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The impacts of general mutual funds and macroeconomic factors on the performance of an infrastructure oriented mutual fund in Indonesia

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Purpose – The goal of this study to examine the dynamic relationship of general mutual funds and macroeconomic variables on the performance of a selected infrastructure oriented mutual fund, called the RDPT.

Design/methodology/approach – Monthly time series data spanning the period of December 2014 to December 2019 have been used. The co-integration test and Engle-Granger's error correction mechanism (ECM) have been applied to analyse the dynamic behaviour of the RDPT performance.

Findings – The results show that the RDPT performance is co-integrated to the performances of the general types of mutual funds and macroeconomic variables. From the ECM estimation, we find that the performance of the RDPT is negatively affected by the performances of the Exchange Trade Fund (ET) and the Fixed Income Fund (FI) but positively affected by the Capital Protected Fund (CP). The other types of general mutual funds are not significant such as the Equity Fund (EQ), the Index Fund (IF), the Mixed Asset Fund (MA), and the Money Market Fund (MM). From macroeconomic factors, the Consumer Price Index (CPI) has negative effect on the RDPT meanwhile the Real Gross Domestic Product (RGDP) and Indonesian Central Bank policy rate (BI Rate) have positive effects. The other macroeconomic variables, such as Indonesian exchange (IDX) composite index and exchange rate (ER) are not significant. The paper conclusively discovers that that some of the general type of mutual funds have substitution effects to the RDPT and the others have complementary effects. Moreover, the performance of the RDPT is depend on macroeconomic variables event though not all are statistically significant.

Originality/Value – The study might be the first study to explore the infrastructure oriented investment in the case of Indonesia which is now boosting the development of infrastructure to all regions in the country.

Keywords – infrastructure investment, mutual fund, macroeconomic variables, Co-integration, Error Correction Model.

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Introduction

During the first Jokowi's administration in 2014-2019, the construction of infrastructure such as toll roads, ports, airports and dams took place massively. In the second term of his administration, infrastructure development remains a priority for his policies to be carried out. Apart from coming from state financing through the central government budget as well as from foreign loans, infrastructure development financing support can be done through the development of various alternative financing products. Although this financial product can be categorized as mutual funds, the Indonesian Financial Services Authority, called Otoritas Jasa Keuangan (OJK) classifies this type of investment as other investments. It is hoped that investment products that support infrastructure development can become an alternative investment besides general mutual funds which have been the favourite among investors.

Several types of mutual fund investment products in Indonesia that specifically to support infrastructure financing are Limited Participation Mutual Funds (RDPT), Collective Investment Contracts of Asset-Backed Securities (CIC-ABS), Asset Backed Securities Collective Investment Contracts (KIK-EBA), EBA-SP, Real Estate Investment Trust, Real Estate Investment Fund (DIRE) and Infrastructure Fund (DINFRA).

The RDPT in Indonesia is one of the infrastructure supporting investment products that is different from other infrastructure supporting investment products aimed specifically at professional investors, so that the sales method is not offered in retail like the usual mutual funds. In the period December 2014 - April 9 2020, the average net asset value of the RDPT was higher (IDR
23.6 trillion) compared to other infrastructure supporting investment products, such as EBA IDR 5.1 trillion; EBA SP IDR 2.8 trillion; DIRE IDR 3.6 trillion; DINFRA IDR 4.8 Trillion). In line with this, the proportion of net asset value of the RDPT to total mutual funds during the 2014 to 2020 period shows fluctuation with range from 3.7% to 6.8%.

However, with the emergence of various investment alternatives for mutual funds to support the aforementioned infrastructure, it is interesting to analyse whether the performance of general types of mutual funds, such as Exchange Traded Fund (ET), Fix Income Fund (FI), Capital Protected Fund (CP), Equity Fund (EQ), Index Fund (IF), Mixed Asset Fund (MA), and Money Market Fund (MM) will affect the performance of the mutual funds supporting the infrastructure, in this case the performance of the RDPT.

Therefore, this paper intends to analyse the performance effect of general mutual funds and macroeconomic variables on the performance of one of the most developed infrastructure supporting mutual funds, namely: RDPT. This paper will then be further divided into four parts. The second part is the literature review. Section 3 describes the research methodology used in this analysis. Section 4 discusses the results and interpretations. The final section of this paper discusses the conclusions and managerial implications of the results obtained.

Literature review

The empirical facts show that various macroeconomic variables such as gross domestic product (GDP), exchange rates, consumer price index, interest rates, and composite stock price index have significant effects on mutual fund performance (Pal and Ruhee, 2011, Monjazeb and Ramazanpour, 2013, Panigrahi et. al, 2019, Qureshi et. al, 2019). However, there is still limited studies that investigate the effects of one mutual fund performance to the performance of other type of mutual funds.

Pal and Mittal (2011) examine the long-run relationship between the Indian capital markets and key macroeconomic variables such as interest rates, inflation rate, exchange rates and gross domestic savings (GDS) of Indian economy. Their study use quarterly time series data from January 1995 to December 2008. The unit root test, the co-integration test and error correction mechanism

(ECM) have been applied to derive the long run and short-term statistical dynamics. The findings of the study establish that there is co-integration between macroeconomic variables and Indian stock indices which is indicative of a long-run relationship. Their ECM regression shows that the rate of inflation has a significant impact on both the BSE Sensex and the S&P CNX Nifty. Interest rates on the other hand, have a significant impact on S&P CNX Nifty only. However, in case of foreign exchange rate, significant impact is seen only on BSE Sensex. The changing GDS is observed as insignificantly associated with both the BSE Sensex and the S&P CNX Nifty. The study reveals that the changes in stock markets are affected not only by change in few selected macroeconomic variables, but there are other macroeconomic dimensions affecting the Indian capital market.

In the other study, Panigrahi *et al* (2019) examine the impact of macroeconomic variables to Net Asset Value of Mutual Funds in India. In their hypothesis, mutual fund performance is also heavily influenced by the performance cycle and the intervention of macroeconomic variables within the industries or the ventures in which the funds invest. Using regression analysis, macroeconomic variables that used in the model is interest rate, inflation rate, and exchange rate. From the trend analysis and regression model, the study finds out that the macroeconomic variables influence the performances among mutual funds; they either affect it positively or negatively. If the interest rate in the future goes up by a certain percentage, then it will drastically affect the performance of the mutual fund in a negative way. In future with the current trend, the inflation expects to increase, resulting in higher prices. The risk increases with the increase in the inflation rate; the performance of the mutual fund tends to improve. Exchange rate plays a significant role while dealing with foreign investments, but in general, the contribution of the exchange rate in the mutual fund is meagre.

Qureshi *et al.* (2019) also exercise the relationship among mutual fund flows, stock market returns, and macroeconomic indicators for nine Asian developing economies, they are: China, India, Indonesia, Korea, Malaysia, Pakistan, Philipines, Taiwan and Thailand. The study employs a panel vector autoregressive model in the context of generalized method of moment (GMM) estimation to identify the dynamic relationships. Macroeconomic variables that used in this study are CPI, GDP money supply (M1), exchange rate, and ratio of fiscal deficit to GDP. The findings show that GDP, money growth, unemployment and the ratio of fiscal deficit to GDP positive and significantly affect the equity flows and bond flows. The study also finds that causality between fund flows and macroeconomic variables is bi-directional in further support of the information hypothesis. This means that fund flows not only respond to past economic conditions, but they also foreshadow future economic conditions.

In the case of Indonesia, Hermawan and Wiagustini (2016) indicate that macroeconomic variables, such as inflation has a negative relationship on the performance of the mutual fund. In contrary, inflation has positive impact on mutual fund performance (Alexandri, 2013). However, Pasaribu and Kowanda (2014) reveal that there is no effect of inflation to the performance of mutual fund.

Research methodology

Data sources and description

The main source of Indonesian mutual fund statistics come from Indonesia Financial Authority or Otoritas Jasa Keungan (OJK). The data for performances derive from net asset value (NAV) of general mutual fund products and the RDPT. Meanwhile, RGDP and CPI data come from Indonesia Statistics or Badang Pusat Statistik (BPS). The data for exchange rate and BI rate come from Indonesia Central Bank or Bank Indonesia (BI) and the last data, composite index arise from Indonesia Stock Exchange (IDX). To conduct the research objectives, the time series monthly data spanning from December

2014 to December 2019 comprising 61 time observations have been used for the empirical econometric analyses.

Econometric Model

In time-series analysis, it is required that the variables are stationary variables to prevent spurious regression. However, if the variables are not stationary but they have same degree of integration or I(1) and their linear combination is co-integrated or stationery, I(0), then one of the best model for estimation is the error correction mechanism (Engle and Granger, 1987). Therefore, first we perform the unit root tests according to Augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1979, 1981). The ADF can be tested for all variables using following regression:

$$\Delta y_t = c_0 + c_1 y_{t-1} + \sum_{j=1} \Delta y_{t-j} + e_t \qquad (1)$$

where: Δ is first difference and y refers to all variables that we use on the empirical model. This study applies Schwarz Information Criterion (SIC) to select suitable lag lengths of ADF test and the results are reported in Table 2.

Our empirical model in this study basically refers to the model developed by Pal and Ruhee (2011). Slightly different to their model, this study includes all types of general mutual funds in Indonesia that are theoretically considered as a substitution for RDPT. Thus, we develop an empirical econometric model as follows:

$$LRDPT_t = \alpha_0 + \alpha_1 LEQ_t + \alpha_2 LET_t + \alpha_3 LFI_t + \alpha_4 LIF_t + \alpha_5 LMX_t + \alpha_6 LMM_t + \alpha_7 LPF_t + \alpha_8 LCPI_t + \alpha_9 LIDX_t + \alpha_{10} LRGDP_t + \alpha_{11} LBIrate_t + \alpha_{12} LER_t + u_t \qquad (2)$$

where: L refers to logarithms, net asset values for general type of mutual funds: Equity Fund (EQ), Exchange-Traded Fund (ET), Fixed Income Fund (FI), Index Fund (IF), Mixed Asset Fund (MX), Money Market Fund (MM), Capital Protected Fund (CP). For macroeconomic variables, we use Consumer Price Index (CPI), Indonesia Exchange Composite Index (IDX), Real Gross Domestic Product (RGDP), Central Bank policy rate (BI rate), and exchange rate IDR/US$ (ER).

To test for long-run effects of general mutual funds and macroeconomic variables, we use Engle and Granger (1987) procedure. The Engle-Granger method for co-integration test utilizes the Augmented Dickey-Fuller (ADF) test for the resulting residuals from equation (2).

Carried out the ADF test, performs co-integration test based on Engle-Granger, therefore is called Augmented Engle-Granger (AEG) test can be tested via following equation:

$$\Delta u_t = c_1 u_{t-1} + \sum_{j=1} \Delta u_{t-j} + \varepsilon_t \qquad (3)$$

where u_t is residuals from equation (2).

After established the unit root and co-integrating tests, the study moves onto examining the error correction mechanisms that describe short-run dynamics on RDPT equation. The ECM model for the RDPT can be developed as follows:

$$\Delta LRDPT_t = b_1 \Delta LEQ_t + b_2 \Delta LET_t + b_3 \Delta LFI_t + b_4 \Delta LIF_t + b_5 \Delta LMX_t + b_6 \Delta LMM_t + b_7 \Delta LPF_t + b_8 \Delta LCPI_t + b_9 \Delta LIDX_t + b_{10} \Delta LRGDP_t + b_{11} \Delta LBIrate_t + b_{12} \Delta LER_t + b_{13} ECT_{t-1} + v_t \quad (4)$$

where ECTt-1 equal to ut-1 from equation (2).

Empirical evidence

Table I describes the descriptive statistics for the thirteen variables used in this research. They are seven types of mutual funds and five macroeconomic variables. The values of skewness and kurtosis are useful to investigate normal distribution of the variables. We may also use JB statistics (Jarque and Bera, 1987) in order to test whether the distributions of the variables are symmetric or normal distribution. The null hypothesis for JB statistics is normal distribution, meaning that the values of Skewness and Kurtosis equal to zero. From the table, we find that most of the variables are normal distributions, except for LFI and LIF.

Table I. Descriptive statistics of all variables

	Sample: December 2014 to December 2019												
	LRDPT	LEQ	LET	LFI	LIF	LMX	LMM	LPF	LCPI	LIDX	LGDP	LBIRATE	LER
Mean	3.076	4.856	1.965	4.341	0.525	3.218	3.768	4.529	4.858	8.628	14.717	1.737	9.522
Median	3.052	4.800	2.029	4.451	0.020	3.250	3.847	4.568	4.865	8.665	14.721	1.749	9.514
Maximum	3.335	5.107	2.743	4.796	2.168	3.484	4.273	5.050	4.935	8.796	14.852	2.048	9.629
Minimum	2.786	4.551	1.147	3.541	-0.713	2.938	3.198	3.802	4.773	8.349	14.585	1.447	9.428
Std. Dev.	0.162	0.160	0.505	0.395	0.957	0.152	0.313	0.390	0.050	0.117	0.077	0.203	0.041
Skewness	0.082	0.163	-0.161	-0.579	0.270	-0.139	-0.019	-0.303	-0.112	-0.525	-0.004	0.126	0.244
Kurtosis	1.559	1.594	1.649	1.928	1.336	1.695	1.553	1.727	1.799	2.261	1.944	1.656	2.792
Jarque-Bera (JB)	5.343	5.293	4.906	6.330	7.777	4.523	5.323	5.051	3.795	4.187	2.836	4.753	0.715
Prob (JB)	0.069	0.071	0.086	0.042	0.020	0.104	0.070	0.080	0.150	0.123	0.242	0.093	0.699
Observations	61	61	61	61	61	61	61	61	61	61	61	61	61

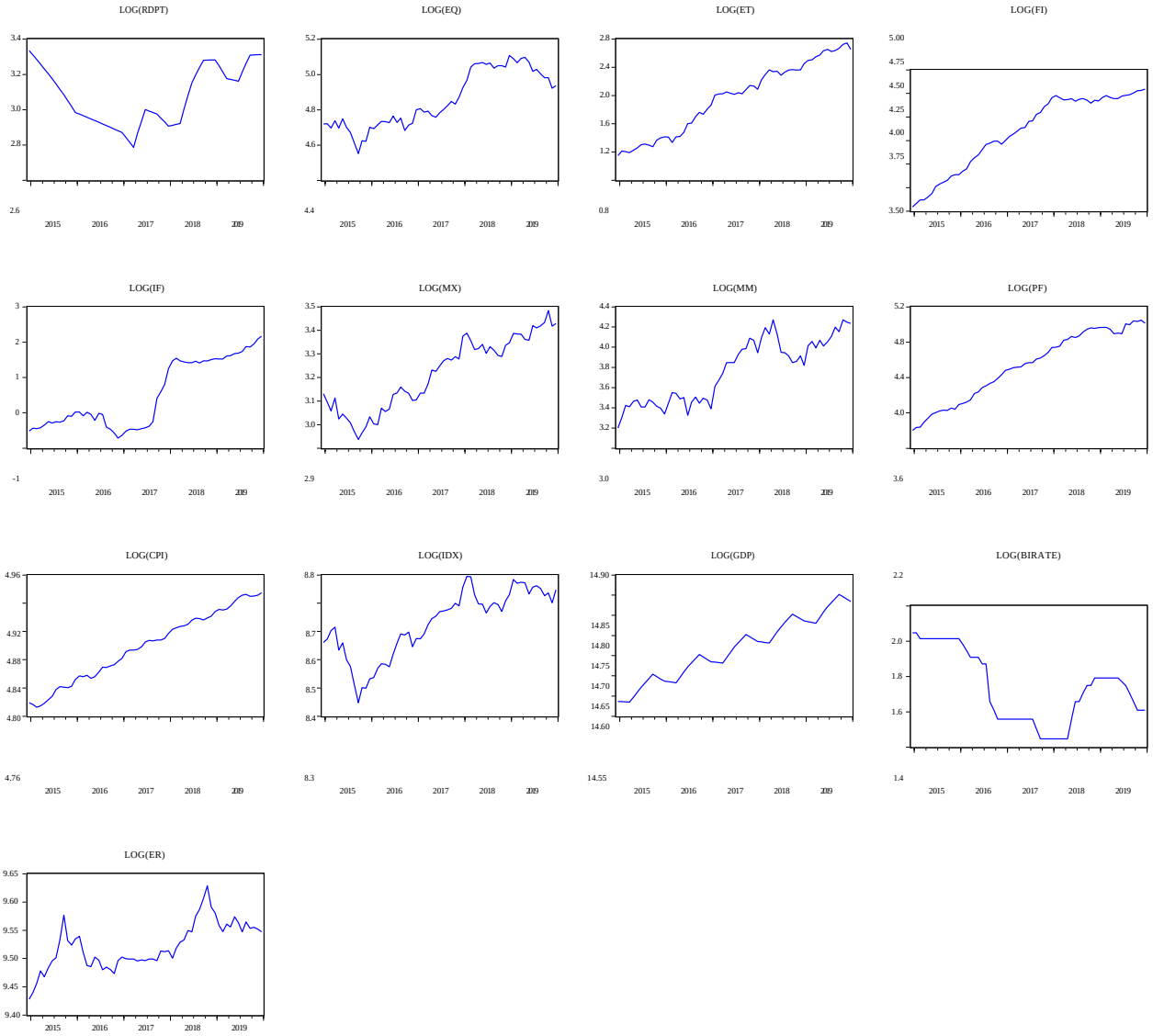

Figure 1. Dataset graphs

To determine whether the time series is stationary or not, we may use graphical representation which is shown in Figure 1. The graphs observe the evidence of trend, mean, variance, and seasonality. Statistically, a time series data is said to be stationary if the mean, variance and covariance of these variables are entirely unaffected by time or in other words constant, therefore Yt~I(0). All variables seems to be non-stationary based on all graphs in Figure 1. For formal test, we employ ADF tests for all variables used on this study. The ADF tests results are presented on Table II. The tests indicate that all variables are non-stationery but have the same order of integration on first degree of I(1).

After it finds out that all the variables are non-stationary series, it may be interested in determining whether the series are co-integrated. Engle and Granger (1987) pointed out that a linear combination of two or more non-stationary variables might be stationary. If such a stationary, or I(0), linear combination exists, the non-stationary, the variables are said to be co-integrated. The stationary linear combination is called the co-integrating equation and may be interpreted as a long-run equilibrium relationship among the variables.

Based on the ADF test of the resulting residuals from equation (2) or u_t, we found significant test value at t-stat = -5.239. Therefore u_t is stationary series or I(0). This concludes that there is co- integration or long-run linear effects from all independent variables on equation (2) to dependent variable, the RDPT.

Table II. Unit root and co-integration tests

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Variables	ADF test at Level	ADF test at First Difference	Order of integration
Unit root test			
LRDPT	-2.497	-3.045***	I(1)
LEQ	-1.452	-7.258***	I(1)
LET	-2.298	-6.214***	I(1)
LFI	0.158	-2.682**	I(1)
LIF	-2.154	-2.599**	I(1)
LMX	-2.468	-9.466***	I(1)
LMM	-2.544	-2.817***	I(1)
LPF	-1.193	-2.740***	I(1)
LCPI	-2.554	-6.562***	I(1)
LIDX	-2.207	-7.054***	I(1)
LGDP	-2.622	-13.497***	I(1)
LBIrate	-1.415	-5.592***	I(1)
LER	-2.454	-7.258***	I(1)
Co-integration test			
u	-5.239***		I(0)

Notes: *, * *, and * * * indicate rejection of null hypothesis of non-stationary at 10, 5, and 1 percent significant levels; the critical values at 1, 5 and 10 percent for the ADF test (level variables) are -4.094, -3.475, and -3.165. For first difference, critical values of the ADF test without constant and time-trend are -2.598, -1.945, and -1.614.

The results obtained from ECM specification as represented on equation (4) is shown on the Table III. From estimated ECM, it produces adjusted R^2 = 0.454. We employ residual normality test by Jarque-Bera-stat = 0.659 (p-value = 0.719) which indicates the residuals of the ECM estimation are normal distribution. We employ heteroskedasticity test by Breusch-Pagan method (Breusch and Pagan (1979) and find insignificant test, therefore we conclude that the estimation are free from heteroscedasticity with F-stat=1.419 (p-value=0.187). However, from serial correlation LM-test (Breusch. 1978 and Godfrey, 1978), we find a significant F-stat = 6.832 (p-value= 0.000) which is latter on we use AR(1) in order to solve this problem.

From the estimation, we find the negative impacts of the exchange-traded fund (ET) and the fixed income fund (FI) on the RDPT in the short-run. It means that ET and FI seems to have substitution effects on the RDPT. Investors may have to choose to buy exchange traded fund or RDPT. They also may have to choose fixed income fund or RDPT. However, protected fund (PF) has a positive significant impact on RDPT meaning that these two mutual fund types are complementary. The investors who want to buy protected funds may also buy RDPT.

Moreover, consumer price index has negative impact on RDPT meanwhile real GDP and policy rate from the central bank have positive impacts. The massive infrastructure development in Indonesia have increase economic growth, therefore increase the demand for infrastructure oriented mutual funds such as the RDPT.

Table III. The Estimation of Error Correction Model for the Net Asset Value of RDPT

Variables	Coefficient	Prob.
ΔLEQ	0.092	0.492
ΔLET	-0.125*	0.097
ΔLFI	-0.497***	0.002
ΔLIF	0.006	0.822
ΔLMX	0.181	0.187
ΔLMM	0.050	0.253
ΔLPF	0.218*	0.096
$\Delta LCPI$	-1.816*	0.080
$\Delta LIDX$	0.294	0.113
$\Delta LGDP$	2.287***	0.000
$\Delta LBIrate$	0.293***	0.003
ΔLER	0.122	0.625
ECT_{t-1}	-0.389***	0.001

Note: * , **, *** denote significance at the 10, 5 and 1 levels, respectively.

Lastly, the ECT shows the significant of speed adjustment from short-run to long-run equilibrium. The absolute value of the ECT is 0.389 is less than one indicates that the stable estimated RDPT finally converges to the long-run equilibrium position. The estimated model recommends that 39 percent of any previous disequilibrium in the long-run will be corrected in short-term.

Conclusion and implications

The massive infrastructure development from five years ago and for the next five year in near future required huge financing. The financial sources might come from infrastructure oriented mutual funds. The paper has proved that there are significant impacts of some general types of mutual funds and macroeconomic factors on a selected infrastructure oriented mutual fund or the RDPT in Indonesia. This study reveals not all types of general mutual funds and macroeconomic factors have impacts on the performance of the RDPT.

The implications of this study can be for investors, investment managers, and the government. For investors and investment managers, in order to buy RDPT mutual fund, they must be aware to the trends of some types of general mutual funds, especially the mutual funds that have substitution effects to the RDPT. For government, they should promote RDPT and the other infrastructure oriented mutual funds in order to extent the sources of infrastructure financing.

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