Time-series analysis of Japanese mutual fund performance: Considerations on asset flow and return

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Abstract

In Japan, various institutional reforms have been made to promote "a flow from savings to investments." The ratio of "cash and deposit" to the financial assets of Japanese households is still higher than the US and Europe, but the importance of self-asset building is gradually taking root, allowing preparations for pension savings in Japan's aging society. Therefore, mutual funds, which can easily make "long-term, accumulation, and diversified" investments as a means of asset formation, will play an increasingly important role.

This paper, therefore, looks at the main trends in the Japanese open-end fund market over the past 20 years and then uses time-series analysis focusing on asset flow and return to analyze Japanese open-end funds overall and by product category. Net asset value (NAV) was broken down into net asset value per share (NAVPS) and the unit number, and the relationship between percentage changes in NAVPS and the changing rate of the unit number was examined. The results show that the explanatory power of the previous or current month's percentage change in NAVPS on the changing rate of the unit number for the current month was generally high. For example, when NAVPS of "Japanese stock" rises or falls for the current month it is likely that the unit number slightly decreases or increases, respectively, for the same month due to contrarian selling or buying, so "Japanese stock" tends to be traded by observing short-term price movements. And when NAVPS of "Global stock (non-hedge)" or "Mixed" rises or falls for the previous month, it is likely that the unit number slightly increases or decreases, respectively, for the current month, due to trend-followers' buying or selling, so "Global stock (non-hedge)" or "Mixed" seems to be traded in a trend-following investment stance for a longer period than "Japanese stock". Therefore, investors may tend to take a different investment stance such as trend-following or contrarian decision-making depending on the category of the funds.

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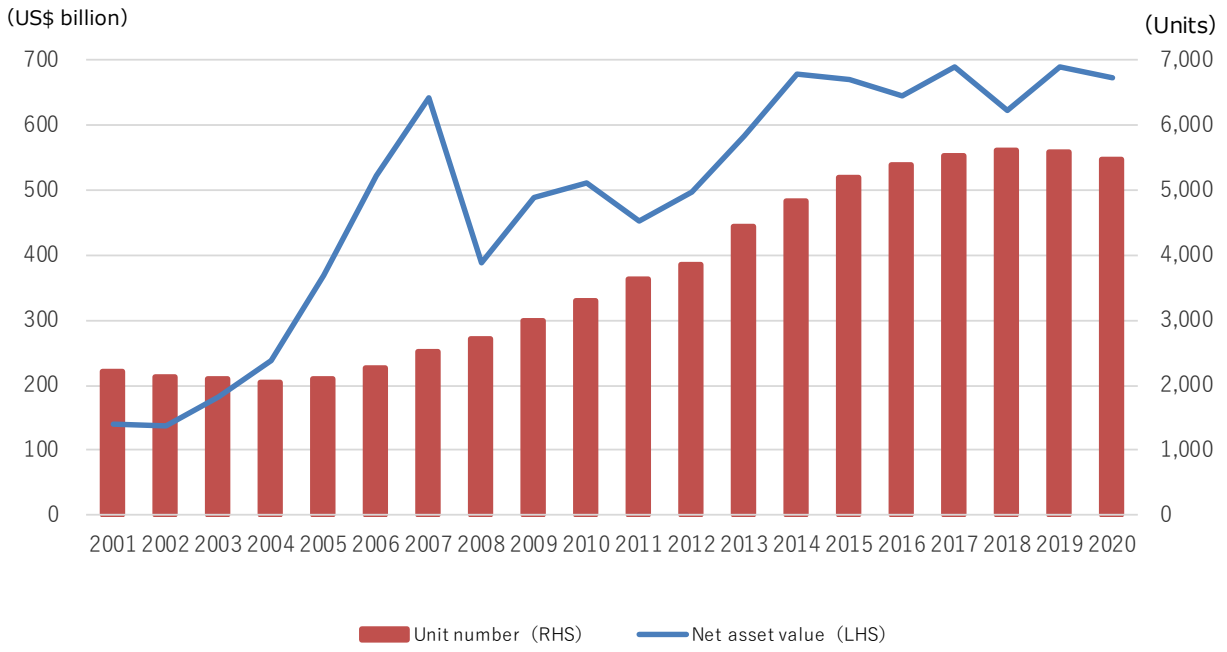
1. Introduction

Since 2001, both the net asset value or NAV and the unit number of Japanese open-end funds excluding ETF, hereinafter just called Japanese open-end funds were on the rise but this growth has reached a plateau since the NAV peaked at US$716 billion in May 2015, and the unit number peaked at 5,617 in February 2019 because of the increase in the early redemption of small-scale open-end funds (See Figure 1). Note that a conversion rate of US$1 to Japanese 105 yen has been used throughout. In October 2020, the NAV of Japanese open-end funds was US$672 billion, and the unit number was 5,472.

Figure 1: Net asset value (NAV) and the unit number of Japanese open-end funds[1]
(As of the end of December from 2001 to 2019 and as of October in 2020)



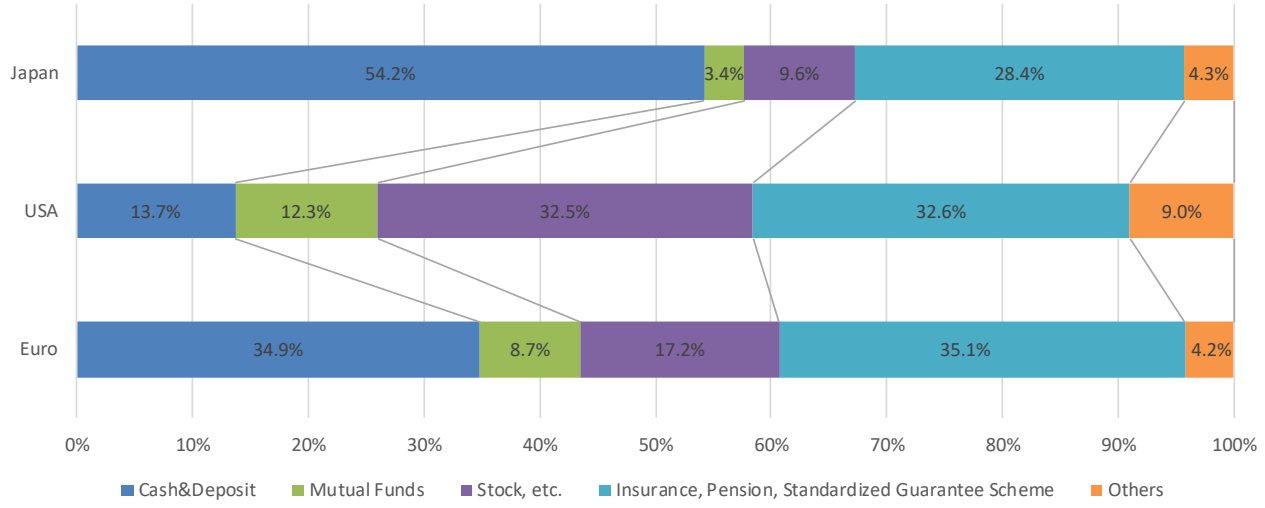
Source : Created by Nikko Research Center based on data from the Investment Trusts Association, Japan

To see the environment surrounding Japanese open-end funds first check the financial asset composition of Japan, the US and Europe. According to a "Japan-US-Europe comparison of money circulation" as of March 2020 published by the Bank of Japan in August 2020, "mutual funds" and "stocks, etc." account for 3.4% and 9.6% of Japanese household financial asset composition (See Figure 2). This is less than the figures of 12.3% and 32.5% for the US, and 8.7% and 17.2% for the euro area, respectively. In contrast, "cash and deposit" accounts for 54.2%, the majority of

[1] Open-end fund is a mutual fund that can be purchased and sold at any time since its inception. The data is as of the end of December from 2001 to 2019 and as of October in 2020.

Japanese household asset composition, and is higher than the figures of 13.7% for the US and 34.9% for the euro area. So, this shows that Japanese are more highly conscious of cash and deposit.

Figure 2 : Financial asset composition of households in Japan, the US and Europe



Source : Created by Nikko Research Center based on the data from the Bank of Japan

In Japan, various institutional reforms have been made to promote "a flow from savings to investments ." (See Figure 3) First, the Defined Contribution Plan was started in Japan in 2001. This system is modeled on the US 401(k) plan in which companies and subscribers contribute a fixed amount each month and manage it by themselves. The revised Defined Contribution Pension Act was enacted in 2016 and the number of people eligible to join the Individual-type Defined Contribution Pension was expanded in 2017. Meanwhile, a NISA system was launched in 2014, modeled on the UK's Individual Savings Account. With NISA all individuals in Japan are eligible for an exemption from the 20% levy on income from capital gains and dividends of stocks or mutual funds from annual investments up to 5 years. In 2017, the Financial Services Agency of Japan established a principle called "Initiatives for User Oriented Financial Services in a New Era" to encourage financial institutions such as investment trust companies and securities companies to implement more customer-oriented business operations. As confirmed in figure 2, the ratio of "cash and deposit" to the financial assets of Japanese households is still higher than the US and Europe, but the importance of self-asset building is gradually taking root, allowing preparations for pension savings in Japan's aging society. Therefore, mutual funds, which can easily make "long-term, accumulation, and diversified" investments as a means of asset formation will play an increasingly important role.

Figure 3 : Major institutional reforms that promote Japanese investments

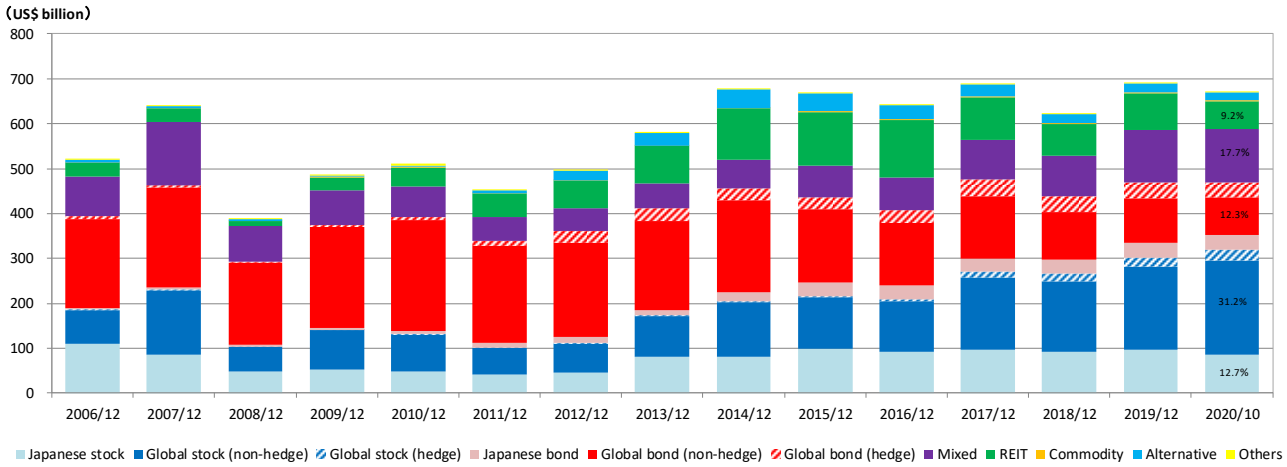
Name	Start year	Overview
Defined Contribution Plan (DC)	2001	The system is modeled on the US 401(k) plan. Companies and subscribers contribute a fixed amount of money each month and manage it by themselves. The revised Defined Contribution Pension Act was enacted in 2016, and the number of individuals eligible to join the Individual-type Defined Contribution Pension (iDeCo) has increased since January 2017.
NISA	2014	NISA is an acronym for Nippon (Japan) Individual Savings Account modeled on the UK's ISA. With NISA, all individuals in Japan are eligible for an exemption from the 20% levy on income from capital gains and dividends of stocks or mutual funds from annual investments up to 5 years.
Initiatives for User Oriented Financial Services in a New Era	2017	A principle established by the Financial Services Agency of Japan to encourage financial institutions such as investment trust companies and securities companies to implement more customer-oriented business operations.

Source : Created by Nikko Research Center based on data from various materials

2. Financial trends of Japanese mutual funds by Nikko Category

First, I propose we check changes in the asset balance of open-end funds. Figure 4 shows the NAV of Japanese open-end funds based on Nikko Category[2] made by Nikko Research Center, Inc. The data is as of end-December from 2006 to 2019 and as of end-October for 2020. In 2006, the largest share of the NAV of Japanese open-end funds by Nikko Category is 38.1% for "Global bond (non-hedge)" that does not carry out currency hedging, followed by 20.9% for "Japanese stock" and then 17.0% for "Mixed" that invests in multiple investment targets.

Figure 4 : NAV of Japanese open-end funds by Nikko Category



Source : Created by Nikko Research Center based on data from the Investment Trusts Association, Japan

[2] Fund classification determined by Nikko Research Center, Inc is based on the investment policy described in the prospectus and focusing on the following criteria: the investment target, investment area, investment policy, and investment method which are classified into "Japanese stock", "Japanese bond", "Global stock (non-hedge/hedge)", "Global bond (non-hedge/hedge)", "Mixed", "REIT", "Commodity", "Alternative", "Others".

The NAV of ”Global bond (non-hedge)“, which was higher than the share of ”Japanese stock“ in 2003, reached its peak in 2006. At that time, foreign bonds were popular among investors because of the long-term stagnation in Japanese stocks and the expectation of relatively high yields on global bonds amid low interest rates in Japan. In addition, the share of the “Global bond (non-hedge)” reached 48.2% in 2010, nearly half of the total, due to the popularity of the monthly distribution type “Global bond”. However, since then, global interest rates have continued to decline, making it less attractive as high yield mutual funds, and under low interest rates, the monthly distribution-type mutual funds continued to pay relatively high distributions, which led to decline in price and increased redemption. Therefore, funds have tended to flow out from the NAV of ”Global bond (non-hedge)“.

“Japanese stock“ had its highest share percentage from 2001 to 2002, but the share then declined while the economy was in recession due to the collapse of the Internet bubble in 2001, falling to 9.2% in 2012. However, after Shinzo Abe was inaugurated as Prime Minister in December 2012, and Abenomics introduced improved investment sentiment, “Japanese stock” tended to increase due to the rise in the stock market.

”Mixed“ is a mutual fund that makes diversified investments in stocks, bonds, or money market products. According to the Nikko Categories, balanced funds that diversify risk by investing in various regions and assets to pursue returns are classified as ”Mixed“. In 2007, the share of ”Mixed“ rose to 22.1% because balanced funds gained popularity among investors, but NAVPS dropped as with other funds due to global stock depreciation after the collapse of Lehman Brothers and moves to reduce risk that resulted in yen appreciation. As the diversification effect of risk reduction did not work well, investors increasingly redeemed ”Mixed” and the share in Japanese open-end funds fell to 9.3% in 2014. However, from around 2015, “long-term, accumulation, and diversified” investments began to gain importance and “Mixed” that could easily make diversified investments continued to flow in.

The category with the highest share as of October 2020 was “Global stock (non-hedge)” at 31.2%, followed by “Mixed” at 17.7%, “Japanese stock“ at 12.7%, and “Global bond (non-hedge)” at 12.3%.

Figure 5 shows changes in the flow of open-end funds by Nikko Category over the last year, created from data as of the end of each month. From November to December, the global financial market remained firm, so investors moved to lock in profits, selling holdings in “Japanese stock“ or “Global stock“, such that the total asset flow became a net outflow.

Figure 5 : Changes in the flow (US$ billion) by Nikko Category over the past year

Nikko category	2019/11	2019/12	2020/01	2020/02	2020/03	2020/04	2020/05	2020/06	2020/07	2020/08	2020/09	2020/10	Sum
Japanese stock	-3.0	-2.7	-0.7	-0.0	1.2	-0.2	-0.5	-2.5	-1.3	-1.7	-1.0	-0.8	-16.0
Global stock (non-hedge)	-2.7	-0.9	0.3	1.4	3.3	1.9	1.3	-1.1	5.4	2.6	4.3	1.6	11.2
Global stock (hedge)	0.0	-0.1	0.0	0.4	0.2	0.1	0.0	0.3	0.5	0.3	0.9	0.6	1.7
Japanese bond	0.3	0.3	0.0	0.0	0.2	-0.4	-0.2	0.2	-0.2	0.2	-0.0	-0.1	0.8
Global bond (non-hedge)	-0.9	-1.1	-0.7	-0.9	-1.5	-0.7	-0.3	-0.6	-0.8	-0.7	-0.6	-0.8	-9.4
Global bond (hedge)	-0.1	0.1	0.2	-0.2	-0.9	0.2	-0.2	-0.2	0.4	-0.0	-0.1	-0.1	-1.0
Mixed	2.3	2.3	3.3	1.8	0.0	-0.5	0.9	1.2	0.6	0.2	0.8	0.1	16.9
REIT	0.4	0.7	0.5	-0.1	0.5	0.9	0.8	1.1	0.3	0.0	0.2	0.0	5.9
Commodity	0.0	0.0	0.0	0.1	-0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.7
Alternative	0.1	-0.2	0.3	0.2	0.0	0.1	-0.1	-0.0	0.3	0.2	0.4	0.5	0.4
Others	-0.0	0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.0	-0.0	0.0	-0.0	-0.0	0.1
合計	-3.6	-1.5	3.1	2.6	2.9	1.5	1.8	-1.4	5.3	1.1	4.8	1.2	18.0

Source : Created by Nikko Research Center based on data from the Investment Trusts Association, Japan

From the beginning of this year, there continued to be a net inflow for the total fund until May. This is because although the spread of COVID-19 caused anxiety about the future of the economy and the stock market fell sharply, investors who thought that the decline in stock market was an opportunity for investment bought many funds, so profit-taking sales were seen around the end of February and the flow turned negative to US$1.4 billion. In June, the market rallied after the plunge caused by the Corona Shock, and with the global monetary easing trend, the flow has been positive since July, so the total amount of cash inflows and outflows in the last year was a positive US$18.0 billion.

Looking at these funds by Nikko Category, the category with the greatest outflow in the past year was "Japanese stock" at US$13.1 billion, followed by "Global bond (non-hedge)" at US$9.4 billion, and "Global bond (hedge)" at US$1.0 billion. Since November 2019, there has been an outflow of investment from the category "Japanese stock".

In March, the Japanese major stock index reached its lowest price since the beginning of the year, which caused a net inflow from investors who saw the stocks as good value buying into the "Japanese stock" category. However, it has since turned into a net outflow since April. "Global bond (non-hedge & hedge)" continues to see net outflows for most months, regardless of current hedging, as low global interest rates continue during the Covid-19 pandemic.

In contrast, the category with the most inflows of open-end funds over the past year was "Global stock (non-hedge)" at US$17.3 billion, followed by "Mixed" at US$12.9 billion, and "REIT" at US$5.3 billion.

The "Global stock (non-hedge)" which had the greatest inflow of funds in the past year, had the second largest outflow after "Japanese stock" in June, but, with the exception of June, it has had a net inflow since the beginning of this year, and the inflow amount has been the highest of all categories.

Due to the popularity of investment trusts that make diversified investments in a wide range of

assets, "Mixed", which ranked second for inflow of funds in the past year, has been at net inflow since November 2019, excluding April. However, before the Corona Shock, high-risk funds such as leveraged funds were popular, whereas after the Corona Shock, stable low-risk funds were preferred.

In addition, "REIT", which ranked third for inflow of funds in the past year, has also been at net inflow since the end of November 2019, and has been positive for all months except for the end of February 2020. Due to the spread of COVID-19 in Japan, there was an outflow of funds from "REIT" in February 2020, but it returned to net inflow again in March because it was noted as a high-yielding asset under low global interest rates.

Next, I propose we show the returns of Japanese open-end funds by Nikko Category. The figure 6 shows the trend in returns by Nikko Category over the last year, where data as of the end of each month is used.

Figure 6 : Changes in returns(%) by Nikko Category(as of the end of each month)

Nikko category	2019/11	2019/12	2020/01	2020/02	2020/03	2020/04	2020/05	2020/06	2020/07	2020/08	2020/09	2020/10	2019/11-2020/10
Japanese stock	2.6	1.6	-3.1	-10.9	-8.2	6.4	8.8	0.7	-2.7	7.4	2.7	-2.1	-0.1
Global stock (non-hedge)	3.3	2.6	-0.6	-6.3	-16.7	10.5	5.6	3.3	4.1	6.6	-2.8	-0.5	0.1
Global stock (hedge)	3.6	1.8	1.0	-7.5	-10.5	12.5	5.8	2.4	6.4	6.1	-3.2	-0.2	0.3
Japanese bond	-0.3	-0.4	0.4	0.6	-1.7	0.3	-0.4	-0.3	0.2	-0.5	0.2	-0.1	-0.0
Global bond (non-hedge)	-0.9	1.3	-1.2	-0.7	-10.3	0.6	3.1	1.5	0.9	0.5	-1.5	-1.8	-0.2
Global bond (hedge)	-0.0	-0.1	0.8	0.1	-6.4	1.9	1.5	1.1	1.5	-0.3	-0.5	-0.1	-0.0
Mixed	0.5	0.6	0.1	-3.3	-8.9	2.6	2.1	0.6	0.9	2.2	-1.0	-1.6	0.0
REIT	-1.6	-2.6	1.8	-7.7	-24.1	2.1	3.5	-1.2	1.0	2.6	-3.5	-5.2	-0.2
Commodity	-1.3	3.6	-0.9	0.7	-9.7	-1.9	6.5	4.7	7.2	2.7	-4.3	-2.1	0.4
Alternative	-0.4	1.2	-2.5	-5.3	-14.7	1.5	3.6	-0.1	0.8	1.6	-1.2	-0.9	-0.1
Others	1.1	0.7	-1.2	-4.8	-4.3	3.4	4.5	0.7	-1.5	3.6	-0.1	-0.7	-0.1
合計	1.1	1.0	-0.5	-5.1	-12.6	4.9	4.2	1.3	1.5	3.8	-1.4	-1.5	-0.0

Source : Created by Nikko Research Center based on data from the Investment Trusts Association, Japan

The calculation method of the return for month t uses the "Dietz method", as shown in this formula, to make the calculation of the entire fund and each category relatively easy, rather than the generally accepted method of calculating the rate of change by considering distributions. It is assumed that the asset inflow and outflow of funds occurred in the middle of the month.

$$Return\ of\ month\ t\ (\%) = \frac{NAV_{(t)} - NAV_{(t-1)} - Asset\ flow_{(t)}}{NAV_{(t-1)} + \frac{Asset\ flow_{(t)}}{2}} * 100 \quad \cdot\cdot\cdot (2.1)$$

$NAV_{(t)}$: NAV of month t, $NAV_{(t-1)}$: NAV of the month preceding month t,

Asset $flow_{(t)}$: Asset flow of month t

Looking at the calculated returns of figure 6 compared with the changes in the asset flows of figure 5, we can see that at the end of November 2019, the asset flow of "Japanese stock" was negative

at US$3.0 billion, while the return was positive at 2.6%. Such a negative-positive or positive-negative relation between the asset flow and the return is found in 8 out of 12 months. This suggests that investors are taking a contradictory investment stance of selling when the price rises due to favorable market conditions or buying when the price falls due to bad market conditions for the capital gain.

On the contrary, "Mixed" had 7 out of 12 months where there was a positive correlation between the asset flow and the return, which suggests that investors are taking a market-following investment stance of buying in anticipation of a further increase in the NAV when the return is positive. Therefore, investors may tend to take a different investment stance depending on the types of fund. So, time-series analysis was performed to elucidate the relationship between the asset flow and returns of open-end funds. The analysis method was applied to funds overall and by category.

3. Regression analysis by Nikko Category

To analyze the relationship between asset flow and return of open-end funds, the NAV of an open-end fund is broken down into NAVPS and the unit number, regression analysis is performed by using the percentage changes in NAVPS and the changing rates of the unit number, and how the percentage changes in NAVPS and the changing rates of the unit number affect each other is examined.

First, the unit number of month t is calculated as Net asset value$_{(t)}$ divided by NAVPS$_{(t)}$.

$$unit\ number\ of\ month\ t = \frac{Net\ asset\ value_{(t)}}{Net\ asset\ value\ per\ share_{(t)}}$$

Net asset value$_{(t)}$: Net asset value of month t, Net asset value per share$_{(t)}$: Net asset value per share of month t

In this paper, the NAV for the whole or each category is not the NAV of the individual fund, but is instead the estimated value calculated by the (2.1) formula, with the end of December 2005 being 10,000 using the return of the following formula as the price for t month.

$$Net\ asset\ value\ per\ share\ of\ month\ t$$
$$= Net\ asset\ value\ per\ share\ of\ month\ _{(t-1)} * \ (1 + return\ of\ month\ t)$$
$$(t-1): the\ month\ preceding\ month\ t, \qquad return\ of\ month\ t: expressed\ as\ a\ rate$$

It is possible to verify the relationship by performing analysis using the Autocorrelation Distributed Log (ADL) model with the two variables of the percentage changes in NAVPS and the changing rates of the unit number by calculating these formulas of NAVPS and the unit number.

In other words, it is possible to confirm whether there are categories that are often bought or sold when NAVPS are rising or falling by statistical criteria.

The calculation of the ADL model's formulas are as follows.

Changing rate of the unit number $_{(t)}$=$\alpha_1+\beta_1\times$Changing rate of the unit number $_{(t-1)}+\beta_2\times$Percentage change in NAVPS $_{(t)}$ $+\beta_3\times$Percentage change in NAVPS $_{(t-1)}$

Percentage change in NAVPS $_{(t)}$=$\alpha_2+\beta_4\times$Percentage change in NAVPS $_{(t-1)}$ $+\beta_5\times$Changing rate of the unit number $_{(t)}+\beta_6\times$Changing rate of the unit number $_{(t-1)}$

β means Multiple regression coefficient, α means Intercept

Figure 7 shows the fundamental statistics of NAV and the unit number, and the results of the ADL model analysis for Japan's total open-end funds. First, when the changing rate of the unit number (t) is an explained variable, and a part of the explanatory variables, the p-value[3] of the percentage change in NAVPS (t-1) is small, with a coefficient[4] of 0.03, which represents a slight positive incline. The result of this is that the percentage change in NAVPS (t-1) is positive or negative, and the changing rate of the unit number (t) tends to be slightly positive or negative, respectively.

And of the explanatory variables, the p-value of the percentage change in NAVPS (t) is small, and the coefficient is −0.03, which represents a slight negative incline. The result of this is that the percentage change in NAVPS (t) is positive or negative, and the changing rate of the unit number tends to be slightly negative or positive, respectively.

In short, looking at the monthly data, when the percentage change in NAVPS of total open-end funds rises or falls for the previous month, the changing rate of the unit number tends to slightly increase or decrease, respectively, for the current month, but when NAVPS of open-end funds rises or falls for the current month, the changing rate of the unit number tends to slightly decrease or increase, respectively, for the same month.

[3] Value of Pr (>|t|) in figure 7. This represents the probability of obtaining results at least as extreme as the observed results of a statistical hypothesis test. The t in Pr (>|t|) does not represent the time point t.

[4] Estimates of intercepts or regression coefficients calculated from the given data. Represents how much the explained variable changes by increasing the variable by 1 when the values of other variables are constant.

Figure 7 : Fundamental statistics of Japan's total open-end funds and the results of the ADL model analysis

Fundamental statistics

NAVPS		Unit number	
Mean	−0.003	Mean	0.008
Sample Variance	0.001	Sample Variance	0.000
Minimum	−0.193	Minimum	−0.015
Maximum	0.074	Maximum	0.037
Count	178	Count	178

Changing rate of the unit number (t)=α1＋β1×Changing rate of the unit number (t−1)＋β2×Percentage change in NAVPS (t)＋β3×Percentage change in NAVPS (t−1)

Adjusted R^2=0.59

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	0.00	0.00	3.04	0.003	**
Changing rate of the unit number (t-1)	0.75	0.05	15.93	< 2e−16	***
Percentage change in NAVPS (t)	−0.03	0.01	−2.56	0.011	*
Percentage change in NAVPS (t-1)	0.03	0.01	2.96	0.004	**

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Statistical analyses performed using R

Percentage change in NAVPS (t)=α2＋β4×Percentage change in NAVPS (t−1)＋β5×Changing rate of the unit number (t)＋β6×Changing rate of the unit number (t−1)

Adjusted R^2=0.03

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	−0.00	0.00	−0.45	0.653	
Percentage change in NAVPS (t-1)	0.15	0.08	2.03	0.044	*
Changing rate of the unit number (t)	−1.22	0.48	−2.56	0.011	*
Changing rate of the unit number (t-1)	1.02	0.47	2.18	0.031	*

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Statistical analyses performed using R

Source : Created by Nikko Research Center based on data from the Investment Trusts Association, Japan

In terms of the background of this trend, the Japanese market has not had a long-term up-trend like the United States, and is characterized by many investors who operate in a contrarian stance when the return becomes positive, and who sell before it becomes negative; and when the return is negative, they buy it before it becomes positive.

In contrast, when the percentage change in NAVPS (t) is an explained variable, and a part of the explanatory valuables, the p-value of the changing rate of the unit number (t-1) is small, with a coefficient of 1.02, which represents a positive incline. The result of this is that the changing rate of the unit number (t) is an explanatory variable, the p-value is also small and the coefficient is —1.22, which represents a negative incline, but the adjusted R-square is low at 0.03, indicating that the explanatory power of the changing rates of the unit number on the percentage changes in NAVPS is low. In short, the movements of the percentage changes in NAVPS are difficult to explain by the changing rates of the unit number and the percentage changes in NAVPS in the past.

Although total open-end funds are investing in various types of funds, such as those aiming for capital gains and those aiming for income gains, the analysis results of the ADL model produced an

interpretable result when the changing rate of the unit number (t) is an explained variable, so I propose we use the same method to verify the results by Nikko Category, and explain the results focusing on the Nikko Category, which showed significant outcomes.

Figure 8 shows the fundamental statistics of NAV and the unit number, and the results of the ADL model analysis for "Japanese stock". First, when the changing rate of the unit number (t) is a explained variable, and a part of the explanatory variables, the p-value of the percentage change in NAVPS (t-1) is small, with a coefficient of −0.15, which represents a slight negative incline. The result of this is that the percentage change in NAVPS (t) is positive or negative, and the changing rate of the unit number (t) tends to be slightly negative or positive, respectively.

Figure 8 : Fundamental statistics of Japan's total open-end funds and the results of the ADL model analysis

Fundamental statistics

NAVPS		Unit number	
Mean	0.001	Mean	−0.001
Sample Variance	0.003	Sample Variance	0.000
Minimum	−0.209	Minimum	−0.082
Maximum	0.134	Maximum	0.067
Count	178	Count	178

Changing rate of the unit number (t)=α1＋β1×Changing rate of the unit number (t−1)＋β2×Percentage change in NAVPS (t)＋β3×Percentage change in NAVPS (t−1)

Adjusted R^2=0.35

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	−0.00	0.00	−0.40	0.691	
Changing rate of the unit number (t-1)	0.48	0.07	7.33	8.64E−12	***
Percentage change in NAVPS (t)	−0.15	0.02	−6.46	1.05E−09	***
Percentage change in NAVPS (t-1)	0.04	0.02	1.66	0.100	.

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Statistical analyses performed using R

Percentage change in NAVPS (t)=α2＋β4×Percentage change in NAVPS (t−1)＋β5×Changing rate of the unit number (t)＋β6×Changing rate of the unit number (t−1)

Adjusted R^2=0.20

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	0.00	0.00	0.08	0.938	
Percentage change in NAVPS (t-1)	0.19	0.07	2.54	0.012	*
Changing rate of the unit number (t)	−1.32	0.20	−6.46	1.05E−09	***
Changing rate of the unit number (t-1)	0.67	0.22	3.09	0.002	**

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Statistical analyses performed using R

Source : Created by Nikko Research Center based on data from the Investment Trusts Association, Japan

In short, looking at monthly data, when NAVPS of "Japanese stock" rises or falls for the current month, it is likely that the unit number slightly decreases or increases, respectively, for the same month, due to contrarian selling or buying, so "Japanese stock" tends to be traded by observing

short-term price movements.

Figure 9 shows the fundamental statistics of NAV and the unit number, and the results of the ADL model analysis for "Global stock (non-hedge)". First, when the changing rate of the unit number (t) is an explained variable, and a part of the explanatory variables, the p-value of the percentage change in NAVPS (t-1) is small, with a coefficient of 0.04, which represents a slight positive incline. The result of this is that the percentage change in NAVPS (t-1) is positive or negative, and the changing rate of the unit number (t) tends to be slightly positive or negative, respectively.

Figure 9 : Fundamental statistics of "Global stock (non-hedge)" and the results of the ADL model analysis

Fundamental statistics

NAVPS		Unit number	
Mean	0.000	Mean	0.013
Sample Variance	0.003	Sample Variance	0.001
Minimum	−0.262	Minimum	−0.026
Maximum	0.128	Maximum	0.132
Count	178	Count	178

Changing rate of the unit number (t)=α1＋β1×Changing rate of the unit number (t−1)＋β2×Percentage change in NAVPS (t)＋β3×Percentage change in NAVPS (t−1)

Adjusted R^2=0.69

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	0.00	0.00	1.86	0.065	.
Changing rate of the unit number (t-1)	0.81	0.04	19.66	<2e−16	***
Percentage change in NAVPS (t)	−0.02	0.02	−0.95	0.345	
Percentage change in NAVPS (t-1)	0.04	0.02	2.47	0.015	*

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
Statistical analyses performed using R

Percentage change in NAVPS (t)=α2＋β4×Percentage change in NAVPS (t−1)＋β5×Changing rate of the unit number (t)＋β6×Changing rate of the unit number (t−1)

Adjusted R^2=0.01

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	−0.00	0.00	−0.56	0.577	
Percentage change in NAVPS (t-1)	0.12	0.08	1.57	0.117	
Changing rate of the unit number (t)	−0.31	0.33	−0.95	0.345	
Changing rate of the unit number (t-1)	0.50	0.32	1.54	0.125	

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
Statistical analyses performed using R

Source : Created by Nikko Research Center based on data from the Investment Trusts Association, Japan

In short, looking at monthly data, when NAVPS of "Global stock (non-hedge)" rises or falls for the previous month, it is likely that the unit number slightly increases or decreases, respectively, for the current month, due to trend-followers' buying or selling. While the percentage change in NAVPS of "Japanese stock" for the current month tends to affect the unit number for the same month, for "Global stock (non-hedge)", the percentage change in NAVPS for the previous month tends to affect

the changing rate of the unit number for the current month. Therefore, "Global stock (non-hedge)" seems to be traded in a trend-following investment stance for a longer period than "Japanese stock".

However, unlike "Japanese stock", "Global bond" has a wide range of investment regions and investment themes, so there is a possibility that investment rotation is taking place within that wide range. Therefore, we must take this into consideration when judging the results of this regression analysis.

Figure 10 shows the fundamental statistics of NAV and the unit number, and the results of the ADL model analysis for "Mixed". First, when the changing rate of the unit number (t) is an explained variable, and a part of the explanatory variables, the p-value of the percentage change in NAVPS (t-1) is small, with a coefficient of 0.05, which represents a slight positive incline. The result of this is that the percentage change in NAVPS (t-1) is positive or negative, and the changing rate of the unit number (t) tends to be slightly positive or negative, respectively.

Figure 10 : Fundamental statistics of "Mixed" and the results of the ADL model analysis

Fundamental statistics

NAVPS		Unit number	
Mean	−0.002	Mean	0.010
Sample Variance	0.001	Sample Variance	0.001
Minimum	−0.189	Minimum	−0.024
Maximum	0.074	Maximum	0.112
Count	178	Count	178

Changing rate of the unit number (t)=α1+β1×Changing rate of the unit number (t−1)+β2×Percentage change in NAVPS (t)+β3×Percentage change in NAVPS (t−1)

Adjusted R^2=0.88

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	0.00	0.00	0.68	0.497	
Changing rate of the unit number (t-1)	0.90	0.03	35.49	<2e−16	***
Percentage change in NAVPS (t)	0.00	0.02	0.04	0.967	
Percentage change in NAVPS (t-1)	0.05	0.02	2.19	0.030	*

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Statistical analyses performed using R

Percentage change in NAVPS (t)=α2+β4×Percentage change in NAVPS (t−1)+β5×Changing rate of the unit number (t)+β6×Changing rate of the unit number (t−1)

Adjusted R^2=0.01

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	−0.00	0.00	−0.65	0.517	
Percentage change in NAVPS (t-1)	0.18	0.08	2.31	0.022	*
Changing rate of the unit number (t)	0.01	0.27	0.04	0.967	
Changing rate of the unit number (t-1)	−0.00	0.26	−0.01	0.989	

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Statistical analyses performed using R

Source : Created by Nikko Research Center based on data from the Investment Trusts Association, Japan

In short, looking at monthly data, when NAVPS of "Mixed" rises or falls for the previous month, it is likely that the unit number slightly increases or decreases, respectively, for the current month due to trend-followers' buying or selling. So, "Mixed" seems to be traded in a trend-following investment stance for a longer period than "Japanese stock" like "Global stock (non-hedge)".

However, unlike "Japanese stock", "Mixed" has a wide range of investment regions and investment themes as well as "Global bond", so there is a possibility that investment rotation is taking place within that wide range. Therefore, we must take this into consideration when judging the results of this regression analysis.

Figure 11 shows the fundamental statistics of NAV and the unit number, and the results of the ADL model analysis for "REIT". When the changing rate of the unit number (t) is an explained variable, and a part of the explanatory variables, the p-value of the percentage change in NAVPS (t) or in NAVPS (t-1) is large and fits poorly.

Figure 11 : Fundamental statistics of "REIT" and the results of the ADL model analysis

Fundamental statistics

NAVPS		Unit number	
Mean	−0.007	Mean	0.017
Sample Variance	0.003	Sample Variance	0.001
Minimum	−0.323	Minimum	−0.025
Maximum	0.168	Maximum	0.155
Count	178	Count	178

Changing rate of the unit number (t)= α1 + β1 × Changing rate of the unit number (t−1) + β2 × Percentage change in NAVPS (t) + β3 × Percentage change in NAVPS (t−1)

Adjusted R^2=0.69

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	0.00	0.00	2.32	0.022	*
Changing rate of the unit number (t-1)	0.81	0.04	18.85	<2e−16	***
Percentage change in NAVPS (t)	0.02	0.02	0.98	0.327	
Percentage change in NAVPS (t-1)	0.03	0.02	1.20	0.233	

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Statistical analyses performed using R

Percentage change in NAVPS (t)= α2 + β4 × Percentage change in NAVPS (t−1) + β5 × Changing rate of the unit number (t) + β6 × Changing rate of the unit number (t−1)

Adjusted R^2=0.04

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	−0.01	0.00	−2.14	0.034	*
Percentage change in NAVPS (t-1)	0.18	0.08	2.38	0.018	*
Changing rate of the unit number (t)	0.25	0.25	0.98	0.327	
Changing rate of the unit number (t-1)	0.00	0.25	0.01	0.996	

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Statistical analyses performed using R

Source : Created by Nikko Research Center based on data from the Investment Trusts Association, Japan

In short, looking at monthly data, when the previous or current month's percentage change in NAVPS of "REIT" rises or falls, it indicates that there is no tendency for an increase or decrease in the changing rates of the unit number for the current month. Therefore, it indicates that the changing rates of the unit number of "REIT" are not affected by the percentage changes in NAVPS, but by factors other than NAVPS, such as the dividend yield.

4. Conclusion

As a result of analyzing the ADL model for the total open-end funds, we have found that the current and previous month's percentage changes in NAV influences the increase and decrease in the changing rate of the unit number for the current month. According to Nikko Category, the relationship between the percentage changes in the NAV and the changing rate of the unit number is different for each category. Therefore, the results of analyzing the ADL model by Nikko Category indicates that while a category such as "Japanese stock" tends to be traded in a contrarian stance by observing short-term price fluctuations, a category such as "Global stock (non-hedge)" and "Mixed", price movements of which are favorable, is traded in a trend-following stance as capital is easily raised when NAVPS rises. From the results of this analysis, it is possible that investors' buying and selling stances differ depending on the category of funds. I will pay close attention to whether this trend will continue or whether the number of investors with a long-term trading stance will increase in "a flow from savings to investments".

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