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✉Corresponding Author:
Irwan Adi Ekaputra:
Tel +62 21 7272 646
E-mail: irwan.adi@ui.ac.id

Investor attention and return reversal in sneakers resale market

Deliana, Irwan Adi Ekaputra

Department of Management, Faculty of Economics and Business, Universitas Indonesia
Kampus Widjojo Nitisastro, Jl. Prof. Dr. Sumitro Djojohadikusumo, Depok, 16424, Indonesia

Abstract

Sneakers, traditionally refer to rubber-soled shoes, are worth more than just footwear nowadays. Resellers believe that sneakers may be considered an investment-grade item due to the profit they booked in recent years. To the best of our knowledge, no former research has investigated the sneakers' resale market behavior specifically. Considering the global sneakers resale market's growth, we aim to analyze investor attention's association with sneakers' return in the sneakers resale market. We use hand-collected sneakers data from StockX.com website and Google Search Volume Index (SVI) as the proxy of investor attention. Based on the system GMM dynamic panel data analysis using some best-seller sneakers as the sample, we conclude that an increase in investor attention tends to increase the sneakers' return as well. Furthermore, the GMM and Fama-Macbeth regression results robustly show short-term return reversals indicated by the negative impact of sneakers' return in the previous period to sneakers' return in the current period. The return reversal may indicate that sneakers' price and return are driven by attention-grabbing information rather than fundamental value.

Abstrak

Sneakers, *yang aslinya merujuk pada sepatu bersol karet, bernilai lebih dari sekedar alas kaki saat ini.* Reseller *percaya bahwa* sneakers *dapat dipandang sebagai benda bernilai investasi dilihat dari keuntungan yang mereka peroleh dalam tahun-tahun belakangan ini. Sejauh pengetahuan kami, belum ada penelitian sebelumnya yang secara spesifik membahas perilaku dalam pasar sekunder* sneakers. *Mempertimbangkan pertumbuhan dari pasar sekunder* sneakers *secara global, penelitian ini bertujuan untuk menganalisis hubungan antara atensi investor dengan imbal hasil sneakers di pasar sekunder* sneakers. *Kami menggunakan data* sneakers *yang dikumpulkan secara satu-per-satu dari situs StokX.com dan Google Search Volume Index (SVI) yang mewakili atensi investor. Berdasarkan analisis data panel dinamis System-GMM menggunakan sejumlah* sneakers *dengan penjualan terbaik sebagai sampel, kami menyimpulkan bahwa peningkatan atensi investor cenderung untuk meningkatkan nilai imbal hasil* sneakers. *Lebih lanjut, hasil dari pengujian GMM dan regresi Fama-Macbeth dengan kuat menunjukkan pembalikan arah nilai imbal hasil dalam jangka pendek yang diindikasikan dengan pengaruh negatif dari imbal hasil* sneakers *di periode sebelumnya terhadap imbal hasil* sneakers *di periode berjalan. Pembalikan arah imbal hasil menandakan bahwa harga dan imbal hasil* sneakers *didorong oleh informasi yang menarik perhatian ketimbang nilai fundamental.*

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1. Introduction

Originated from a sub-culture in the United States, sneakers have made their way worldwide and become mainstream culture. Developments within the sneakers market over the past decade has been nothing but fascinating. In 2019, Cowen Equity Research estimated that the total worth of the current global sneakers market is as much as US$ 100 billion. Meanwhile, the resale market reaches up to US$6 billion (Wade, 2019). Furthermore, Cowen also projects that for the U.S. only, sneakers market will grow from US$2 billion in 2019 to US$6 billion in 2025, or equivalent to 300 percent growth in 6 years. Through its publication in late 2019, StockX predicts that the secondary sneakers market size may become 15–25 percent of the primary sneakers market size in 2025.

Currently, sneakers are not merely a means of footwear, but they are also appreciated for their aesthetic value and work as a form of expression of the wearer. Sneakers collecting is trending, but it is neither characterized as pure consumption nor investment activity. Cowen explains that from December 2013 to December 2018, the proportions of individuals owning four to five pairs of sneakers has increased from 13.3 percent to 16.3 percent. The percentage of women, millennials, and Gen Z collecting sneakers also show increment from year to year. Avid sneakers collector or known as 'sneakerhead' may push sneakers prices to level far beyond their fundamental value. In the resale market, prices can be assumed to be determined by supply and demand. However, many other factors may affect the price as well, such as the aesthetic value of a product and the limited supply of products. Prices paid for sneakers have gained international publicity, and sneakers as an object of investment have become particularly alluring (Sregantan, 2020). StockX, through its website, releases the annual recap of its sneakers resale market in 2019 and flaunts average price premium for the top-selling brand like Air Jordan, Adidas, and Nike to range from 36-61 percent.

StockX is one of the leading resale market globally. Cowen's aforementioned research shows that 29 percent of customers purchasing online choose StockX as the preferred website. Similar to an actual stock exchange, a newly released (IPO) sneakers on StockX will receive a unique ticker symbol. Sneakers will be identified from its silhouette (high top/low top), the feature of release (original-OG/ Retro/Special Edition-SE), and colorway (color combination or nickname of the shoes). StockX only lists sneakers that are considered collectibles or luxury brand sneakers. Collectibles have no or only marginal used-value. However, they provide other non-pecuniary returns from the social status and aesthetic pleasure of the owner. Collectibles can be considered as consumer goods, but the difference is it is usually produced in limited quantity to attract collectors, i.e. stamps and action figures (Erdos, 2010).

'Hype' or in this study, referred to as 'attention' is the winning strategy for brands and resellers alike. The scarcity of product due to limited production and hype in the market will typically boost sneakers' price. Media coverage or artists' collaboration will typically attract public attention. This will work as a self-sustaining strategy for brands because greater attention will theoretically create higher demand, and with the limited supply, the price will likely to increase.

To the best of our knowledge, there has been no empirical study specifically investigating sneakers resale market. Considering the size of the current market and projected growth, we believe this study will give future studies insights. In general, the role of sneakers or footwear market may become a significant part of an alternative investment universe. Past studies (Mamarbachi, Day, & Favato, 2011; Öztürkkal & Togan-Eðrican, 2019) suggest that art and other collectibles show a low correlation to a conventional asset class such as stocks or bonds, makes it an attractive alternative asset class. Al-

though art poses uncertainty in future reward, it demonstrates price appreciation that defies all logic, mostly in the long-run.

All the hopes and dreams shared by the industry and investors involved bring us to a question: How is 'hype' or attention correlated with return in sneakers resale market? Will the performance persist or perish?

2. Hypotheses Development

In today's era of the internet, information can be obtained in just one click away. Facing a massive amount of information may overwhelm the investor in making an investment decision. The limited amount of energy, time, and cognitive capacity to process the information makes investor limits their effort to handle only a few information that catches their attention (Barber & Odean, 2008). Further, they also demonstrate that individual investors are net buyers of attention-grabbing stocks, resulting in price pressure.

Google Search Volume Index (SVI) is first documented by Da, Engelberg, & Gao (2011) as a proxy to measure investors' attention, whereas greater attention indicates an increase in stock price. Google is arguably the most-used search engine in the world, with a market share of over 75 percent in 2018 globally (Davies, 2018). On the other hand, the search is a revealed attention measure, which means if someone search for something on Google, they undoubtedly pay attention to it. The study also concludes that SVI is specifically valid to measure retail investors' attention compared to institutional investors.

H_1: return in the resale market is positively associated with investor's attention to specific sneakers' type

In the same paper by Da et al. (2011), they include two types of SVI for comparison purposes, which are SVI based on company name and SVI based on the main product of a company. Therefore, we also employ two types of SVI, which is SVI based on specific sneakers' type and SVI based on sneakers' brand.

H_2: return in the resale market is positively correlated with investor's attention to sneakers' brand

Da, Liu, & Schaumburg (2014) also later observes that stock returns unexplained by fundamental strength are more likely to reverse. Barber & Odean (1999; 2000; 2002) and Barber, Odean, & Zhu (2009) support the suggestion that retail investors trade for non-informational reasons (i.e., misperception of future returns). Barber & Odean (2008) show that individual investors are net buyers of attention-grabbing stocks, resulting in price pressure. They also breakdown the three proxies to measure whether an investor is paying attention to a stock: (1) abnormal trading volume, (2) return in previous period, and (3) media coverage. Tversky & Kahneman (1973) suggest that bounded rationality causes investors to overweight recent information and underweight prior data. To support the notion that return is affected by attention and not fundamental of the asset itself, we test the following hypotheses.

H_3: return in the resale market will tend to reverse

3. Method, Data, and Analysis

For this study, the data are from StockX and Google Trend. The decision to pick StockX as the primary data source for sneakers is because: (1) it mimics the stock exchange by employing bid and ask mechanism to set price, (2) it is the top-recommended website for reselling sneakers. Sneakers-related data such as product type, transaction date, and price are retrieved directly from StockX website. The sneakers' data extracted will represent a specific silhouette and color combination released by specific brands, which resembles one company in a stock exchange.

SVI data are collected directly from the Google Trend website. The SVI reflects the volume of queries users entered into Google from time to time in a given geographic area with scores ranging from 0 to 100. The sneakers samples must meet certain criteria: First, the specific product type must be released no later than in June 2019. Second, the total number of sold for specific product type quantity must be over 100 pairs. Third, the specific product type must have search inquiries that can be quantified by Google Trend.

Based on the best-selling criteria, this study only includes 35 product types as the sample, covering the period starting from July 2019 to January 2020. Out of the 35 product types, the brands included are Air Jordan, Adidas, Nike, and Converse, which together make up over 50 percent of StockX's sneakers market population in 2019. The sample then consists of 35 sneakers (cross-section) and 27 weeks (period) or 945 balanced-panel observations.

The study's dependent variable is the weekly return generated by a specific product type (*RETURN*). The primary independent variable is the abnormal volume of search for the specific product type (*ASVI*).

RETURN is the total of daily log return for specific sneakers type in week *n* calculated as in Eq.

$$Return_{i,t} = ln(\frac{P\,i,t}{Pi,t-1}) \quad (1)$$

Where, $P_{i,t}$ = average price of sneakers *i* at period *t*; $P_{i,t-1}$ = average price of sneakers *i* at period *t-1*

ASVI represents the abnormal volume of aggregate search frequency on Google Trend (SVI) related to specific sneakers type during the previous eight weeks. Following Da et al. (2011), we calculate *ASVI* as in Eq. (2).

$$ASVI_{i,t} = log\ (SVI_{i,t}) - log\ [Med\ (SVI_{i,t-1}, \ldots\ SVI_{i,t-8})] \quad (2)$$

Where, $log\ (SVI_{i,t})$ = log of SVI score for sneakers *i* at period *t*

This study also employs additional independent variables, *ASVI_BRAND* and $RETURN_{t-1}$. The inclusion of *ASVI_BRAND* is to capture investor attention to the sneakers' brand in general. *ASVI_BRAND* is the log of weekly *BRANDSVI* (aggregate search frequency on Google Trend related to the sneakers' brand) minus the median during the previous eight weeks.

The inclusion of $RETURN_{t-1}$ is to capture the correlation between sneakers' return in the current period and sneakers' return in the previous period. A negative correlation may indicate a short-term return reversal due to the attention-driven purchase.

Adapting Ekaputra (2015) and Chen et al. (2013), this study includes lag of *RETURN* as a regressor that produces dynamic panel data structure. The inclusion of lag considers the possibility that the correlation of variables exists within the variables in the same period and may also be related to variables in the previous period. The presence of lagged dependent variables leads to the endogeneity issue. Hence, we employ a dynamic data panel estimation method known as the System GMM (S-GMM) (Arellano & Bover, 1995; Blundell & Bond, 1998). The base equation for this model is as follow:

$$RETURNi,t = \alpha + \beta 1\ RETURNt\text{-}1 + \beta 2\ ASVIi,t + \beta 3 ASVI\_BRANDi,t + \varepsilon i,t \quad (3)$$

Whereas *RETURN* is the return of sneakers i during week t, and $RETURN_{t-1}$ is the previous one week (lag) of price return of product i. *ASVI* is the abnormal search volume for specific sneakers type during the last eight weeks, and *ASVI_BRAND* is the abnormal search volume for the sneakers' brand during the last eight weeks.

Ekaputra (2015) revealed that the S-GMM estimators are consistent if the residuals do not exhibit a second-order autocorrelation. This condition will later be tested using the Arellano-Bond test for AR(2). To check the validity of instrument variables, we employ the Sargan test. The Sargan joint null hypoth-

Table 1. Descriptive statistics

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
RETURN	945	-0,0004	0,1167	-0,7498	0,6393
ASVI	945	-0,0533	0,5739	-1,7508	2,0000
ASVI_BRAND	945	0,0215	0,0634	-0,1570	0,1909

RETURN is the weekly return of sneakers i during week t, *ASVI* is the abnormal search volume for specific sneakers types during the last eight weeks, and *ASVI_BRAND* is the abnormal search volume for the sneakers' brand during the previous eight weeks.

eses: (1) instrument variables are independently distributed of the error process, and (2) instrument variables are correctly omitted from the model.

4. Results

Descriptive analysis

The description of the data used in this study is available in Table 1. From Table 1, we learn that the mean of *RETURN* is -0.0004, with a standard deviation of 0.1167. In the first week of September 2019, the Jordan 1 Retro High Black Gym Red generates the highest return of 0.6393. Interestingly, in the third week of November 2019, the same sneakers also generate the worst performance of -0.7498.

The independent variable *ASVI* shows a mean of -0.0533 and a standard deviation of 0.5739. The highest *ASVI* of 2.000 is generated by Jordan 1 Mid Patent Black White Gold in the third week of July 2019. While the lowest *ASVI* of -1.7508 is generated by Jordan 1 Retro High Neutral Grey Hyper Crimson in the fourth week of November 2019.

The independent variable *ASVI_BRAND* shows a mean of 0.0215 and a standard deviation of 0.0634. From the Table 1, we observe that Jordan is the brand with the greatest investor attention of 0.1909 in the fourth week of November 2019. On the other hand, Jordan also shows the lowest *ASVI_BRAND* of -0.1570 in the fifth week of December 2019.

Dynamic panel data

System-GMM estimator is designed for research where the amount of instruments (N) is larger than the period parameter (T). We conduct the Arellano-Bond Test and Sargan Test to ensure that the estimation model employed is appropriate, consistent, and not containing bias. The regression result is presented in Table 2.

Arellano-Bond (AB-Test) is employed to test the consistency of estimation generated from GMM Estimation. The decision to reject H_0 is if $Z_{stat}>Z_{table}$. Failing to reject H_0 means that the GMM estimation is consistent (Table 2). As seen in Table 2 above, the AB Test result shows the Z_{stat} of -1.3084 and p-value of 0.1907. Using a significance level of 5 percent (á = 0.05), we fail to reject H_0. Therefore, the estimated model is consistent.

Next, the Sargan test is employed to test the validity of overidentifying restriction. As seen in Table 2 above, the p-value is 1.000. Using a significance level of 5 percent (α = 0.05), we fail to reject H_0. Failure to reject H_0 means that the instruments used in the model are valid.

Table 2. Regression result

Variable	Coefficient (t-statistic)
Intercept	-0.0020
	(-3.6815)
$RETURN_{t-1}$	-0.3253
	(-34.5958)
ASVI	0.0116
	(10.8867)
ASVI_BRAND	0.1065
	(9.2157)
AB Test for AR (2)	-1.3084
(p-value)	(0.1907)
Sargan Test	30.8707
(p-value)	(1.0000)

$RETURN_{t-1}$ is the previous one week (lag) return of sneakers i. *ASVI* is the abnormal search volume for specific sneakers types during the last eight weeks, and *ASVI_BRAND* is the abnormal search volume for the sneakers' brand during the previous eight weeks.

From the regression result set out in Table 2, the coefficient of *ASVI* is 0.0116 and significant at α = 5 percent. This result supports the first hypothesis that investor attention to specific sneakers will affect the sneakers' return. The positive value shows that an increase in investor attention to specific sneakers type will increase the sneakers' return. Da et al. (2011) find that abnormal SVI significantly and directly related to an increase in stock return of Russell 3000. Barber & Odean (2008) also find that there is price pressure generated by attention-driven buying behavior. Individual investors face limited cognitive capacity in processing a vast amount of information circulating in the market. Limited amount of time and energy forces investors to narrow down their set of choices and focus on information's focal point. Here is when attention will take its cue to affect the investor's decision. Investor attention also finds to more likely affect internet financial products' performance, compared to its effect on other security markets (Chen et al., 2019).

The coefficient of *ASVI_BRAND* is 0.1065 and significant at α = 5 percent. This result supports the second hypothesis that investor attention to the sneakers' brands will affect the sneakers' return. The positive value of 0.1065 suggests that an increase in *ASVI_BRAND* of 1 percent will positively affect the sneakers' return in the resale market by 0.1065 percent. A higher coefficient of *ASVI_BRAND* compared to *ASVI* indicates that *ASVI_BRAND* has a more substantial influence over sneakers' return in the resale market. Statman (2008) professes that emotion of feeling when combined with pressures from information overload may exert more considerable influence in investor's decision making over rational thinking. Statman's conclusion is commonly embedded in the brand, location, or connotation of a product.

5. Discussion

The coefficient of $RETURN_{t-1}$, as shown in Table 4, is -0.3253 and significant at α = 5 percent. This finding supports the third hypothesis that sneakers' return in the previous period affects the current week sneakers' return. The negative coefficient indicates that a positive (negative) return in one period will be followed by a negative (positive) return in the following period. This inverse relationship shows that short-term return reversal exists in sneakers resale market. Barber & Odean (2008) find that short-term price increase will usually be reversed in the longer term. Price pressure usually exists when investors made a decision without the base of fundamental information. Da et al. (2014) also confirm that abnormal investor attention volume predicts the significant increase in stock return and return reversal that follows. Zhu, Sun, & Chen (2019) find that investor sentiment plays a more dominant role than liquidity shocks in explaining return reversal. Chen et al. (2019) find that the impact of investor attention on the return of internet financial products will gradually weaken and disappear in less than a month, which is consistent with the rapid update of information in the internet environment.

Robustness test

Following Da et al. (2011), this study employs the Fama–Macbeth Cross-Sectional model to test the correlation of independent variables to return. This test is conducted as a robustness check using the empirical model in Eq. (3). The Fama-MacBeth regression is a practical way of testing how risk factors describe portfolio or asset returns over a shorter time, like daily or weekly holding periods. This is because the return of assets like the stock has weak time-series autocorrelation in a shorter holding period. The Fama-MacBeth regression provides standard error corrected for cross-sectional correlation, not time-series autocorrelation.

Fama–Macbeth cross-sectional model will be conducted in 2 steps. For the first step, we estimate the cross-sectional regression in each period (T). In the second step, we average the coefficients from

the first step regressions for each variable. We then calculate the t-statistic of each coefficient using Eq. (4) and (5).

$$\frac{Std.Error}{\hat{\beta}} \quad (4)$$

Where, $\hat{\beta}$: average coefficient of $X_{ki,t}$ during the *time series* (T). Whereas *standard error* is calculated using Eq. (6).

$$SE = \frac{Std.Dev\ (\beta)}{\sqrt{T}}\left(\frac{1+\rho(1)}{1-\rho(1)}\right) \quad (5)$$

For the robustness check, we employ two sets of data. First is the weekly data, which covers the observation period from July 2019 to December 2019 (27 weeks). Secondly, we conduct the test using daily data, which covers the observation period from October 1, 2019, to January 1, 2020 (93 days). There is no alteration to sneakers used the sample in both specifications.

Fama–Macbeth using weekly data

Table 3. Fama–Macbeth regression result using weekly data

Variable	Coefficient (t-statistic)
$RETURN_{t-1}$	-0.3528
	(-6.4166)
ASVI	-0.0024
	(-0.2917)
ASVI_BRAND	0.4391
	(1.1023)
Adj. R-squared	0.2262

$RETURN_{t-1}$ is the previous one week (lag) return of sneakers i. *ASVI* is the abnormal search volume for specific sneakers types during the last eight weeks, and *ASVI_BRAND* is the abnormal search volume for the sneakers' brand during the previous eight weeks.

The regression result is presented in Table 3. The t-stat value of *ASVI* is -0.2917 implies that *ASVI* has no significant influence over sneakers' return. For *ASVI_BRAND*, the t-stat value is 0.4391, which implies that *ASVI_BRAND* has no significant influence over sneakers' return. However, the t-stat value for $RETURN_{t-1}$ shows a consistent result with our findings using the S-GMM model, supporting the third hypothesis with the t-stat value of -6.4166 (negative and significant at a = 1 percent). Coefficient $RETURN_{t-1}$ of -0.3528 indicates that a 1 percent increase of sneakers' return in the previous one-week will negatively affect sneakers' return in the resale market for as much as 0.3528 percent. Based on the adjusted R^2, we learn that the variations of independent variables explain 22.62 percent of the dependent variable variation.

Fama–Macbeth using daily data

Table 4. Fama–Macbeth regression result using daily data

Variable	Coefficient (t-statistic)
$RETURN_{t-1}$	-0.3914
	(-13.0647)
ASVI	-0.0042
	(-1.3271)
ASVI_BRAND	0.0397
	(0.5697)
Adj. R-squared	0.2121

$RETURN_{t-1}$ is the previous one day (lag) return of sneakers i. *ASVI* is the abnormal search volume for specific sneakers types during the last eight days, and *ASVI_BRAND* is the abnormal search volume for the sneakers' brand during the previous eight days.

The regression and statistical result is presented in Table 4. The t-stat value of *ASVI* is -1.3271, implying that *ASVI* has no significant influence over sneakers' return. This also the case for *ASVI_BRAND*. However, the t-stat value for $RETURN_{t-1}$ is -13.0647 (negative and significant at a = 1 percent). This shows a consistent result with our previous findings using the S-GMM model and Fama-Macbeth weekly data. The result supports the third hypothesis that the sneakers' return will tend to reverse. Based on the adjusted R^2, we observe that the independent variables' variations explain 21.21 percent of the dependent variable variation.

Fama–Macbeth using sub-sample weekly data

We also conduct an additional robustness test for each brand within our sample using weekly data interval to investigate further. The test result using sub-samples is presented in Table 5. We find that *ASVI* does not demonstrate a significant positive association with sneakers' return across all brands. The results are consistent with the previous robustness checks using a weekly and daily interval. However, the t-statistic result for $RETURN_{t-1}$ is significantly negative (at α = 1 percent) and consistent across all brands. We note that the Jordan brand has the highest adjusted-R^2 of 29.92 percent, while Adidas and Nike only show adjusted-R^2 of around 8 percent.

Based on the results, we confirm the third hypothesis that price will tend to reverse when trading is based on attention-grabbing information rather than a fundamental change in sneakers' value. This confirms the short-term return reversal hypothesis professed by Da et al. (2014). Furthermore, the existence of price reversal in weekly and daily intervals indicates volatility. Audrino, Sigrist, & Ballinari (2020) documented evidence that attention variables constructed from online search queries significantly impact volatility.

1. Conclusion

Based on system GMM panel data analysis, this study provides evidence that returns in sneakers resale market tend to increase when investor shows more significant attention to such sneakers brand or specific type. Therefore, we conclude that investor attention affects the return in sneakers resale market. Additionally, we also find that sneakers' return from the previous period negatively affects the sneakers' return in the current period. The sneakers' resale market exhibits short-term return reversals that are robust using both weekly and daily datasets. The return reversal supports the notion that price and return are generally affected by attention-grabbing information circulated in the market rather than a fundamental change in sneakers' value.

The existence of price reversal in daily and weekly intervals implies the volatility of price in the market. Although we did not compare the performance of sneakers' return to conventional investment classes, with the market's speculative nature, it will be too early to deem collectibles, specifically sneakers, as hedging or diversification instruments in a portfolio. Materializing profit from price appreciation of artwork or collectibles will usually take a longer time.

This study's sneakers data is collected manually from StockX.com after sorting for only the best-seller models from major brands within the platform. For further studies, we suggest collecting samples from multiple platforms to ensure the representativeness of return information in global sneakers resale market. On another note, we recommend future studies to test at least 4-weeks lag of return to figure out how long the return reversal will last.

Table 5. Fama–Macbeth regression result using sub-sample weekly data

Variable	Coefficient (t-statistic)		
Brand:	Adidas	Nike	Jordan
$RETURN_{t-1}$	-0.2646	-0.2842	-0.3688
	(-3.9349)	(-2.7003)	(-3.8091)
ASVI	-0.0031	-0.0354	-0.0013
	(-0.2774)	(-2.1506)	(-0.1920)
Adj. R-squared	0.0830	0.0797	0.2992

$RETURN_{t-1}$ is the previous one day (lag) return of sneakers i. *ASVI* is the abnormal search volume for specific sneakers types during the last eight days, and *ASVI_BRAND* is the abnormal search volume for the sneakers' brand during the previous eight days.

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