds (Jank, 2011). On the other hand, the real economy is worse after observing funds flow into bond funds (Qureshi et al, 2019).

Table 5 Testable hypotheses: mutual fund flows and real economic indicators

The table demonstrate the coefficient correlation of VAR system from equation (6):

$$GDP_{c,t} = \alpha_{c,02} + \sum_{p=1}^{4} \beta_{c,21}(p) EQUITY_{c,t-p} + \sum_{p=1}^{4} \beta_{c,22}(p) GDP_{c,t-p} + \sum_{p=1}^{4} \beta_{c,23}(p) \Delta UE_{c,t-p} + \sum_{p=1}^{4} \beta_{c,24}(p) \Delta MS_{c,t-p} + \gamma_{c,12t} D_1 + \gamma_{c,22t} D_2 + \varepsilon_{c,2t}$$

$$\Delta UE_{c,t} = \alpha_{c,03} + \sum_{p=1}^{4} \beta_{c,31}(p) EQUITY_{c,t-p} + \sum_{p=1}^{4} \beta_{c,32}(p) GDP_{c,t-p} + \sum_{p=1}^{4} \beta_{c,33}(p) \Delta UE_{c,t-p} + \sum_{p=1}^{4} \beta_{c,34}(p) \Delta MS_{c,t-p} + \gamma_{c,13t} D_1 + \gamma_{c,23t} D_2 + \varepsilon_{c,3t}$$

$$\Delta MS_{c,t} = \alpha_{c,04} + \sum_{p=1}^{4} \beta_{c,41}(p) EQUITY_{c,t-p} + \sum_{p=1}^{4} \beta_{c,42}(p) GDP_{c,t-p} + \sum_{p=1}^{4} \beta_{c,43}(p) \Delta UE_{c,t-p} + \sum_{p=1}^{4} \beta_{c,44}(p) \Delta MS_{c,t-p} + \gamma_{c,14t} D_1 + \gamma_{c,24t} D_2 + \varepsilon_{c,4t}$$

and the coefficient correlation of VAR system from equation (7):

$$GDP_{c,t} = \alpha_{c,06} + \sum_{p=1}^{4} \beta_{c,61}(p) BOND_{c,t-p} + \sum_{p=1}^{4} \beta_{c,62}(p) GDP_{c,t-p} + \sum_{p=1}^{4} \beta_{c,63}(p) \Delta UE_{c,t-p} + \sum_{p=1}^{4} \beta_{c,64}(p) \Delta MS_{c,t-p} + \gamma_{c,16t} D_1 + \gamma_{c,26t} D_2 + \varepsilon_{c,6t}$$

$$\Delta UE_{c,t} = \alpha_{c,07} + \sum_{p=1}^{4} \beta_{c,71}(p) BOND_{c,t-p} + \sum_{p=1}^{4} \beta_{c,72}(p) GDP_{c,t-p} + \sum_{p=1}^{4} \beta_{c,73}(p) \Delta UE_{c,t-p} + \sum_{p=1}^{4} \beta_{c,74}(p) \Delta MS_{c,t-p} + \gamma_{c,17t} D_1 + \gamma_{c,27t} D_2 + \varepsilon_{c,7t}$$

$$\Delta MS_{c,t} = \alpha_{c,08} + \sum_{p=1}^{4} \beta_{c,81}(p) BOND_{c,t-p} + \sum_{p=1}^{4} \beta_{c,82}(p) GDP_{c,t-p} + \sum_{p=1}^{4} \beta_{c,83}(p) \Delta UE_{c,t-p} + \sum_{p=1}^{4} \beta_{c,84}(p) \Delta MS_{c,t-p} + \gamma_{c,18t} D_1 + \gamma_{c,28t} D_2 + \varepsilon_{c,8t}$$

$EQUITY$ is the normalized aggregate net equity flows. $BOND$ is the normalized aggregate net bond flows. GDP is the gross domestic product growth rate. ΔUE is the change in unemployment rate. ΔMS is the change in short-term nominal interest.

	Dependent Variable		
	GDP	ΔUE	ΔMS
EQUITY	$(+)\beta_{21}$	$(-)\beta_{31}$	$(+)\beta_{41}$
BOND	$(-)\beta_{61}$	$(+)\beta_{71}$	$(-)\beta_{81}$

5. Empirical Result

To examine the relationship between flow of equity and bond fund with both expected and real economy among US, UK and Japan market, two VAR analysis are conducted.

5.1 Result and discussion on the measurement of mutual fund flow and predictive variables

5.1.1 the VAR System Result and the Granger Causality test

To test the information response hypothesis, four-lag VAR models are used to examine separately the relationship of aggregated equity fund flows and aggregated bond fund flows with the three predictive variables. The model diagnostic test results namely serial correlation and normality demonstrate that all fourth-order VAR models are well-specified. The test results are not reported for brevity.

Table 6 illustrates the Granger Causality/Block Exogeneity Wald Tests to dependent variable EQUITY and BOND while Table 7 expresses the Granger Causality/Block Exogeneity Wald Tests to dependent variable ΔDY, ΔTS and ΔDS. Table 8 reports the VAR System Result of dependent variable EQUITY and BOND. The VAR System Result of dependent variable ΔDY, ΔTS and ΔDS is described below but not report for the reason of brevity.

Table 6 Granger Causality/Block Exogeneity Wald Tests to dependent variable EQUITY and BOND

The table reports the Chi-square values for Granger Causality/Block Exogeneity Wald Tests to dependent variable EQUITY and BOND. $EQUITY$ is the normalized aggregate net equity flows. $BOND$ is the normalized aggregate net bond flows. ΔDY is the change in the dividend yield. ΔTS is the change in the term spread. ΔDS is the change in the default spread. ***, **and * indicate the significant level at the 1%, 5% and 10% respectively.

	US		UK		Japan	
	EQUITY	BOND	EQUITY	BOND	EQUITY	BOND
ΔDY	12.31 **	3.77	3.38	9.08 *	8.87 *	4.99
ΔTS	7.55	6.22	6.02	10.66 **	9.21 *	4.94
ΔDS	12.89 **	4.52	3.18	14.81 ***	5.89	2.63

Table 7 Granger Causality/Block Exogeneity Wald Tests to dependent variable ΔDY, ΔTS and ΔDS

The table reports the Chi-square values for Granger Causality/Block Exogeneity Wald Tests to dependent variable ΔDY, ΔDS and ΔTS. $EQUITY$ is the normalized aggregate net equity flows. $BOND$ is the normalized aggregate net bond flows. ΔDY is the change in the dividend yield. ΔTS is the change in the term spread. ΔDS is the change in the default spread. ***, **and * indicate the significant level at the 1%, 5% and 10% respectively.

	US			UK			Japan		
	ΔDY	ΔTS	ΔDS	ΔDY	ΔTS	ΔDS	ΔDY	ΔTS	ΔDS
EQUITY	6.70	5.16	6.08	4.95	5.68	2.47	6.39	12.67 **	3.06
BOND	13.38 ***	9.33 *	19.28 ***	13.39 ***	0.60	5.23	3.43	4.64	5.35

Table 8 VAR model for the measurement of mutual fund flow and predictive variables

The table reports the VAR System Result of dependent variable equity flow using equation (4):
$EQUITY_{c,t} = \alpha_{c,01} + \sum_{p=1}^{4} \beta_{c,11}(p) EQUITY_{c,t-p} + \sum_{p=1}^{4} \beta_{c,12}(p) \Delta DY_{c,t-p} + \sum_{p=1}^{4} \beta_{c,13}(p) \Delta TS_{c,t-p} + \sum_{p=1}^{4} \beta_{c,14}(p) \Delta DS_{c,t-p} + \gamma_{c,11t} D_1 + \gamma_{c,21t} D_2 + \varepsilon_{c,11t}$
and the VAR System Result of dependent variable bond flow using equation (5):
$BOND_{c,t} = \alpha_{c,05} + \sum_{p=1}^{4} \beta_{c,51}(p) BOND_{c,t-p} + \sum_{p=1}^{4} \beta_{c,52}(p) \Delta DY_{c,t-p} + \sum_{p=1}^{4} \beta_{c,53}(p) \Delta TS_{c,t-p} + \sum_{p=1}^{4} \beta_{c,54}(p) \Delta DS_{c,t-p} + \gamma_{c,15t} D_1 + \gamma_{c,25t} D_2 + \varepsilon_{c,1t}$.
$EQUITY$ is the normalized aggregate net equity flows. $BOND$ is the normalized aggregate net bond flows. ΔDY is the change in the dividend yield. ΔTS is the change in the term spread. ΔDS is the change in the default spread. D_1 is a dummy variable capturing the effect of Subprime crisis. D_2 is a dummy variable capturing the effect of COVID-19 pandemic. The T-statistics are provided in parentheses. ***, **and * indicate the significant level at the 1%, 5% and 10% respectively.

	US			UK			Japan		
	EQUITY	BOND		EQUITY	BOND		EQUITY	BOND	
C	-0.0002	0.0032		0.0019	0.0062		0.0035	0.0018	
	(-0.49)	(2.22)	**	(1.71) *	(2.86)	***	(1.53)	(1.93)	*
Flow (t-1)	0.3128	-0.1731		0.3109	0.2231		0.4347	0.7479	
	(2.20) **	(-1.05)		(2.39) **	(1.73)	*	(3.23) ***	(6.03)	***
Flow (t-2)	0.0748	0.3871		0.0921	-0.2039		0.0547	0.1902	
	(0.49)	(2.09)	**	(0.72)	(-1.47)		(0.38)	(1.18)	
Flow (t-3)	0.3508	-0.0598		0.2606	-0.0047		0.0662	-0.1179	
	(2.41) **	(-0.32)		(2.04) **	(-0.03)		(0.50)	(-0.88)	
Flow (t-4)	-0.0296	0.1253		-0.2231	0.2341		0.0687	-0.1334	
	(-0.22)	(0.61)		(-1.66) *	(2.16)	**	(0.53)	(-1.24)	
ΔDY (t-1)	0.5384	-1.0761		-1.1365	-7.1366		-4.0588	1.5618	
	(0.36)	(-0.22)		(-0.71)	(-2.02)	**	(-0.93)	(0.77)	
ΔDY (t-2)	0.3113	-3.3758		0.5126	-5.3755		-2.5390	0.2633	
	(0.20)	(-0.72)		(0.32)	(-1.46)		(-0.53)	(0.12)	
ΔDY (t-3)	5.4357	0.6014		0.0092	-4.9172		10.4682	3.7751	
	(3.05) ***	(0.12)		(0.01)	(-1.43)		(2.14) **	(1.78)	*
ΔDY (t-4)	3.4344	7.8644		-2.1617	-6.1832		-1.6713	3.1121	
	(2.22) **	(1.67)	*	(-1.42)	(-1.76)	*	(-0.33)	(1.46)	
ΔTS (t-1)	0.6453	-1.0599		0.5048	4.3884		8.9584	0.4990	
	(1.87) *	(-0.87)		(0.61)	(2.41)	**	(1.98) **	(0.25)	
ΔTS (t-2)	-0.5352	0.7751		0.6082	2.7464		-4.9253	0.0769	
	(-1.47)	(0.59)		(0.71)	(1.44)		(-1.14)	(0.04)	
ΔTS (t-3)	0.2492	0.4222		-1.6754	0.2799		5.7576	3.4998	
	(0.71)	(0.35)		(-1.97) *	(0.14)		(1.41)	(1.87)	*
ΔTS (t-4)	-0.3545	2.1145		0.7972	2.2494		4.5674	2.4722	
	(-1.04)	(1.95)	*	(0.97)	(1.23)		(1.06)	(1.28)	
ΔDS (t-1)	-1.4534	-1.2976		0.5067	7.5590		12.7525	-1.6113	
	(-1.83) *	(-0.48)		(0.38)	(2.60)	***	(2.02) **	(-0.54)	
ΔDS (t-2)	-0.0742	5.5701		-0.8106	5.5860		-2.7422	-3.9614	
	(-0.09)	(1.94)	*	(-0.59)	(1.75)	*	(-0.41)	(-1.29)	
ΔDS (t-3)	-2.4789	-0.3819		-0.7223	4.0803		-1.7935	-2.5676	
	(-3.14) ***	(-0.13)		(-0.59)	(1.39)		(-0.26)	(-0.86)	
ΔDS (t-4)	-1.5491	0.4894		1.4098	5.9037		0.5927	-3.3939	
	(-1.92) *	(0.17)		(1.21)	(2.11)	**	(0.10)	(-1.25)	
D_1	-0.0023	-0.0072		0.0059	-0.0082		-0.0011	0.0001	
	(-1.04)	(-1.03)		(1.21)	(-0.74)		(-0.13)	(0.02)	
D_2	0.0002	-0.0214		-0.0058	-0.0143		0.0021	-0.0029	
	(0.09)	(-2.60)	***	(-1.16)	(-1.31)		(0.20)	(-0.60)	
R^2	55.62	32.73		37.27	44.91		42.60	70.62	
Adj. R^2	41.60	11.49		17.46	27.52		24.48	61.34	

From the tested result, there is an observation on the possibility that predictive variables can predict the movement of mutual fund flows. Moreover, the tested result also expresses the possibility that the movement of mutual fund flows effect predictive variables as well. The followings are the evidence given from VAR System Result and Granger Causality test among US, UK and Japan.

Dividend yield seems to relate with mutual fund flows. The change in dividend yield incliningly have a positive relation with the aggregate net flow of equity funds while have a negative relation with the aggregate net flow of bond funds. Given the support result among US and Japan equity funds on Table 6, Granger Causality test shows the unidirectional relation of the changes in dividend yield to the flows of equity funds. Table 6 shows the significant level at 5% and 10% in Granger Causality test of the changes in dividend yield to equity flows for US and Japan respectively. VAR System Result on Table 8 also support Granger test. For US equity funds, ΔDY on third and fourth lags give positively significant at 1% and 5% respectively. As for Japan equity funds, the third lag of ΔDY are positive and significant at 5%. For bond funds, there is a support from UK market. Table 6 on UK bond fund flow indicates the significance in Granger Causality test of ΔDY to dependent variable bond flows. ΔDY granger-cause bond flow at 10% significant level. The first and fourth lags of ΔDY on UK bond fund flows in Table 8 are negatively significant at 5% and 10% respectively. Additionally, the change in dividend yield seems to impacted by mutual fund flow. The evidence from US bond funds supports the results. Granger Causality test on Table 7 shows 1% significant level of bond flows to ΔDY. According to VAR System Result, the first and second lags of bond flow to dependent variable ΔDY are 1% and 10% significant with t-stat 3.2066 and -1.6883 sequentially. The conclusion is that dividend

yield and mutual fund flow possibly relate. An increase in dividend yield capture investors' s expectation of good future economy. Thus, it could lead to an increase in equity flows or a decrease in bond flows. Moreover, an increase in bond flow could relate to a decrease in dividend yield.

Term spread and mutual fund flows are likely associate. The change in term spread has a potential to predict mutual fund flows and mutual fund flows also have a possibility to predict the change in term spread. The followings are the support. The Granger Causality test from UK bond funds on Table 6 show 5% significant level of ΔTS to UK bond flows. Table 8 illustrates that the first lag of ΔTS for UK bond VAR model is positive and significant at 5%. On the other way around, Table 7 express the significance in Granger Causality test of US bond flows and Japan equity flows to ΔTS. US bond flows show the 10% significance in Granger Causality test of the flows to ΔTS while Japan equity funds show the 5% significant level in Granger Causality test of the flows to ΔTS. VAR System Result lends support to Granger Causality test. US bond flow to dependent variables ΔTS is 5% positive significance at second lag with t-stat 2.2420. For Japan, the third lag of equity flows to dependent variable ΔTS is negatively significant at 10% with t-stat -1.8861. All thing together suggests that not only an increase in term spread seem to bring up the aggregate net bond flow but the movement of mutual fund flows also possibly affect term spread. An increase in term spread may lead to increase in bond fund flows as well as an increase in bond fund inflows or equity fund outflows potentially predict an increase term spread.

Default spread express a potential link to mutual fund flows as well. An increase in default spread tend to decrease the aggregate net flow of equity funds but increase the aggregate net flow of bond funds. Moreover, mutual fund flows could affect the

change in default spread. US and UK market confirm these findings. For US equity fund flows, Granger Causality test shows the unidirectional relation of the changes in default spread to the fund flows. Table 6 reports 5% significance of ΔDS to equity flows. VAR System Result on Table 8 also illustrates that the first, third and fourth lags of ΔDS provides the negative and significance of 10%, 1% and 10% respectively. UK bond funds also show the evidence of support. Table 6 indicate the 1% significance in Granger Causality test of ΔDS to dependent variable bond flows. The first, second and fourth lags of ΔDS on Table 8 are positively significant at 1%, 10% and 5% respectively. Furthermore, Granger Causality test of US bond fund flows on Table 7 shows the one-way relation of bond flows to ΔDS at 1% significant level. VAR System Result on US bond flows support the result of Granger Causality. The first, second and fourth lags of bond flow are 1%, 5% and 5% significant with t-stat 3.0122, -2.4047 and -2.0726 respectively to dependent variables ΔDS. All thing together, it can be concluded that mutual fund investors tend to perceive an increase in default spread as a bad future economy. This may lead to outflow from equity funds and inflows to bond funds. Furthermore, inflow to bond flows potentially increase default spread.

For the impact of crisis to mutual fund flows, none of dummy coefficient from equity and bond funds among three focus countries is significant. This means mutual funds are not affected by both Subprime crisis and COVID-19 pandemic. The results slightly corroborate with the study of Chalmers et al (2010). A possible explanation is that predictive variables cover explanatory power. The three predictive variables contain the same information about business cycle and already account for this information.

All the findings in the relationship of aggregated equity fund flows and aggregated bond fund flows with the three predictive variables among US, UK and Japan show the support of information theory. The results feebly substantiate the previous findings of Jank (2011) and Qureshi et al (2019). Which is mutual fund flows potentially react to the anticipated change in economy. Dividend yield, default spread and term spread capture a prospective of investor to the future economy. An increase in dividend yield indicates a good future economy. Therefore, there is an intension to bring up inflow into equity funds and outflow from bond funds. On the contrary, an increase in term spread and default spread is an indication of a poor economic state. It may lead to bond fund inflows and equity fund outflows. Moreover, the study found that mutual fund flows possibly predict future economic expectation as well. The results in bidirectional relation are slightly line with the study of Qureshi et al (2019). An increase in equity fund flows or a decrease in bond fund flow tend to follow by increasing in dividend yield. Whereas, term spread and default spread seems to increase after a raise in the flow into bond funds or after a decline in equity fund inflows.

5.1.2 Forecast error variance decomposition (FEVD)

Table 9, 10 and 11 report the forecast error variance decomposition of mutual fund flows and predictive variables for US, UK and Japan respectively. Overall, the findings corroborate with the VAR results reported in Section 5.1.1.

ΔDY, ΔTS and ΔDS seem to account for the forecast error in equity and bond flow. The proportion of the forecast error in US equity fund at the 8^{th} quarter on Table 9 is explained by ΔDY 17.66% and ΔDS 13.78%. For UK bond funds, approximately 25% of bond flows is explained by ΔDY, ΔTS and ΔDS as shown in Table 10. As well

as Japan equity funds, the proportion of the forecast error at the 8th quarter shown on Table 11 is explained considerably by its own with ΔDY 8.27% and ΔTS 8.56%. All thing together from the variance decomposition implies that the three predictive variables potentially determine the movement of mutual fund flows.

Moreover, equity and bond fund themselves could explain the forecast error in ΔDY, ΔTS and ΔDS. As shown in Table 9, US bond fund flows accounts for approximately more than 10% in each forecast error proportion of ΔDY, ΔTS and ΔDS. Table 10 also reveals that the proportion of the forecast error in ΔDY is explained by UK bond fund flows 8.63%. Moreover, Table 11 illustrates that Japan equity fund flows accounts for approximately 13% in the forecast error proportion of ΔTS. This would mean that the movement of mutual fund flow is also related to the expectation about future economy.

Table 9 FEVD of VAR model for the measurement of mutual fund flow and predictive variables for US

The table reports forecast error variance decomposition (FEVD) of mutual fund flow and predictive variables for US. $EQUITY$ is the normalized aggregate net equity flows. $BOND$ is the normalized aggregate net bond flows. ΔDY is the change in the dividend yield. ΔTS is the change in the term spread. ΔDS is the change in the default spread. The table presents FEVD for 8 periods

Variance Decomposition of EQUITY:				
Period	EQUITY	ΔDY	ΔTS	ΔDS
1	91.98	4.28	1.50	2.24
2	76.88	7.66	6.52	8.95
3	75.56	7.51	7.68	9.24
4	68.18	14.55	6.78	10.49
5	62.84	17.43	6.18	13.55
6	61.91	18.03	6.66	13.40
7	61.84	17.83	7.00	13.33
8	61.65	17.66	6.90	13.78

Variance Decomposition of BOND:				
Period	BOND	ΔDY	ΔTS	ΔDS
1	100.00	0.00	0.00	0.00
2	98.45	0.10	1.10	0.36
3	92.84	0.33	1.50	5.33
4	92.83	0.33	1.53	5.31
5	85.61	3.08	6.40	4.91
6	84.96	3.05	6.97	5.01
7	84.53	3.04	7.44	4.99
8	83.94	3.32	7.39	5.36

Variance Decomposition of ΔDY:				
Period	EQUITY	ΔDY	ΔTS	ΔDS
1	0.00	100.00	0.00	0.00
2	0.02	93.89	3.42	2.67
3	1.56	85.17	5.59	7.69
4	1.57	83.68	5.71	9.04
5	2.34	80.18	9.21	8.28
6	2.32	79.87	9.23	8.58
7	2.26	80.24	9.08	8.42
8	2.27	80.26	9.09	8.39

Variance Decomposition of ΔDY:				
Period	BOND	ΔDY	ΔTS	ΔDS
1	19.80	80.20	0.00	0.00
2	18.87	65.84	6.33	8.95
3	16.92	64.12	6.87	12.10
4	17.01	62.99	7.35	12.64
5	17.42	60.73	9.79	12.06
6	18.71	58.46	10.54	12.29
7	18.44	58.76	10.38	12.42
8	18.61	58.73	10.35	12.31

Variance Decomposition of ΔTS:				
Period	EQUITY	ΔDY	ΔTS	ΔDS
1	2.20	5.18	91.83	0.79
2	5.10	5.48	87.95	1.47
3	8.05	7.32	81.35	3.29
4	8.15	7.36	80.48	4.02
5	7.75	9.27	72.93	10.05
6	8.69	9.41	71.32	10.58
7	8.64	9.91	70.35	11.11
8	8.61	9.94	70.24	11.21

Variance Decomposition of ΔTS:				
Period	BOND	ΔDY	ΔTS	ΔDS
1	10.08	16.10	71.66	2.16
2	9.49	16.93	67.13	6.44
3	11.34	16.60	60.42	11.64
4	11.28	16.49	60.23	12.00
5	11.37	15.61	56.96	16.06
6	12.68	14.78	55.67	16.87
7	12.59	14.55	54.60	18.26
8	12.46	14.46	54.40	18.69

Variance Decomposition of ΔDS:				
Period	EQUITY	ΔDY	ΔTS	ΔDS
1	0.00	0.00	0.00	100.00
2	0.66	0.92	1.71	96.71
3	1.37	2.95	3.74	91.94
4	3.01	2.92	3.74	90.33
5	4.41	5.02	7.85	82.71
6	4.56	5.05	7.86	82.53
7	4.60	5.57	7.71	82.12
8	4.55	6.81	7.65	80.99

Variance Decomposition of ΔDS:				
Period	BOND	ΔDY	ΔTS	ΔDS
1	27.74	30.15	0.08	42.04
2	26.00	29.03	5.46	39.51
3	20.99	28.19	4.81	46.01
4	22.23	27.62	5.53	44.62
5	20.81	28.25	8.87	42.07
6	21.76	27.50	9.62	41.12
7	21.50	28.19	9.51	40.79
8	21.28	28.99	9.47	40.25

Table 10 FEVD of VAR model for the measurement of mutual fund flow and predictive variables for UK

The table reports forecast error variance decomposition (FEVD) of mutual fund flow and predictive variables for US. $EQUITY$ is the normalized aggregate net equity flows. $BOND$ is the normalized aggregate net bond flows. ΔDY is the change in the dividend yield. ΔTS is the change in the term spread. ΔDS is the change in the default spread. The table presents FEVD for 8 periods

Variance Decomposition of EQUITY:				
Period	EQUITY	ΔDY	ΔTS	ΔDS
1	95.62	0.94	1.96	1.48
2	93.24	2.13	2.70	1.92
3	88.90	2.64	5.16	3.30
4	88.39	2.65	5.04	3.92
5	86.72	3.51	5.12	4.64
6	86.44	3.57	5.20	4.79
7	86.32	3.63	5.24	4.82
8	85.99	3.86	5.26	4.89

Variance Decomposition of BOND:				
Period	BOND	ΔDY	ΔTS	ΔDS
1	95.14	2.26	0.19	2.41
2	84.15	4.69	3.07	8.10
3	78.51	7.22	3.24	11.04
4	76.38	8.06	4.41	11.15
5	74.96	8.51	4.45	12.08
6	73.96	8.57	4.94	12.53
7	73.88	8.56	5.07	12.49
8	73.74	8.72	5.06	12.48

Variance Decomposition of ΔDY:				
Period	EQUITY	ΔDY	ΔTS	ΔDS
1	1.03	70.82	2.49	25.66
2	2.84	69.49	2.63	25.03
3	4.13	60.37	12.95	22.55
4	3.88	57.17	14.13	24.82
5	6.65	55.51	13.67	24.17
6	6.58	55.53	13.70	24.18
7	6.80	54.72	13.89	24.59
8	6.70	54.26	14.04	25.01

Variance Decomposition of ΔDY:				
Period	BOND	ΔDY	ΔTS	ΔDS
1	3.41	70.04	1.48	25.07
2	10.55	63.86	1.98	23.61
3	9.01	55.13	15.15	20.70
4	8.12	52.70	14.79	24.39
5	8.72	51.55	14.74	24.99
6	8.57	50.60	15.27	25.56
7	8.50	50.32	15.23	25.95
8	8.63	49.77	15.67	25.93

Variance Decomposition of ΔTS:				
Period	EQUITY	ΔDY	ΔTS	ΔDS
1	1.51	5.03	85.68	7.77
2	9.45	6.55	76.33	7.68
3	9.94	7.49	74.77	7.80
4	9.75	8.94	72.69	8.61
5	8.99	11.06	65.08	14.88
6	8.87	11.89	64.53	14.71
7	10.23	11.91	63.38	14.47
8	10.31	11.82	63.51	14.36

Variance Decomposition of ΔTS:				
Period	BOND	ΔDY	ΔTS	ΔDS
1	0.35	3.97	88.49	7.19
2	0.37	5.22	86.94	7.46
3	0.64	6.16	85.30	7.90
4	0.81	7.62	83.27	8.30
5	1.13	10.90	73.04	14.93
6	1.16	11.33	72.65	14.86
7	1.24	11.17	72.31	15.28
8	1.48	11.22	72.09	15.22

Variance Decomposition of ΔDS:				
Period	EQUITY	ΔDY	ΔTS	ΔDS
1	1.16	26.76	13.42	58.66
2	1.09	24.67	18.12	56.12
3	3.99	24.39	18.83	52.79
4	4.51	25.78	21.18	48.53
5	4.52	26.38	21.47	47.63
6	4.44	27.07	21.42	47.08
7	5.92	26.86	21.19	46.03
8	5.97	26.69	20.77	46.57

Variance Decomposition of ΔDS:				
Period	BOND	ΔDY	ΔTS	ΔDS
1	0.96	24.88	14.13	60.03
2	3.39	22.34	20.38	53.88
3	3.64	22.18	21.69	52.49
4	3.36	24.25	23.48	48.90
5	3.30	24.49	24.40	47.81
6	3.29	24.41	24.95	47.35
7	3.28	24.16	25.77	46.79
8	3.66	24.09	25.40	46.86

Table 11 FEVD of VAR model for the measurement of mutual fund flow and predictive variables for Japan

The table reports forecast error variance decomposition (FEVD) of mutual fund flow and predictive variables for US. $EQUITY$ is the normalized aggregate net equity flows. $BOND$ is the normalized aggregate net bond flows. ΔDY is the change in the dividend yield. ΔTS is the change in the term spread. ΔDS is the change in the default spread. The table presents FEVD for 8 periods

Variance Decomposition of EQUITY:				
Period	EQUITY	ΔDY	ΔTS	ΔDS
1	98.42	0.81	0.20	0.57
2	83.87	4.48	6.40	5.25
3	85.06	4.18	5.91	4.86
4	80.94	8.46	5.94	4.65
5	78.62	8.37	8.47	4.54
6	77.93	8.25	8.33	5.48
7	77.70	8.22	8.55	5.53
8	77.61	8.27	8.56	5.56

Variance Decomposition of BOND:				
Period	BOND	ΔDY	ΔTS	ΔDS
1	99.02	0.00	0.89	0.08
2	98.16	0.73	0.73	0.38
3	96.02	0.68	0.75	2.55
4	92.66	2.19	2.02	3.13
5	86.47	5.05	3.84	4.64
6	85.23	5.13	4.91	4.73
7	83.79	5.26	6.28	4.67
8	83.18	5.34	6.75	4.72

Variance Decomposition of ΔDY:				
Period	EQUITY	ΔDY	ΔTS	ΔDS
1	2.37	90.67	4.87	2.09
2	3.73	87.69	6.20	2.39
3	3.86	86.37	6.06	3.71
4	4.99	83.63	5.99	5.39
5	8.33	79.29	7.07	5.30
6	8.42	77.59	6.97	7.02
7	8.67	77.25	7.06	7.01
8	8.63	77.06	7.35	6.96

Variance Decomposition of ΔDY:				
Period	BOND	ΔDY	ΔTS	ΔDS
1	1.80	89.18	7.06	1.96
2	2.20	87.77	7.02	3.02
3	2.16	87.30	7.02	3.51
4	2.17	86.05	7.15	4.63
5	4.54	81.50	9.27	4.69
6	5.04	80.59	9.42	4.95
7	5.42	79.47	9.85	5.26
8	5.41	79.35	9.94	5.29

Variance Decomposition of ΔTS:				
Period	EQUITY	ΔDY	ΔTS	ΔDS
1	0.42	13.97	85.38	0.22
2	3.13	13.37	83.27	0.24
3	4.52	12.70	81.25	1.52
4	9.94	12.29	76.08	1.69
5	13.07	15.32	70.02	1.59
6	13.38	15.42	69.08	2.13
7	13.16	16.70	67.99	2.15
8	13.14	16.71	68.00	2.15

Variance Decomposition of ΔTS:				
Period	BOND	ΔDY	ΔTS	ΔDS
1	0.42	20.37	78.81	0.39
2	0.45	20.39	78.67	0.49
3	0.44	19.17	76.70	3.70
4	2.84	18.63	74.41	4.12
5	2.75	23.49	69.76	4.00
6	2.73	23.60	69.42	4.25
7	2.75	24.03	68.98	4.24
8	2.76	23.95	68.94	4.34

Variance Decomposition of ΔDS:				
Period	EQUITY	ΔDY	ΔTS	ΔDS
1	0.12	2.68	0.22	96.98
2	0.57	21.82	5.10	72.51
3	2.07	20.66	5.54	71.73
4	2.29	20.43	5.91	71.38
5	3.51	20.35	7.95	68.20
6	4.69	20.25	8.24	66.82
7	5.26	20.05	8.86	65.83
8	5.66	19.98	8.96	65.39

Variance Decomposition of ΔDS:				
Period	BOND	ΔDY	ΔTS	ΔDS
1	0.00	5.20	0.00	94.80
2	3.51	19.30	2.87	74.33
3	3.69	17.80	6.36	72.15
4	3.83	17.43	7.27	71.48
5	4.52	17.19	9.26	69.04
6	4.95	17.24	9.34	68.47
7	5.11	16.75	10.64	67.50
8	5.25	16.76	10.65	67.34

5.2 Result and discussion on the measurement of mutual fund flow and real economic indicators

5.2.1 the VAR System Result and the Granger Causality test

To find the alternative support of information-response hypothesis, four-lag VAR models are used to examine separately the relationship of aggregated equity fund flows and aggregated bond fund flows with the three macroeconomic indicators. The model diagnostic test results namely serial correlation and normality demonstrate that all fourth-order VAR models are well-specified. The test results are not reported for brevity.

Table 12 reports the Granger Causality/Block Exogeneity Wald Tests to dependent variable GDP, ΔUE and ΔMS while Table 13 reports the Granger Causality/Block Exogeneity Wald Tests to dependent variable EQUITY and BOND. Table 14 illustrates the VAR System Result of equity fund flows to dependent variable GDP, ΔUE and ΔMS and Table 15 shows the VAR System Result of bond fund flows to dependent variable GDP, ΔUE and ΔMS. The VAR System Result of dependent variable EQUITY and BOND is described below but not report for the reason of brevity.

Table 12 Granger Causality/Block Exogeneity Wald Tests to dependent variable GDP, ΔUE and ΔMS

The table reports the Chi-square values for Granger Causality/Block Exogeneity Wald Tests to dependent variable EQUITY and BOND. $EQUITY$ is the normalized aggregate net equity flows. $BOND$ is the normalized aggregate net bond flows. GDP is the gross domestic product growth rate. ΔUE is the change in unemployment rate. ΔMS is the change in short-term nominal interest. ***, **and * indicate the significant level at the 1%, 5% and 10% respectively.

	US						UK						Japan					
	GDP		ΔUE		ΔMS		GDP		ΔUE		ΔMS		GDP		ΔUE		ΔMS	
EQUITY	3.08		2.12		3.98		1.56		6.35		12.92	**	0.75		3.78		10.64	**
BOND	46.60	***	44.28	***	4.92		0.42		2.14		0.93		4.97		0.73		6.90	

Table 13 Granger Causality/Block Exogeneity Wald Tests to dependent variable EQUITY and BOND

The table reports the Chi-square values for Granger Causality/Block Exogeneity Wald Tests to dependent variable GDP, ΔUE and ΔMS. $EQUITY$ is the normalized aggregate net equity flows. $BOND$ is the normalized aggregate net bond flows. GDP is the gross domestic product growth rate. ΔUE is the change in unemployment rate. ΔMS is the change in short-term nominal interest. ***, **and * indicate the significant level at the 1%, 5% and 10% respectively.

	US				UK				Japan			
	EQUITY		BOND		EQUITY		BOND		EQUITY		BOND	
GDP	2.71		17.04	***	6.5590		6.0181		2.1658		2.2667	
ΔUE	3.73		4.86		9.3826	*	9.6191	**	2.2484		3.8549	
ΔMS	14.97	***	0.57		2.4446		5.5139		6.6874		1.6897	

Table 14 VAR model for the measurement of equity fund flow and real economic indicators

The table reports the VAR System Result of dependent variable *GPD*, Δ*UE* and Δ*MS* using equation (6):

$$GDP_{c,t} = \alpha_{c,02} + \sum_{p=1}^{4} \beta_{c,21}(p) EQUITY_{c,t-p} + \sum_{p=1}^{4} \beta_{c,22}(p) GDP_{c,t-p} + \sum_{p=1}^{4} \beta_{c,23}(p) \Delta UE_{c,t-p} + \sum_{p=1}^{4} \beta_{c,24}(p) \Delta MS_{c,t-p} + \gamma_{c,12t} D_1 + \gamma_{c,22t} D_2 + \varepsilon_{c,2t}$$

$$\Delta UE_{c,t} = \alpha_{c,03} + \sum_{p=1}^{4} \beta_{c,31}(p) EQUITY_{c,t-p} + \sum_{p=1}^{4} \beta_{c,32}(p) GDP_{c,t-p} + \sum_{p=1}^{4} \beta_{c,33}(p) \Delta UE_{c,t-p} + \sum_{p=1}^{4} \beta_{c,34}(p) \Delta MS_{c,t-p} + \gamma_{c,13t} D_1 + \gamma_{c,23t} D_2 + \varepsilon_{c,3t}$$

$$\Delta MS_{c,t} = \alpha_{c,04} + \sum_{p=1}^{4} \beta_{c,41}(p) EQUITY_{c,t-p} + \sum_{p=1}^{4} \beta_{c,42}(p) GDP_{c,t-p} + \sum_{p=1}^{4} \beta_{c,43}(p) \Delta UE_{c,t-p} + \sum_{p=1}^{4} \beta_{c,44}(p) \Delta MS_{c,t-p} + \gamma_{c,14t} D_1 + \gamma_{c,24t} D_2 + \varepsilon_{c,4t}$$

$EQUITY$ is the normalized aggregate net equity flows. GDP is the gross domestic product growth rate. ΔUE is the change in unemployment rate. ΔMS is the change in short-term nominal interest. D_1 is a dummy variable capturing the effect of Subprime crisis. D_2 is a dummy variable capturing the effect of COVID-19 pandemic. The T-statistics are provided in parentheses. ***, **and * indicate the significant level at the 1%, 5% and 10% respectively.

Note: independent variable *GPD*, Δ*UE* and Δ*MS* are not reported for the reason of brevity

	US						UK						Japan					
	GDP		ΔUE		ΔMS		GDP		ΔUE		ΔMS		GDP		ΔUE		ΔMS	
C	0.0133		-0.0013		0.0005		0.0184		0.0001		-0.0003		0.0039		0.0000		0.0000	
	(3.39)	***	(-1.49)		(1.36)		(4.05)	***	(0.52)		(-1.42)		(1.78)	*	(-0.79)		(-0.85)	
EQUITY (t-1)	-0.0879		0.0986		0.0716		0.3641		0.0142		-0.0161		-0.0621		-0.0020		-0.0001	
	(-0.23)		(1.15)		(1.91)	*	(1.15)		(1.62)		(-1.16)		(-0.56)		(-0.73)		(-0.15)	
EQUITY (t-2)	0.6515		-0.0798		-0.0030		-0.0872		0.0052		0.0178		0.0938		-0.0008		0.0019	
	(1.61)		(-0.87)		(-0.07)		(-0.30)		(0.64)		(1.38)		(0.79)		(-0.28)		(2.08)	**
EQUITY (t-3)	-0.1964		-0.0125		0.0070		0.0648		0.0082		0.0027		-0.0390		0.0051		0.0015	
	(-0.48)		(-0.14)		(0.17)		(0.23)		(1.04)		(0.22)		(-0.31)		(1.72)	*	(1.55)	
EQUITY (t-4)	0.1654		-0.0389		-0.0061		-0.1753		-0.0148		0.0383		0.0179		-0.0030		-0.0006	
	(0.45)		(-0.47)		(-0.17)		(-0.61)		(-1.86)	*	(3.05)	***	(0.15)		(-1.02)		(-0.62)	
D_1	-0.0221		0.0037		0.0001		-0.0294		0.0009		-0.0021		-0.0320		0.0006		-0.0002	
	(-3.36)	***	(2.48)	**	(0.16)		(-3.02)	***	(3.24)	***	(-4.97)	***	(-4.18)	***	(3.19)	***	(-3.08)	***
D_2	-0.0570		0.0114		-0.0013		-0.0977		0.0003		-0.0001		-0.0487		0.0006		0.0000	
	(-8.10)	***	(7.16)	***	(-1.89)	*	(-8.99)	***	(0.93)		(-0.18)		(-5.16)	***	(2.67)	***	(0.66)	
R^2	77.35		87.56		41.60		71.34		67.48		66.57		48.00		63.39		61.87	
Adj. R^2	70.07		83.56		22.83		62.29		57.21		56.01		31.29		51.63		49.61	

Table 15 VAR model for the measurement of bond fund flow and real economic indicators

The table reports the VAR System Result of dependent variable *GPD*, ΔUE and ΔMS using equation (6):

$$GDP_{c,t} = \alpha_{c,06} + \sum_{p=1}^{4} \beta_{c,61}(p) BOND_{c,t-p} + \sum_{p=1}^{4} \beta_{c,62}(p) GDP_{c,t-p} + \sum_{p=1}^{4} \beta_{c,63}(p) \Delta UE_{c,t-p} + \sum_{p=1}^{4} \beta_{c,64}(p) \Delta MS_{c,t-p} + \gamma_{c,16t} D_1 + \gamma_{c,26t} D_2 + \varepsilon_{c,6t}$$

$$\Delta UE_{c,t} = \alpha_{c,07} + \sum_{p=1}^{4} \beta_{c,71}(p) BOND_{c,t-p} + \sum_{p=1}^{4} \beta_{c,72}(p) GDP_{c,t-p} + \sum_{p=1}^{4} \beta_{c,73}(p) \Delta UE_{c,t-p} + \sum_{p=1}^{4} \beta_{c,74}(p) \Delta MS_{c,t-p} + \gamma_{c,17t} D_1 + \gamma_{c,27t} D_2 + \varepsilon_{c,7t}$$

$$\Delta MS_{c,t} = \alpha_{c,08} + \sum_{p=1}^{4} \beta_{c,81}(p) BOND_{c,t-p} + \sum_{p=1}^{4} \beta_{c,82}(p) GDP_{c,t-p} + \sum_{p=1}^{4} \beta_{c,83}(p) \Delta UE_{c,t-p} + \sum_{p=1}^{4} \beta_{c,84}(p) \Delta MS_{c,t-p} + \gamma_{c,18t} D_1 + \gamma_{c,28t} D_2 + \varepsilon_{c,8t}$$

$BOND$ is the normalized aggregate net bond flows. GDP is the gross domestic product growth rate. ΔUE is the change in unemployment rate. ΔMS is the change in short-term nominal interest. D_1 is a dummy variable capturing the effect of Subprime crisis. D_2 is a dummy variable capturing the effect of COVID-19 pandemic. The T-statistics are provided in parentheses. ***, **and * indicate the significant level at the 1%, 5% and 10% respectively.

Note: independent variable *GPD*, ΔUE and ΔMS are not reported for the reason of brevity

	US						UK						Japan					
	GDP		ΔUE		ΔMS		GDP		ΔUE		ΔMS		GDP		ΔUE		ΔMS	
C	0.0053		0.0000		0.0005		0.0174		0.0000		-0.0002		0.0048		0.0000		0.0000	
	(2.01)	**	(-0.08)		(1.42)		(3.96)	***	(0.04)		(-0.86)		(2.71)	***	(-0.85)		(-0.30)	
BOND (t-1)	0.6693		-0.1459		-0.0236		0.0801		0.0000		-0.0061		0.3135		-0.0030		0.0011	
	(6.62)	***	(-6.36)	***	(-1.80)	*	(0.56)		(0.00)		(-0.89)		(1.18)		(-0.44)		(0.50)	
BOND (t-2)	-0.2421		0.0463		-0.0138		-0.0346		0.0042		0.0047		-0.2237		-0.0022		0.0006	
	(-1.76)	*	(1.49)		(-0.78)		(-0.25)		(1.06)		(0.70)		(-0.68)		(-0.26)		(0.21)	
BOND (t-3)	-0.0507		0.0665		0.0239		0.0317		-0.0038		-0.0017		0.0174		0.0057		-0.0038	
	(-0.35)		(2.05)	**	(1.29)		(0.23)		(-0.97)		(-0.26)		(0.05)		(0.68)		(-1.40)	
BOND (t-4)	0.0409		-0.0575		-0.0100		-0.0001		0.0027		0.0012		-0.2859		-0.0019		0.0047	
	(0.32)		(-1.99)	**	(-0.61)		(-0.00)		(0.87)		(0.23)		(-1.22)		(-0.32)		(2.43)	**
D_1	-0.0177		0.0019		-0.0005		-0.0306		0.0008		-0.0021		-0.0276		0.0006		-0.0002	
	(-3.84)	***	(1.81)	*	(-0.84)		(-3.11)	***	(3.00)	***	(-4.37)	***	(-3.60)	***	(2.94)	***	(-3.58)	***
D_2	-0.0391		0.0078		-0.0018		-0.0946		0.0003		-0.0006		-0.0491		0.0006		0.0000	
	(-6.58)	***	(5.79)	***	(-2.34)	**	(-8.48)	***	(1.02)		(-1.12)		(-5.30)	***	(2.48)	**	(0.61)	
R^2	86.96		92.79		42.49		70.77		65.17		59.65		51.60		61.43		59.60	
Adj. R^2	82.77		90.47		24.01		61.54		54.17		46.91		36.04		49.03		46.61	

The tested result shows the potential of the association between mutual fund flows and the real economic conditions. There is a possibility that not only the movement of mutual fund flows can help to predict macroeconomy but the real economic conditions also impact mutual fund flows. The followings are the evidence given from VAR System Result and Granger Causality test among US, UK and Japan.

The results among US, UK and Japan suggest that mutual fund flow tend to have an ability to predict the real economy. The aggregate net flow of equity funds seems to have a positive correlation with an improve in the real macroeconomy while the aggregate net flow of bond funds seems to have co-movement with a deterioration in the real economy. For US, the aggregate net flow of bond funds shows a two-way relation with GDP growth and a unidirectional relation to the change in unemployment rate. Table 12 expresses a strong significant level at 1% in Granger Causality test of bond flows to both dependent variable GPD and ΔUE. VAR System Result also conform with Granger Causality test. On Table 15, the first and second lags of bond flows to dependent variable GDP are significant at 1% and 10% respectively while the first, third and fourth lags of bond flows to dependent variable ΔUE are significant at 1%. 5% and 5% respectively. For UK, Table 12 illustrates that equity flow have a unidirectional relation to dependent variable ΔMS. UK equity flow granger-cause ΔMS at 5% significant level. The fourth lag of equity flow on Table 14 shows 1% positively significant level to dependent variable ΔMS. The results for Japan equity fund share the similar result with UK equity fund. Japan equity funds have the unidirectional relation to dependent variable ΔMS. On Table 12, Japan equity flow shows a significance at 5% in Granger Causality test to ΔMS. On Table 14, the second lag of Japan equity flow is positively significant at 5% to dependent variable ΔMS. All thing can be concluded that

mutual fund flows contain information about the real economy. An increase in equity fund flows seem to indicate a good future economy while an increase in bond fund flows inflows point out a bad future economy. Therefore, a raise in equity fund flows tend to follow by increasing in GDP growth rate and monetary policy rate or decreasing in unemployment rate. On the contrary, a raise in bond fund flows tend to follow by decrease in growth rate and monetary policy rate or increasing in unemployment.

The results among US, UK and Japan additionally seem to suggest that mutual fund flows themselves could be affected by the real economy. Good economy may lead to an increase in the aggregate net equity flow and a decline in the aggregate net bond flow. US bond funds expresses the two-way relation between the movement of bond fund flows and GDP growth. Table 13 illustrates a strong significant level at 1% in GDP to depend variable bond flow. VAR System Result supports that the first lag of GPD is 1% negatively significant to depend variable bond flow with t-stat -3.1161. US equity funds have the unidirectional relation from the change in monetary policy rate to equity flows. Granger Causality test of ΔMS on Table 13 shows 1% significant level to dependent variable equity flow. Also, VAR System Result indicates that the fourth lag of ΔMS is 1% positively significant with t-stat 3.0659. For UK, Table 13 shows the unidirectional relation of the change in unemployment rate to UK bond flows. ΔUE granger-cause bond flows at 5% significance level. According to VAR System Result, the second lag of UE to dependent variable bond flow is 5% positively significant with t-stat 2.4940. This could mean that mutual fund flows response to the real economic condition as well. An improve in GDP growth rate and monetary policy rate is inclined to increase the flows into equity funds and the flows out of bond funds. On the other

hand, an increase in unemployment rate seem to bring up the flow into bond fund but lower the flow into equity funds.

All the findings in the alternative test between mutual fund flows and the real economy among US, UK and Japan provides a support to information-response hypothesis. The results lend feeble support to the study of Qureshi et al (2019). Which is that mutual fund flows and the real economy are associated. An increase in equity fund flows seem to imply about a good economic future while an increase in bond fund flows seem to indicate the deterioration in the future economy. Therefore, a raise in equity fund flows and a decline in bond fund flows tend to predict an improvement in GPD growth rate and monetary policy rate but a decrease in unemployment rate. Whereas, an increase in bond fund flows or a decline in equity fund flows seem to predict a raise in unemployment rate but a decrease in GPD growth rate and monetary policy rate. Furthermore, mutual fund flows are also impacted by the real economic condition. An improvement in GPD growth rate and monetary policy rate is inclined to bring the flow into equity fund and the flow out of bond funds. On the contrary, a raise in unemployment rate possibly relates to an increase in bond fund flows or a decrease in equity fund flows.

5.2.2 Forecast error variance decomposition (FEVD)

Table 16, 17 and 18 report the forecast error variance decomposition of mutual fund flows and macroeconomic indicators for US, UK and Japan respectively. Overall, the findings corroborate with the VAR results reported in Section 5.2.1.

Equity and bond flow tent to account for the forecast error in GDP, ΔUE and ΔMS. Table 16 expresses that approximately one-fourth of the forecast error in ΔUE at

the 8th quarter is explained by US bond flows. 23.53% of US bond flows also accounts for the proportion of the forecast error in GDP at the 8th quarter. For UK on Table 17, the proportion of the forecast error in ΔMS is largely explained by its own shock with 10% equity flows at the 8th quarter. Similar to UK equity funds, 21.12% of Japan equity flows accounts for the proportion of the forecast error in ΔMS at the 8th quarter. Moreover, GDP, ΔUE and ΔMS could also explain the forecast error in equity and bond flow. On Table 16, the proportion of the forecast error in US bond flows at the 8th quarter is largely explained by its own with 20.84% GDP. ΔMS also accounts for 7.48% of the forecast error in US equity funds at the 8th quarter. Table 17 shows that the proportion of the forecast error in UK bond flows at the 8th quarter is explained by ΔUE approximately 5%. All findings confirm with VAR System Result that mutual fund flows and the real economy are associated.

Table 16 FEVD of VAR model for the measurement of mutual fund flow and real economic indicators for US

The table reports forecast error variance decomposition (FEVD) of mutual fund flow and macroeconomic variables for US. $EQUITY$ is the normalized aggregate net equity flows. $BOND$ is the normalized aggregate net bond flows. GDP is the gross domestic product growth rate. ΔUE is the change in unemployment rate. ΔMS is the change in short-term nominal interest. The table presents FEVD for 8 periods

Variance Decomposition of EQUITY:				
Period	EQUITY	GDP	ΔUE	ΔMS
1	3.01	78.56	17.60	0.83
2	1.99	59.85	29.43	8.73
3	6.50	56.00	27.17	10.33
4	2.93	58.10	34.02	4.94
5	2.06	46.84	42.48	8.63
6	3.57	40.03	43.32	13.07
7	2.51	49.88	38.65	8.95
8	1.51	48.28	42.73	7.48

Variance Decomposition of BOND:				
Period	BOND	GDP	ΔUE	ΔMS
1	99.51	0.00	0.00	0.49
2	87.02	8.38	3.89	0.70
3	86.58	8.03	3.93	1.45
4	79.04	13.17	6.12	1.67
5	65.46	12.09	14.66	7.79
6	68.87	8.84	14.57	7.72
7	67.37	12.17	13.10	7.37
8	51.31	20.84	18.05	9.80

Variance Decomposition of GDP:				
Period	EQUITY	GDP	ΔUE	ΔMS
1	3.01	78.56	17.60	0.83
2	1.99	59.85	29.43	8.73
3	6.50	56.00	27.17	10.33
4	2.93	58.10	34.02	4.94
5	2.06	46.84	42.48	8.63
6	3.57	40.03	43.32	13.07
7	2.51	49.88	38.65	8.95
8	1.51	48.28	42.73	7.48

Variance Decomposition of GDP:				
Period	BOND	GDP	ΔUE	ΔMS
1	0.00	100.00	0.00	0.00
2	18.99	50.34	25.94	4.73
3	33.07	38.67	24.23	4.02
4	28.77	43.79	24.14	3.30
5	20.60	40.60	34.75	4.05
6	26.83	33.21	36.85	3.11
7	35.09	27.93	34.22	2.76
8	23.53	38.23	35.40	2.84

Variance Decomposition of ΔUE:				
Period	EQUITY	GDP	ΔUE	ΔMS
1	0.55	52.00	45.58	1.86
2	1.14	42.76	49.53	6.57
3	2.71	37.26	48.83	11.19
4	1.47	50.30	42.14	6.09
5	1.51	46.15	44.97	7.38
6	2.61	37.90	46.83	12.66
7	2.89	43.14	41.58	12.39
8	1.38	49.94	41.94	6.74

Variance Decomposition of ΔUE:				
Period	BOND	GDP	ΔUE	ΔMS
1	0.00	53.77	46.23	0.00
2	9.75	40.99	47.81	1.45
3	27.64	28.62	42.01	1.72
4	24.99	34.69	38.60	1.72
5	13.68	41.80	41.96	2.56
6	22.66	33.92	40.82	2.60
7	34.54	26.77	36.40	2.29
8	24.56	37.18	35.98	2.29

Variance Decomposition of ΔMS:				
Period	EQUITY	GDP	ΔUE	ΔMS
1	0.63	0.38	9.33	89.67
2	3.73	4.20	9.68	82.39
3	3.52	4.86	8.95	82.67
4	3.75	6.80	10.63	78.83
5	3.91	10.38	16.24	69.46
6	2.56	18.12	25.81	53.52
7	3.78	18.06	27.04	51.12
8	2.94	30.72	29.13	37.22

Variance Decomposition of ΔMS:				
Period	BOND	GDP	ΔUE	ΔMS
1	0.00	1.09	15.29	83.63
2	3.59	1.31	15.40	79.70
3	4.10	1.09	13.64	81.17
4	3.79	2.00	17.66	76.55
5	8.02	22.87	27.80	41.31
6	14.94	23.94	36.14	24.99
7	27.52	20.04	31.87	20.58
8	17.30	34.69	34.65	13.35

Table 17 FEVD of VAR model for the measurement of mutual fund flow and real economic indicators for UK

The table reports forecast error variance decomposition (FEVD) of mutual fund flow and macroeconomic variables for UK. $EQUITY$ is the normalized aggregate net equity flows. $BOND$ is the normalized aggregate net bond flows. GDP is the gross domestic product growth rate. ΔUE is the change in unemployment rate. ΔMS is the change in short-term nominal interest. The table presents FEVD for 8 periods

Variance Decomposition of EQUITY:				
Period	EQUITY	GDP	ΔUE	ΔMS
1	97.43	0.11	0.00	2.46
2	94.78	0.45	1.72	3.04
3	92.38	1.32	1.74	4.56
4	78.15	5.35	12.83	3.68
5	73.52	9.53	13.43	3.53
6	69.97	13.69	12.93	3.42
7	65.51	14.20	16.63	3.67
8	63.80	16.20	16.22	3.79

Variance Decomposition of BOND:				
Period	BOND	GDP	ΔUE	ΔMS
1	96.04	3.72	0.14	0.10
2	91.15	3.65	4.23	0.98
3	84.43	3.67	8.49	3.41
4	63.78	19.80	11.37	5.05
5	64.96	18.88	10.77	5.39
6	61.42	23.47	10.03	5.09
7	56.94	24.76	13.61	4.69
8	51.35	31.21	12.64	4.79

Variance Decomposition of GDP:				
Period	EQUITY	GDP	ΔUE	ΔMS
1	0.57	96.79	1.18	1.45
2	1.12	93.69	3.90	1.29
3	2.80	91.82	3.87	1.51
4	2.66	88.52	7.21	1.60
5	2.60	87.57	8.22	1.61
6	2.03	89.53	6.97	1.47
7	2.10	87.77	8.68	1.45
8	2.06	88.33	8.19	1.42

Variance Decomposition of GDP:				
Period	BOND	GDP	ΔUE	ΔMS
1	0.00	100.00	0.00	0.00
2	0.33	97.21	2.15	0.30
3	0.57	96.74	2.22	0.47
4	0.48	94.08	5.01	0.43
5	0.62	91.95	6.95	0.48
6	0.52	93.76	5.35	0.36
7	0.93	92.17	6.57	0.33
8	1.00	92.44	6.23	0.32

Variance Decomposition of ΔUE:				
Period	EQUITY	GDP	ΔUE	ΔMS
1	0.02	3.32	96.25	0.40
2	3.20	9.59	86.58	0.64
3	3.63	9.29	86.42	0.66
4	5.96	8.96	81.54	3.53
5	6.01	9.15	81.31	3.53
6	6.08	10.06	80.29	3.57
7	5.88	11.65	78.82	3.65
8	5.85	11.89	78.59	3.68

Variance Decomposition of ΔUE:				
Period	BOND	GDP	ΔUE	ΔMS
1	0.04	4.75	95.17	0.04
2	1.08	10.74	88.04	0.14
3	2.80	10.16	86.90	0.13
4	3.02	11.22	82.10	3.66
5	3.05	11.31	81.98	3.66
6	4.34	13.08	79.04	3.54
7	4.49	14.79	77.26	3.46
8	4.48	15.48	76.60	3.44

Variance Decomposition of ΔMS:				
Period	EQUITY	GDP	ΔUE	ΔMS
1	0.77	1.79	0.79	96.65
2	3.01	1.89	2.07	93.02
3	3.43	1.95	7.50	87.11
4	3.46	10.14	6.98	79.42
5	10.18	9.95	6.87	73.00
6	10.57	10.64	6.80	72.00
7	10.16	13.44	7.48	68.92
8	10.24	16.92	7.54	65.30

Variance Decomposition of ΔMS:				
Period	BOND	GDP	ΔUE	ΔMS
1	0.00	0.99	0.04	98.97
2	1.56	1.29	0.44	96.72
3	1.50	1.29	2.92	94.28
4	1.81	8.15	3.58	86.46
5	1.80	8.09	3.55	86.57
6	1.95	9.90	3.55	84.60
7	2.14	10.82	4.66	82.39
8	2.30	13.08	4.58	80.04

Table 18 FEVD of VAR model for the measurement of mutual fund flow and real economic indicators for Japan

The table reports forecast error variance decomposition (FEVD) of mutual fund flow and macroeconomic variables for US $EQUITY$ is the normalized aggregate net equity flows. $BOND$ is the normalized aggregate net bond flows. GDP is the gross domestic product growth rate. ΔUE is the change in unemployment rate. ΔMS is the change in short-term nominal interest. The table presents FEVD for 8 periods

Variance Decomposition of EQUITY:					Variance Decomposition of BOND:				
Period	EQUITY	GDP	ΔUE	ΔMS	Period	BOND	GDP	ΔUE	ΔMS
1	97.90	0.40	0.65	1.05	1	97.29	2.31	0.29	0.10
2	97.53	0.38	1.16	0.93	2	96.39	2.53	0.41	0.67
3	95.00	0.40	1.85	2.75	3	95.59	3.10	0.75	0.56
4	91.43	2.52	2.05	4.00	4	92.52	6.18	0.74	0.56
5	88.77	4.42	2.79	4.02	5	91.98	6.68	0.78	0.56
6	88.21	4.84	2.87	4.08	6	91.89	6.67	0.81	0.64
7	87.60	5.48	2.87	4.05	7	91.89	6.66	0.81	0.64
8	86.90	6.20	2.88	4.03	8	91.75	6.65	0.90	0.70
Variance Decomposition of GDP:					Variance Decomposition of GDP:				
Period	EQUITY	GDP	ΔUE	ΔMS	Period	BOND	GDP	ΔUE	ΔMS
1	1.14	97.87	0.32	0.67	1	0.00	100.00	0.00	0.00
2	1.76	95.09	1.95	1.20	2	2.03	96.62	1.33	0.02
3	2.24	91.81	3.39	2.56	3	2.15	94.09	2.37	1.39
4	2.56	91.57	3.25	2.62	4	2.12	94.33	2.22	1.33
5	3.18	90.95	3.23	2.64	5	3.56	92.05	2.17	2.22
6	3.19	90.80	3.28	2.73	6	4.11	91.23	2.22	2.44
7	3.18	90.52	3.48	2.82	7	4.30	90.57	2.52	2.61
8	3.30	90.30	3.58	2.82	8	4.29	90.26	2.65	2.80
Variance Decomposition of ΔUE:					Variance Decomposition of ΔUE:				
Period	EQUITY	GDP	ΔUE	ΔMS	Period	BOND	GDP	ΔUE	ΔMS
1	0.00	1.27	98.73	0.00	1	0.16	0.97	97.85	1.02
2	0.58	0.96	98.40	0.05	2	0.19	0.76	98.07	0.98
3	0.55	2.18	93.74	3.53	3	0.24	2.98	93.67	3.12
4	3.82	13.54	79.64	3.01	4	0.45	13.01	83.61	2.93
5	5.35	13.11	77.92	3.62	5	0.55	12.73	83.45	3.28
6	5.95	11.64	78.68	3.73	6	0.50	11.39	85.12	2.99
7	6.03	12.95	77.44	3.57	7	1.27	11.71	83.86	3.17
8	6.06	13.08	77.21	3.64	8	1.28	12.64	82.90	3.18
Variance Decomposition of ΔMS:					Variance Decomposition of ΔMS:				
Period	EQUITY	GDP	ΔUE	ΔMS	Period	BOND	GDP	ΔUE	ΔMS
1	0.24	0.76	5.64	93.36	1	0.00	4.78	3.19	92.03
2	0.26	0.78	6.89	92.07	2	0.36	4.43	5.98	89.23
3	6.18	0.89	10.05	82.88	3	1.31	4.38	10.95	83.36
4	18.85	5.31	8.88	66.96	4	1.76	9.67	11.14	77.42
5	18.71	6.22	8.35	66.73	5	3.67	9.51	9.81	77.01
6	18.14	7.06	7.89	66.92	6	4.33	9.83	9.66	76.18
7	19.47	6.99	7.88	65.66	7	6.05	9.83	9.85	74.27
8	21.12	9.15	7.94	61.79	8	6.24	10.46	10.54	72.77

6. Conclusion

This study examines the relationship between flow of equity and bond fund with both expected and real economy. US, UK and Japan are the focus countries of this paper. Based on the studies of Jank (2011) and Qureshi et al (2019), the two objective is set to test the implication of information hypothesis. First is to study the relation between mutual fund flow and news about the future economy which represented by predictive variables. Second is to analyze the ability of mutual fund flows to predict the real economy if mutual fund investors on the average react rightly according to future economic situation. Overall findings support to an exist of information-response theory. The empirical analysis suggests that mutual fund flows are likely related to both expected and real economy.

The findings from the first objective indicates that mutual fund flows potentially relate to new information about the future economic conditions. Anticipated changes in economic conditions tend to cause mutual fund investors to adjust their asset holding. Dividend yield, term spread and default spread capture a future economic prospective. An increase in dividend yield contains a view of good future economy. Therefore, this tends to bring the flows into equity funds and outflow from bond funds. On the contrary, an increase in term spread and default spread is a signal of a poor economic state. It could possibly increase bond fund flows and decrease equity fund flows. Moreover, the results suggest that mutual fund flows themselves contain investors' prospective about the future economy. An increase in equity flows possibly relates to an increase in dividend yield but a decrease in term spread and default spread. Conversely, an increase

in bond flow seem to link with a decrease in dividend yield but an increase in term spread and default spread.

Moreover, it is interesting that mutual fund flows are not affected by Subprime crisis and COVID-19 pandemic. It is likely that the flows already react through an anticipated changes in economic conditions.

The findings in the second objective also suggest that mutual fund flows and the real economy are potentially related. Mutual fund flows themselves contain information about the real economy. A raise in equity fund flows possibly indicate a good future economy while a raise in bond fund flows point out to future economic deterioration. Therefore, an increase in equity fund flow could predict an improvement in GPD growth rate and monetary policy rate but a decrease in unemployment rate. On the other way, an increase in bond fund flow could prospect a raise in unemployment rate but a decline in GDP growth and monetary policy rate. Additionally, mutual fund flows are affected by the real economic condition as well. A good economy tends to bring up the flow into equity funds while a poor economic state possibly leads to an increase in bond flows.

Furthermore, the findings reveal a weak support to the studies of Jank (2011), Qureshi et al (2019) and Chalmers et al (2010). Overall results suggest that mutual fund flows are likely related with both predictive variables and macroeconomic indicators but the results are not consistent across the sample countries. However, this is not particularly surprising. Several research also found that the results from other countries may inconsistent in comparison with US (Paek and Ko, 2014; Lee et al., 2014). There are various explanations. One possible explanation is that the difference in culture and market structure may drive the difference in trading behaviors (Paek and Ko, 2014). In

US, individualism play a major role in mutual fund market while bank and institution dominate the market. Moreover, Kaneko (2004) finds that Japanese fund investors buy and sell irrationally. Another explanation is that external factors are more important to mutual fund flows than domestic states (Chuhan et al, 1998; Fong et al, 2018). For future research, it would be interesting to consider global factors in the study of mutual fund flows.

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