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Article

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Transactions of the National Pension Service of Korea in the KOSPI200 futures market

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Abstract

It is known that the National Pension Service (NPS) of Korea contributes to the market stability because it tends to pursue the negative feedback trading strategy in the Korean stock market. While many studies deal with institutional investors' trading in the financial derivatives market, the NPS's trading in the derivatives market is rarely studied. Using the NPS's trading data for the period from January 2010 to March, 2020, the authors examine the transactions of the NPS in the KOSPI200 futures market. We find that the NPS's net investment flow (NIF) in KOSPI200 futures is negatively associated with the past returns of KOSPI200 futures and the KOSPI200 index. However, we also find that the NPS's NIF of KOSPI200 futures is positively associated with its NIF in KOSPI200 stocks. Along with the legal restriction on the NPS's trading in the derivatives market, the result suggests that the NPS uses KOSPI200 futures to deviate the problems related to non-synchronous trading in the spot market. To the best of our knowledge, this paper is the first study of the NPS's transactions of KOSPI200 futures. The paper suggests that the NPS does not trade KOSPI200 futures for hedging or arbitrage profit but for complementing its transactions in the spot market of KOSPI200 stocks.

Keywords Feedback trading, KOSPI200 futures, KOSPI200 index, Market stabilizer, National Pension Service

Paper type Research paper

1. Introduction

The National Pension Service (NPS) of Korea is considered as an institutional investor with the largest influence in the Korean stock market. It is known for pursuing the negative feedback trading strategy resulting in the increase of buying pressure when the stock prices decline. Prior studies explain that the NPS tends to play a role of a market stabilizer by providing liquidity and reducing volatility in the stock market.

Institutional investors including foreign institutions are involved in the derivatives market for various purposes, for instance, hedging, making arbitrage profits, speculative trading, etc. The NPS participates in the derivatives market too but academic studies of the NPS's trading of the derivatives market are seldom found.



This study examines the NPS's transactions in the KOSPI200 futures market. First, using the measure of net investment flow (NIF), we investigate whether the NPS shows the feedback trading behavior against the past returns of KOSPI200 futures, which are measured as the cumulative abnormal returns (CAR). We also investigate whether the relationship between the NPS's NIF and the CARs of KOSPI200 futures changes across the different lengths of the window for CAR. Finally, considering that the NPS is not allowed to trade derivatives for the speculative purpose in principle [1], we further examine whether the NPS's trading of KOSPI200 futures is to pursue a certain investment strategy in the futures market or is related to the NPS's transactions in the spot market.

Main empirical results are as follow. First, the NPS's NIF is negatively related to the CARs of KOSPI200 futures. Second, this relationship appears for the CARs of relatively short windows but disappears for the CARs of longer windows. Third, the NPS's purchase of KOSPI200 futures is positively associated with the NPS's purchase of KOSPI200 stocks. It suggests that the NPS, which tends to pursue the negative feedback trading in the spot market, may trade in the same direction in the futures market to avoid the problems associated with the non-synchronous trading in the stock market. Thus, in addition to the restrictions on the NPS's derivatives trading, the empirical results of this study in overall suggest that the NPS uses KOSPI200 futures for the complementary trading purpose rather than for hedging or making arbitrage profits.

Prior studies of the NPS's involvement in the financial market mostly deal with the transactions in the spot market. This paper, to the best of the authors' knowledge, is the first study that examines the NPS's trading of KOSPI200 futures. It contributes to the literature of large institutional investors' roles in the Korean stock market by adding evidence of the NPS's trading behavior in the Korean index futures market. It is notable that the NPS trades KOSPI200 futures not for an investment strategy with the speculative purpose but for an alternative to complement its trading in the spot market. The remaining parts of this paper are as follow. In Section 2, prior studies are documented, in Section 3, data and methodology are described, in Section 4, empirical results are shown, and in Section 5 the summary of this paper is presented.

2. Literature

Investors participate in the futures market for several purposes.

A feedback trading behavior tends to appear when investors trade for the speculative purpose. [Kurov \(2008\)](#) suggests that traders of the index futures are positive feedback traders, and their positive feedback trading tends to become strong during the period with bullish sentiment, while it tends to become weak during the period with bearish sentiment. Market makers and scalpers show the positive feedback trading behavior as they take small positions for a very short window and liquidate the positions ([Manaster and Mann, 1996](#)). According to [Irwin and Yoshimaru \(1999\)](#), transaction behavior similar to herding creates positive feedback trading in various markets of futures products such as currency, energy, food, metal, cattle and stock index listed in Chicago Mercantile Exchange (CME). [Antoniu and Koutmos \(2008\)](#) show that the participants in the markets of S&P500, Nikkei, DAX and CAC40 pursue the positive feedback trading strategy. They explain such strategy is caused by the inverse relationship between the autocorrelation in futures return and the volatility of the return. [Salm and Schuppli \(2010\)](#) show the positive feedback transactions exist in the futures market of 32 developed and emerging countries including the KOSPI200 futures market. They also show that there is a strong tendency of positive feedback trading at the time of market collapse such as a financial crisis. [Antoniu et al. \(2005\)](#), however, said that they did not find evidence of feedback trading after investigating the index futures markets

of six countries including Canada, Germany, France, Japan, UK and the USA. They said that a lack of positive feedback trading contributes to the stability of the spot market, which the underlying assets of the futures products are from.

Index futures products may be used for the hedging purpose. [Choi \(2013\)](#) examines the effect of KOSPI200 futures and options to suggest the best hedging method. When informed traders selling in the futures market to hedge their positions in the spot market, noise traders follow the informed traders reducing the market stability and increasing the volatility ([De Long et al., 1990](#)). Other investors might participate in the index futures market for arbitrage transactions. The spot market and the futures market of a stock index are connected to each other. The value of an index futures contract should reflect the information of the component stocks traded in the spot market. Furthermore index arbitrage strengthens the connection between the futures market and the spot market ([Oh, 2002](#)). [Kang \(2009\)](#) suggests that the stock index futures market, where the transactions costs are low and are not subject to the restriction on short sale, responds early to the news and then the spot market responds later. Thus, investors might use the futures market as an alternative for the spot market.

Among previous studies on the Korean index futures market, some focus on the performance across different investor types. According to [Yun and Lee \(2003\)](#), which examines KOSPI200 futures with the data of four years since the inception of the market, foreign investors take a lead in the market, and individual investors and institutional investors follow the foreign investors' transactions. [Kho and Kim \(2005\)](#), using the trading volume weighted average stock prices, compare the performance of investors who participates in the KOSPI200 futures market. They argue that foreign investors are not likely to show superior performance than domestic investors, based on the findings showing that the volume weighted average stock price is higher in the former group than in the latter investors group. [Kim and Ohk \(2015\)](#) suggest that foreign investors are informed investors and pursue the negative feedback trading strategy, while domestic institutional investors and individual investors are the positive feedback traders. [Lee \(2015\)](#), having investigated high frequency traders in the futures market, suggests that high frequency trade does not provide liquidity to the market, deteriorates the market quality and does not contribute to the price discovery function of the futures price. The paper also suggests that investment profit from trading index futures is minimal and only foreign investors achieve statistically significant profit. [Oh and Hahn \(2014\)](#) suggest the possibility of developing the investment strategy using KOSPI200 futures.

3. Data and methodology

3.1 Data

In this study, the NPS's trading of KOSPI200 stocks in the spot market and KOSPI200 futures are tracked through the transaction documents of Korea Exchange, as in [Woo and Kim \(2018\)](#). When a large amount of trading occurs for the shares issued by a listed firm, the changes in the ownership of the firm are disclosed through the Report of large ownership excluding 5% of the entire shares and/or the Report of the shares owned by board members or large shareholders with more than 10% of the entire shares. These reports let the NPS's transactions identified because they include the information of the stockholders, the timing of trade, the name of the stock, the price and the number of traded shares, etc. For instance, according to the Report of the shares owned by board members or large shareholders with more than 10% of the entire shares filed on the 21 of December, 2016, the NPS' ownership in Lottechilsung declined by 561 shares on the 4th of October and the selling price was 1,612,889 won per share. By searching for the matching transaction in the transaction

documents of Korea Exchange on the 29 of September, which is two operating days prior to the date of disclosure, we could specify the account for the NPS among those categorized for institutional investors. When there was no single transaction exactly matching to one in the disclosure report, two or more transactions are added until an exact match is found. In the case of Hanwha Teckwin stocks, for instance, the NPS' ownership in the firm increased by 6,580 shares on the 29 of September, 2016 and the buying price was 63,130 won per share. However, no transaction corresponding to both the number of the shares and the price reported was found in the transaction documents of Korea Exchange on the 27, which is the transaction date for the disclosure. Two candidates are found instead among the transactions by the accounts categorized as institutional investors. One of them showed a buy transaction of 3,860 shares and the other showed a buy transaction of 2,720 shares. By applying this process for 72,622 reports from year 2010 until 2016, we identified 3,920 accounts showing the matching transactions that are consistent with the reports of the NPS's ownership. These accounts are considered for the NPS's stock trading. Then based on the account data and the unique account number structure by each security firm, which differentiates the transactions in the spot market from those in the derivatives market, 785 derivatives trading accounts are identified as those for the same institutional investor. In this paper, we add up the amount of KOSPI200 futures which are traded through these derivatives trading accounts, assuming that all of the transactions by those accounts belong to the NPS.

Figure 1 shows the trends of the NPS's net purchase amount of KOSPI200 futures and the price of KOSPI200 futures for the period from January 2010 until March, 2020. It is interesting that the NPS shows a large amount of net sale in November, 2010, when the futures price continues to rise, and the NPS shows consecutive net sales in July, 2015, when the futures price dramatically falls. In October, 2019 the decline in the futures price and the net purchase of the NPS appear simultaneously. Although more analytical approach will be taken in the next section of this paper, a graphic description of the past trends seems to suggest that there is a certain relationship between the price of KOSPI200 futures and the NPS's net purchase of the KOSPI200 futures.

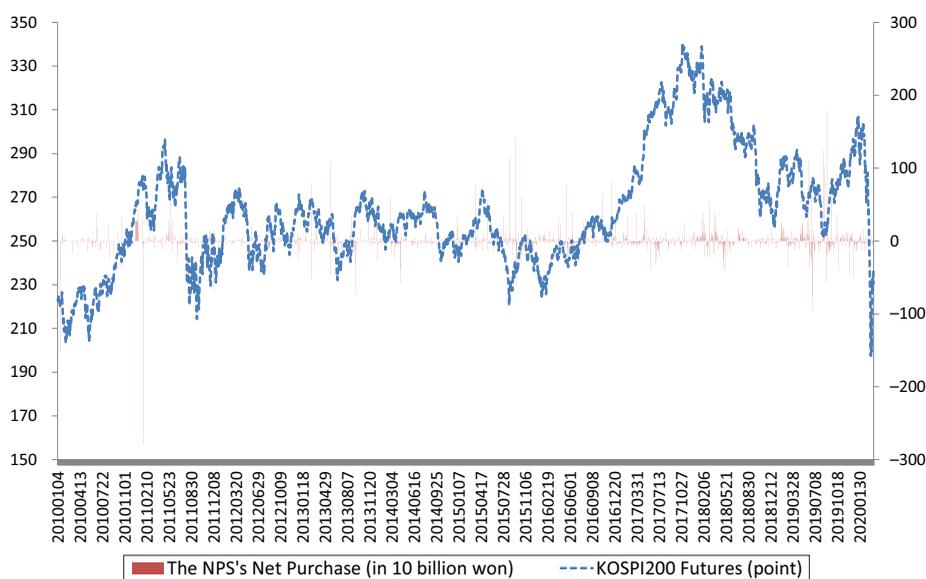


Figure 1.
NPS's net purchase of
KOSPI200 futures

Table 1 shows the descriptive statistics of the data. Panel A provides the statistics of the price and the daily returns for KOSPI200 (index) and KOSPI200 futures, respectively, for the period from January 2010 to March, 2020. The average price level of KOSPI200 and KOSPI200 futures are 263.78 and 263.33, respectively. Panel B provides the statistics of the contracts in the KOSPI200 futures market. The average number of contracts in the KOSPI200 futures market is 210,231 per day. The NPS purchases 105 contracts and sells 102 contracts per day, which is a negligible portion in the market. The average amount of the NPS's purchase is 9bn won, the average amount of the NPS's sale is 8.8bn won, and the average amount of the NPS's open interests is 2,063 contracts per day.

3.2 Methodology

This study investigates the NPS's transactions in the KOSPI200 futures market during the period of more than 10 years from January 2010 to March, 2020. The NIF of [Kamesaka et al. \(2013\)](#) is used to show the NPS's trading behavior in the KOSPI200 futures market. The NIF in the paper is calculated by dividing the net purchase amount with the sum of both purchase amount and sell amount. [Kho et al. \(2008\)](#) and [Woo and Kim \(2015\)](#) also use it in their studies of the stock market. [Schwarz \(2012\)](#) used a similar measure for the index futures market, using the number of contracts instead of the dollar amount. In our study, however, we use won amount so that we can control the effect of the change in the investment multiple in KOSPI200 futures from 500,000 won to 250,000 won, which occurred during the sample period. For the denominator of the NIF in our study, the NPS's transaction amount is used instead of the entire transaction amount in the market because the former shows the direction of NPS's position more clearly. The calculation of the NIF is as follows:

$$NIF_t = \frac{BuyWon_t - SellWon_t}{BuyWon_t + SellWon_t} \quad (1)$$

KOSPI200 (index) and KOSPI200 futures	Mean	SD	Max	Median	Min
<i>Panel A: Price and Daily Return</i>					
Price of KOSPI200 (index) (p)	263.78	26.26	339.90	260.20	197.50
Price of KOSPI200 futures (p)	263.33	26.20	338.83	259.74	199.28
Basis (p)	0.45	0.87	6.79	0.49	-4.23
Daily return of KOSPI200 (%)	0.01	1.06	9.15	0.03	-7.67
Daily return of KOSPI200 futures (%)	0.01	1.10	10.33	0.05	-7.49
<i>Panel B: Contracts of KOSPI200 futures</i>					
Entire contracts per day (in number of contracts)	210,231	102,821	888,863	185,919	29,248
NPS's buy contracts per day (in number of contracts)	105	204	3,305	31	0
NPS's sell contracts per day (in number of contracts)	102	181	2,805	35	0
NPS's net buy contracts per day (in number of contracts)	3	144	2,820	-1	-2,010
NPS's open interests (in number of contracts)	2,063	2,051	11,473	1,107	-1,449
NPS's buy contracts (in million won)	9,076	16,158	235,570	3,573	0
NPS's sell contracts (in million won)	8,879	14,554	282,465	3,935	0
NPS's net buy contracts (in million won)	196	13,227	179,492	-94	-279,683

Notes: This table provides the descriptive statistics of the data for the period from January 2010 until March 2020. Panel A shows the statistics of the price and the daily return of KOSPI200 (index) and KOSPI200 futures, respectively. Panel B shows the statistics of the contracts in the KOSPI200 futures market.

Table 1.
Descriptive statistics

In this paper, two kinds of NIFs are calculated. One is $FuturesNIF_t$ representing the NPS's NIF of KOSPI200 futures on day t . Here, $BuyWon_t$ and $SellWon_t$ are the amount of the NPS's buying and selling of KOSPI200 futures on day t , respectively. The other is $StockNIF_t$ representing the NPS's NIF of the KOSPI200 stocks on day t . Here, $BuyWon_t$ and $SellWon_t$ are the amount of the NPS's buying and selling amount of KOSPI200 stocks on day t , respectively.

To investigate the NPS's trading behavior in relation with the past returns of KOSPI200 futures, we use the regression models, where the NPS's NIF in the KOSPI200 futures is the dependent variable and the CARs of KOSPI200 futures or KOSPI200 (index) is the explanatory variable as in equations (2) and (4) [2]. Abnormal returns of KOSPI200 futures and KOSPI200 are calculated by subtracting the return of the KOSPI Market Index from the returns of KOSPI200 futures and KOSPI200, respectively. The regression models in equations (6) and (8) include $StockNIF_t$ as the explanatory variable, estimating the relationship between the NPS's trading of KOSPI200 futures and KOSPI200 stocks in the spot market. Each relationship represented by equations (2), (4), (6) and (8) is also estimated using the regression models of equations (3), (5), (7) and (9), respectively. These models include the price of KOSPI200 futures, the price of KOSPI200, and the liquidity and the volatility of KOSPI200 futures to control the effect of the market situation:

$$FuturesNIF_t = \alpha_0 + \beta_1 \times F_Car_{t-\tau,t-1} + \epsilon_t \quad (2)$$

$$FuturesNIF_t = \alpha_0 + \beta_1 \times F_Car_{t-\tau,t-1} + \beta_2 \times FutRet_t + \beta_3 \times FutPrice_t + \beta_4 \times \text{Ln}(TrdWon)_t + \beta_5 \times Volatility_t + \epsilon_t \quad (3)$$

$$FuturesNIF_t = \alpha_0 + \beta_1 \times I_Car_{t-\tau,t-1} + \epsilon_t \quad (4)$$

$$FuturesNIF_t = \alpha_0 + \beta_1 \times I_Car_{t-\tau,t-1} + \beta_2 \times IndexRet_t + \beta_3 \times IndexPrice_t + \beta_4 \times \text{Ln}(TrdWon)_t + \beta_5 \times Volatility_t + \epsilon_t \quad (5)$$

$$FuturesNIF_t = \alpha_0 + \beta_1 \times StockNIF + \beta_2 \times F_Car_{t-\tau,t-1} + \epsilon_t \quad (6)$$

$$FuturesNIF_t = \alpha_0 + \beta_1 \times StockNIF + \beta_2 \times F_Car_{t-\tau,t-1} + \beta_3 \times FutRet_t + \beta_4 \times FutPrice_t + \beta_5 \times \text{Ln}(TrdWon)_t + \beta_6 \times Volatility_t + \epsilon_t \quad (7)$$

$$FuturesNIF_t = \alpha_0 + \beta_1 \times StockNIF + \beta_2 \times I_Car_{t-\tau,t-1} + \epsilon_t \quad (8)$$

$$FuturesNIF_t = \alpha_0 + \beta_1 \times StockNIF + \beta_2 \times I_Car_{t-\tau,t-1} + \beta_3 \times FutRet_t + \beta_4 \times FutPrice_t + \beta_5 \times \text{Ln}(TrdWon)_t + \beta_6 \times Volatility_t + \epsilon_t \quad (9)$$

Here:

$F_CAR_{t-\tau,t-1}$ = CAR of KOSPI200 futures for the window from $t-\tau$ until $t-1$;

$I_CAR_{t-\tau,t-1}$ = CAR of KOSPI200 for the window from $t-\tau$ until $t-1$;

$FutRet_t$ = Return of KOSPI200 futures on day t ;
 $FutPrice_t$ = Price of KOSPI200 futures on day t ;
 $Ln(TrdWon)$ = Natural log of average trading amount of KOSPI200 futures on day t ; and
 $Volatility$ = Average volatility of KOSPI200 futures on day t .

4. Empirical results

Table 2 shows the correlation between the NPS's NIF, the CARs of KOSPI200 futures and the CARs of KOSPI200. CARs for the window of 3, 5 and 10 days are used for the short-term returns, CARs for the window of 15, 20 and 30 days are used for the medium-term returns, and CARs for the window of 60 and 90 days are used for the long-term returns. The longest window contains 90 days, which is the interval between the expiration dates of the index futures. The correlation coefficients between the NPS's NIF in KOSPI200 futures and the CARs of KOSPI200 futures are statistically negative for CAR ($t-3, t-1$), CAR ($t-5, t-1$), CAR ($t-10, t-1$), CAR ($t-15$) and CAR ($t-20, t-1$). The correlation coefficients between the NPS's NIF in KOSPI200 futures and the CARs of KOSPI200 are also statistically negative for the CARs with the same windows.

Table 3 shows the results from the regression analyses using the models that include the CARs of KOSPI200 futures as the explanatory variable.

Panel A in Table 3 shows that CARs for the windows of 3, 5 and 10 days, respectively, show negative and statistically significant regression coefficients. It means that the NPS's net purchase of KOSPI200 futures increases as the CAR of KOSPI200 futures decreases and vice-versa. The CARs for the medium term windows

Panel A.

Cumulative abnormal return (CAR) of KOSPI200 futures	Correlation coefficient	P-value
CAR [$t-3, t-1$]	-0.0958	<0.0001
CAR [$t-5, t-1$]	-0.0857	<0.0001
CAR [$t-10, t-1$]	-0.1023	<0.0001
CAR [$t-15, t-1$]	-0.0800	<0.0001
CAR [$t-20, t-1$]	-0.0497	0.0156
CAR [$t-30, t-1$]	-0.0308	0.1348
CAR [$t-60, t-1$]	-0.0275	0.1855
CAR [$t-90, t-1$]	-0.0105	0.6158

Panel B.

Cumulative abnormal return (CAR) of KOSPI200 (spot index)	Correlation coefficient	P-value
CAR [$t-3, t-1$]	-0.0867	<0.0001
CAR [$t-5, t-1$]	-0.0800	<0.0001
CAR [$t-10, t-1$]	-0.0948	<0.0001
CAR [$t-15, t-1$]	-0.0721	0.0004
CAR [$t-20, t-1$]	-0.0432	0.0357
CAR [$t-30, t-1$]	-0.0280	0.1752
CAR [$t-60, -1$]	-0.0239	0.2492
CAR [$t-90, t-1$]	-0.0089	0.6707

Table 2.
Correlations with the NPS's NIF in KOSPI200 futures

Notes: This table shows the correlations between NPS's net investment flow (NIF) and the Cumulative Abnormal Returns (CARs) of KOSPI200 futures or KOSPI200 (index), respectively, for the various windows. Panel A provides the correlations between the NPS's NIF and the CARs of KOSPI200 futures. Panel B provides the correlations between the NPS's NIF and the CARs of KOSPI200 (index)

Variable	Coefficient <i>t</i> -value							
<i>Panel A</i>								
F_CAR(t-3,-1)	-2.9532*** -4.61							
F_CAR(t-5,-1)		-1.9782*** -4.06						
F_CAR(t-10,-1)			-1.7761*** -4.90					
F_CAR(t-15,-1)				-1.1459*** -3.84				
F_CAR(t-20,-1)					-0.6053** -2.31			
F_CAR(t-30,-1)						-0.3325 -1.48		
F_CAR(t-60,-1)							-0.2480 -1.37	
F_CAR(t-90,-1)								-0.0766 -0.50
Adj R ²	0.0088	0.0067	0.0099	0.0060	0.0019	0.0005	0.0004	0.0003
<i>Panel B</i>								
F_CAR(t-3,-1)	-2.0909** -2.54							
F_CAR(t-5,-1)		-1.2303** -2.12						
F_CAR(t-10,-1)			-1.5084*** -3.55					
F_CAR(t-15,-1)				-0.9136*** -2.63				
F_CAR(t-20,-1)					-0.3102 -1.02			
F_CAR(t-30,-1)						-0.1075 -0.41		
F_CAR(t-60,-1)							-0.1417 -0.68	
F_CAR(t-90,-1)								0.0147 0.08
FutRet	-0.0174 -0.13	-0.0264** -2.20	-0.0271** -2.41	-0.0317*** -2.86	-0.0352*** -3.19	-0.0365*** -3.33	-0.0365*** -3.33	-0.0370*** -3.38
FutPrice	0.0013*** 2.64	0.0013*** 2.68	0.0015*** 2.96	0.0015*** 2.96	0.0014*** 2.72	0.0013*** 2.60	0.0014*** 2.66	0.0013** 2.37
Ln(TrdWon)	-0.0386 -1.22	-0.0359 -1.13	-0.0254 -0.79	-0.0285 -0.89	-0.0353 -1.10	-0.0383 -1.19	-0.0356 -1.09	-0.0413 -1.24
Volatility	4.3331** 2.26	4.1448** 2.10	2.4321 1.19	3.2234 1.57	4.6274** 2.24	5.1885** 2.52	5.0107** 2.48	5.6186*** 2.78
Adj R ²	0.0131	0.0122	0.0157	0.0133	0.0107	0.0104	0.0105	0.0103

Notes: This table shows the results of regressing NPS's net investment flow (NIF) in KOSPI200 futures against the cumulative abnormal returns (CARs) of KOSPI200 futures. Panel A shows the effect of only the CARs of KOSPI200 futures on NPS's NIF. Panel B estimates the relationship using the regression models that include the control variables representing the market situation; ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively

Table 3.
Effect of the past
returns of KOSPI200
futures

of 15 and 20 days are also statistically and negatively related to the NPS's NIF, suggesting that the NPS shows the negative feedback trading behavior. The coefficients of the CARs for longer-term windows of 60 and 90 days also show negative signs but are not statistically significant.

Panel B in [Table 3](#) shows the results from the regression model that include other variables such as the daily returns, the price, the natural log of the average trading volume and the average volatility of KOSPI200 futures for controlling the effect of the market situation on the dependent variable.

In the models that include the CARs of short-term or medium-term windows, the relationship between the NPS's NIF in KOSPI200 futures and the CARs remains the same as in Panel A. However, for the regression models with the CARs of long-term windows, the CARs of the KOSPI200 futures are not statistically significant. Instead the volatility of KOSPI200 futures on day t shows the significantly positive coefficient. In all models of Panel B, the daily return of KOSPI200 futures has the negative coefficient, while the price of KOSPI200 futures has the positively coefficient. Results from [Table 3](#) suggests that the NPS's trading of KOSPI200 futures is likely to be involved with the negative feedback trading against the past returns of KOSPI200 futures. Further discussion on this finding will be given with additional regression analyses.

[Table 4](#) shows the result of the regression analysis using a model to estimate the effect of the CARs of KOSPI200 on the NPS's NIF in KOSPI200 futures.

Panel A shows that the NPS's net purchase of KOSPI200 futures increases as the CAR of KOSPI200 for the windows of 3, 5 or 10 days increases and vice-versa. Similar to the results from [Table 3](#), the CARs of KOSPI200 for the medium-term windows of 15 or 20 days are also statistically and negatively related to the NPS's NIF in the KOSPI200 futures market. The coefficients of the CARs for longer-term windows of 60 or 90 days also show negative signs but are not statistically significant.

Panel B shows the results from the regression model that control variables are added to. The daily return, the price, the market liquidity and the volatility of KOSPI200 futures are included in the regression model to control the effect of the market situation on the transaction day. The CARs for the short-term or medium-term windows have statistically significant coefficients and the significance of the coefficients of the control variables are also similar to the results from Panel B of [Table 3](#).

NIS's NIF in KOSPI200 futures shows the negative relation with the past returns of the KOSPI200 spot index as it does with the past returns of KOSPI200 futures, which might suggest the negative feedback trading behavior. However, the NPS is not allowed to trade the derivatives for speculative purpose, in principle. Thus, the NPS's trading in the futures market might be associated with its activities in the spot market. Furthermore, the descriptive statistics of [Table 1](#) shows that the NPS's average daily net investment in the market is only 0.2bn won, which is considered very small for the consequence of the speculative investment decision by a large institutional investor. The regression models of [equations \(6\)–\(9\)](#) of Section 3 estimate the relationship between the NPS's NIF in KOSPI200 futures and its NIF in KOSPI200 stocks in the spot market.

[Table 5](#) shows whether the NPS trades KOSPI200 futures pursuing the negative feedback trading strategy in the futures market as the results of [Table 3](#) suggests or the NPS's trading of KOSPI200 futures is involved with its investment strategy in the spot market of KOSPI200 stocks. If the NPS's net purchase of KOSPI200 futures and its net purchase of KOSPI200 stocks move in the opposite direction, it can be interpreted that the NPS trades KOSPI200 futures for hedging or arbitrage profit purpose. On the contrary, if the NPS's net purchases in those markets move in the same direction, it suggests that the NPS trades in the futures market to avoid the problems caused by non-synchronous trading in the spot market. In addition to the CARs of KOSPI200 futures, the NPS's NIF in KOSPI200 stocks is included in the regression models of [Table 5](#) to estimate its relationship with the

Variable	Coefficient <i>t</i> -value							
<i>Panel A</i>								
I_CAR(t-3,-1)	-2.7082*** -4.18							
I_CAR(t-5,-1)		-1.8830*** -3.79						
I_CAR(t-10,-1)			-1.6803*** -4.53					
I_CAR(t-15,-1)				-1.0563*** -3.45				
I_CAR(t-20,-1)					-0.5371** -2.00			
I_CAR(t-30,-1)						-0.3090 -1.35		
I_CAR(t-60,-1)							-0.2204 -1.19	
I_CAR(t-90,-1)								-0.0660 -0.43
Adj R ²	0.0071	0.0058	0.0084	0.0047	0.0013	0.0004	0.0002	0.0004
<i>Panel B</i>								
I_CAR(t-3,-1)	-1.7763** -2.12							
I_CAR(t-5,-1)		-1.1308** -1.91						
I_CAR(t-10,-1)			-1.3881*** -3.19					
I_CAR(t-15,-1)				-0.7975** -2.24				
I_CAR(t-20,-1)					-0.2220 -0.71			
I_CAR(t-30,-1)						-0.0821 -0.31		
I_CAR(t-60,-1)							-0.1131 -0.54	
I_CAR(t-90,-1)								0.0173 0.10
FutRet	-0.0189 -1.35	-0.0262** -2.08	-0.0271** -2.30	-0.0316*** -2.72	-0.0349*** -3.02	-0.0358*** -3.11	-0.0358*** -3.12	-0.0362*** -3.15
FutPrice	0.0014*** 2.74	0.0014*** 2.79	0.0015*** 3.02	0.0015*** 3.00	0.0014*** 2.77	0.0014*** 2.69	0.0014*** 2.73	0.0013** 2.47
Ln(TrdWon)	-0.0366 -1.15	-0.0343 -1.07	-0.0255 -0.80	-0.0288 -0.90	-0.0351 -1.09	-0.0370 -1.14	-0.0347 -1.06	-0.0395 -1.19
Volatility	4.4872*** 2.34	4.2471** 2.15	2.7149 1.32	3.5278 1.71	4.8624** 2.35	5.2388** 2.55	5.0805** 2.51	5.5875*** 2.76
Adj R ²	0.0119	0.0115	0.0143	0.0121	0.0101	0.0099	0.0100	0.0101

Notes: This table shows the results of regressing NPS's net investment flow (NIF) in KOSPI200 futures against the cumulative abnormal returns (CARs) of KOSPI200 (index). Panel A shows the effect of only the CARs of KOSPI200 on the NPS's NIF. Panel B estimates the relationship using the regression models that include the control variables representing the market situation; ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively

Table 4.
Effect of the past
returns of KOSPI200
(index)

NPS's NIF in KOSPI200 futures. The CARs for the windows of 60 or 90 days, which did not have significant coefficients, are excluded from the regression models.

According to Panel A, the NPS's NIF in KOSPI200 futures increases as the NPS's NIF in KOSPI200 stocks in the spot market increases. The relationship between the NPS's NIF in

Variable	Coefficient <i>t</i> -value					
<i>Panel A</i>						
Stock NIF	0.2880*** 3.44	0.2819*** 3.36	0.2764*** 3.31	0.2690*** 3.23	0.2577*** 3.07	0.2559*** 3.05
F_CAR(<i>t</i> -3,-1)	-4.0938*** -5.25					
F_CAR(<i>t</i> -5,-1)		-2.9626*** -4.91				
F_CAR(<i>t</i> -10,-1)			-2.5568*** -5.69			
F_CAR(<i>t</i> -15,-1)				-1.6637*** -4.59		
F_CAR(<i>t</i> -20,-1)					-0.9684** -3.02	
F_CAR(<i>t</i> -30,-1)						-0.5920** -2.20
Adj <i>R</i> ²	0.0167	0.0151	0.0190	0.0136	0.0079	0.0058
<i>Panel B</i>						
Stock NIF	0.0088* 1.79	0.0025* 1.65	0.0015 1.50	0.0048 1.05	0.0092 1.10	0.0073 1.08
F_CAR(<i>t</i> -3,-1)	-2.7519*** -2.84					
F_CAR(<i>t</i> -5,-1)		-1.8234*** -2.65				
F_CAR(<i>t</i> -10,-1)			-1.8640*** -3.83			
F_CAR(<i>t</i> -15,-1)				-1.1149*** -2.83		
F_CAR(<i>t</i> -20,-1)					-0.4503 -1.31	
F_CAR(<i>t</i> -30,-1)						-0.1546 -0.54
FutRet	-0.0200 -1.27	-0.0296** -2.06	-0.0321** -2.37	-0.0380*** -2.85	-0.0422*** -3.18	-0.0440*** -3.33
FutPrice	0.0010** 2.16	0.0011** 2.18	0.0011** 2.24	0.0011** 2.31	0.0011** 2.27	0.0011** 2.21
Ln(TrdWon)	-0.0137*** -3.08	-0.0137*** -3.08	-0.0136*** -3.07	-0.0142*** -3.19	-0.0144*** -3.24	-0.0144*** -3.24
Volatility	4.9776** 2.18	4.7210** 2.04	3.9074 1.69	4.5365* 1.95	5.5379** 2.37	6.0871*** 2.61
Adj <i>R</i> ²	0.0371	0.0366	0.0402	0.0371	0.0341	0.0335

Table 5.
Effect of the NPS's
NIF in KOSPI200
stocks and the past
returns of KOSPI200
futures

Notes: This table shows the results of regressing the NPS's net investment flow (NIF) in KOSPI200 futures against the NPS's NIF in KOSPI200 stocks in the spot market. Panel A shows the effect of only the NPS's NIF in KOSPI200 stocks in the spot market and the cumulative abnormal returns of KOSPI200 futures. Panel B estimates the relationship using the regression models that include the control variables representing the market situation; ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively

KOSPI200 futures and the CARs of KOSPI200 futures remains negative as in the result from Table 3. The relationship remains statistically significant across the CARs for different length of windows.

Panel B shows the results of estimating the relationship between the NPS's NIF in KOSPI200 futures and that in KOSPI200 stocks. The regression models in Panel B include

the control variables such as the daily return, the price, the trading volume and the market volatility of KOSPI200 futures. The estimation results are similar to those in Panel A. The NPS's NIF in KOSPI200 futures is significantly and positively related to the NPS's NIF in KOPI200 stocks in the spot market.

The positive relationship between the NPS's NIF in the futures market and that in the spot market suggest that the NPS trades KOSPI200 futures for the complementary purpose to avoid the problems involved with the non-synchronous trading in the spot market. In addition, the daily trading volume of the NPS in the KOSPI Market is 400bn won in average and occupies about 8% of the market. Compared to this, the NPS's average daily purchase of 9bn won in the KOSPI200 futures market seems far short for hedging the NPS's position in the spot market or being the result from the NPS's arbitrage trades.

Table 6 shows the relationship between the NPS's NIF in KOSPI200 futures and that in KOSPI200 stocks in the spot market.

According to Panel A, the NPS's NIF in KOSPI200 futures increases as the NPS's NIF in KOSPI200 stocks increases while the NPS's NIF in KOSPI200 futures decreases as the CARs of KOSPI200 (index) increases. The relationship remains statistically significant across different length of windows of CAR.

Panel B shows the result from the regression model including the same control variables used in Table 5. The CARs of relatively short-term window such as 3, 5, 10 and 15 days have statistically significant negative coefficients. From the estimation using the regression models with the CARs of three-day window and five-day window, the NPS's NIF in KOSPI200 stocks in the spot market is significantly and positively related to the NPS's NIF in KOSPI200 futures.

The results of Table 6 suggest that the NPS trades KOSPI200 futures not to follow the negative feedback trading strategy in the futures market but to complement its transactions in the spot market of KOSPI200 stocks.

5. Summary

The NPS manages the 3rd largest pension fund in the world and the largest institutional investor in the Korean stock market. It is known that the NPS contributes to stabilizing the market because it tends to pursue the negative feedback strategy by increasing its purchase of stocks as the prices go down and increasing its sale of stocks as the prices go up. Large institutional investors trade derivatives for different purposes. They may participate in the derivatives market for hedging or arbitrage profits in connection with their positions in the stock market. Or they may trade derivatives for the speculative purpose. Because of the lack of data, the NPS's activities in the KOSPI200 futures market have not been examined. Using the data from January 2010 to March, 2020, we analyzed the NPS's transactions in the KOIPI200 futures market. The analysis of only the futures transactions implies the negative feedback trading behavior of the NPS against the past returns of KOIPI200 futures or those of the KOSPI200 spot index. However, the results from the analysis examining the relation between the NPS's transactions in the KOSPI200 futures market and those in the spot market of KOSPI200 stocks suggest that the NPS trades KOSPI200 futures to complement its trading of KOSPI200 stocks in the spot market. This suggestion is also supported by following information. First, the NPS's trading of derivatives is restricted for the speculative purpose. Second, the NPS's average daily trading volume of KOSPI200 futures, which is 9bn won per day, is far smaller than that in the KOSPI spot market, which is 400bn won per day. Thus, the NPS's main purpose of trading KOSPI200 futures is not likely to be hedging or arbitrage transactions. Third,

Variables	Coefficient <i>t</i> -value					
<i>Panel A</i>						
Stock NIF	0.2707*** 3.24	0.2663*** 3.21	0.2602*** 3.19	0.2640*** 3.17	0.2548*** 3.04	0.2548*** 3.03
I_CAR(t-3,-1)	-2.4708*** -5.34					
I_CAR(t-5,-1)		-2.1080*** -5.04				
I_CAR(t-10,-1)			-1.6982*** -4.86			
I_CAR(t-15,-1)				-1.5701*** -4.22		
I_CAR(t-20,-1)					-0.8905*** -2.71	
I_CAR(t-30,-1)						-0.5625** -2.04
Adj <i>R</i> -Sq	0.0172	0.0070	0.0112	0.0120	0.0078	0.0055
<i>Panel B</i>						
Stock NIF	0.0049* 1.75	0.0043* 1.65	0.0041 1.64	0.0032 1.49	0.0029 1.10	0.0027 1.08
I_CAR(t-3,-1)	-2.3040** -2.40					
I_CAR(t-5,-1)		-1.7246** -2.46				
I_CAR(t-10,-1)			-1.7552*** -3.51			
I_CAR(t-15,-1)				-0.9991** -2.47		
I_CAR(t-20,-1)					-0.3628 -1.03	
I_CAR(t-30,-1)						-0.1188 -0.40
FutRet	-0.0255* -1.66	-0.0315** -2.23	-0.0339** -2.52	-0.0392*** -2.95	-0.0429*** -3.23	-0.0442*** -3.35
FutPrice	0.0010** 2.16	0.0011** 2.18	0.0011** 2.25	0.0011** 2.30	0.0011** 2.25	0.0011** 2.20
Ln(TrdWon)	-0.0138*** -3.11	-0.0138*** -3.10	-0.0137*** -3.09	-0.0142*** -3.21	-0.0144*** -3.24	-0.0144*** -3.24
Volatility	5.1911** 2.27	4.8298** 2.08	4.0731* 1.76	4.7429** 2.04	5.7198** 2.45	6.1770*** 2.65
Adj <i>R</i> ²	0.0361	0.0362	0.0391	0.0362	0.0338	0.0334

Table 6.

Effect of the NPS's NIF in KOSPI200 stocks and the past returns of KOSPI200 (index)

Notes: This table shows the results of regressing the NPS's net investment flow (NIF) in KOSPI200 futures against the NPS's NIF in KOSPI200 stocks in the spot market. Panel A shows the effect of only the NPS's NIF in KOSPI200 stocks in the spot market and the cumulative abnormal returns of KOSPI200 (index). Panel B estimates the relationship using the regression models that include the control variables representing the market situation; ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively

non-synchronous trading effect, which might occur owing to the insufficient liquidity, etc., may hinder the NPS's timely trading in the spot market. In such occasions, the NPS can trade KOSPI200 futures instead. This paper is one of the first studies about the NPS's transactions in the futures market, which have been rarely known. We provide the evidence

that the NPS trades in the KOSPI200 futures market for complementing its transactions in the spot market rather than for hedging or arbitrage transactions. The result also implies that the NPS uses KOSPI200 futures as a tool for its role as the market stabilizer.

Notes

1. We thank the anonymous reviewer for this comment. Under its investment policy, the National Pension Service (NPS) of Korea is not allowed to trade derivatives for the speculative purpose, in principle. Thus, most derivatives trading by the NPS is for hedging, arbitrage profits, asset rebalancing, or managing portfolio volatility.
2. We thank the anonymous reviewer for the valuable comments about the regression models.

References

- Antoniou, A. and Koutmos, G. (2008), "Momentum trading: evidence from futures markets", Working paper, University of Durham, Durham, 7 August.
- Antoniou, A., Koutmos, G. and Pericli, A. (2005), "Index futures and positive feedback trading: evidence from major stock exchanges", *Journal of Empirical Finance*, Vol. 12 No. 2, pp. 219-238.
- Choi, B. (2013), "Hedging effectiveness of KOSPI200 futures and options", *Journal of Derivatives and Quantitative Studies*, Vol. 21 No. 3, pp. 275-305.
- De Long, B.J., Shleifer, A., Summers, L.H. and Waldman, R.J. (1990), "Positive feedback investment strategies and destabilizing rational speculation", *The Journal of Finance*, Vol. 45 No. 2, pp. 379-395.
- Irwin, S.H. and Yoshimaru, S. (1999), "Managed futures, positive feedback trading, and futures price volatility", *Journal of Futures Markets*, Vol. 19 No. 7, pp. 759-776.
- Kamesaka, A., Nofsinger, J.R. and Kawakita, H. (2013), "Investment patterns and performance of investor groups in Japan", *Pacific-Basin Finance Journal*, Vol. 11 No. 1, pp. 1-22.
- Kang, S. (2009), "A study on the price discovery in Korea stock index markets: KODEX200, KOSPI200, and KOSPI200 futures", *Journal of Derivatives and Quantitative Studies*, Vol. 17 No. 3, pp. 67-97.
- Kho, B. and Kim, J. (2005), "Trading performance of domestic and foreign investors in KOSPI200 index futures markets", *Journal of Derivatives and Quantitative Studies*, Vol. 13 No. 1, pp. 1-27.
- Kho, B., Lee, B., Lee, W. and Hwang, L. (2008), "Does national pension services trading destabilize Korean stock market?", *Korean Journal of Financial Studies*, Vol. 37 No. 3, pp. 465-500.
- Kim, T. and Ohk, K. (2015), "Private information and trading behavior: KOSPI200 futures markets", *Journal of Derivatives and Quantitative Studies*, Vol. 23 No. 2, pp. 207-241.
- Kurov, A. (2008), "Investor sentiment, trading behavior and informational efficiency in index futures markets", *The Financial Review*, Vol. 43 No. 1, pp. 107-127.
- Lee, E. (2015), "High frequency trading in the Korean index futures market", *Journal of Future Markets*, Vol. 35 No. 1, pp. 31-51.
- Manaster, S. and Mann, S.C. (1996), "Life in the pits: competitive market making and inventory control", *Review of Financial Studies*, Vol. 9 No. 3, pp. 953-975.
- Oh, S. (2002), "Intraday volatility in the Korean stock index and Korean stock index futures markets", *Journal of Derivatives and Quantitative Studies*, Vol. 10 No. 1, pp. 55-80.
- Oh, S. and Hahn, S. (2014), "Trading strategy for stock index futures based on disposition effect", *Journal of Derivatives and Quantitative Studies*, Vol. 22 No. 1, pp. 25-44.
- Salm, C.A. and Schuppli, M. (2010), "Positive feedback trading in stock index futures: international evidence", *International Review of Financial Analysis*, Vol. 19 No. 5, pp. 313-322.

- Schwarz, K. (2012), "Are speculators informed?", *Journal of Futures Markets*, Vol. 32 No. 1, pp. 1-23.
- Woo, M. and Kim, M. (2015), "Trading pattern of institutional investors in Korean stock market: analysis by institution type", *Journal of Industrial Economics and Business*, Vol. 28 No. 3, pp. 1109-1134.
- Yun, C. and Lee, S. (2003), "The impact of trading volumes by trader types in the KOSPI200 futures market", *Journal of Derivatives and Quantitative Studies*, Vol. 11 No. 2, pp. 1-26.

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