International Journal of Advanced Multidisciplinary Application | IJAMA
Volume 3 Issue 11 Nov 2026
ISSN No: 3048-9350

Semi-Month Calendar Effects in Financial Information Search Behavior: Evidence from Google Trends

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Abstract

In this study, the semi-month calendar effects in financial information search behaviour were studied based on Google Trends data for Investment, Stock Market, SIP, Mutual Fund, Sensex, and Nifty between 2021 and 2025. Each week was divided into two groups: the first half of each month, and the second half of each month, resulting in 60 month-year differences per keyword. The following descriptive statistics, one-sample t-test, sign test and year-wise persistence analysis were used. The findings indicate selective semi-monthly effects, the highest being for mutual funds and SIPs. The study is an extension of calendar anomaly literature to the focus of investors on the Internet.

Keywords: Calendar anomaly; Semi-month effect; Google Trends; Investor attention; Financial search behavior; Mutual Fund; SIP.

1. INTRODUCTION

There are many reasons for calendar anomalies to have featured prominently in financial research for years, with one of the most obvious being that they contradict the idea that the market should not exhibit any calendar-driven patterns at all. Many researchers have investigated whether there are systematic changes in financial variables across days, weeks or months, or across holidays or other recurring calendar features. The day-of-the-week effect, January effect, holiday effect, turn-of-the-month effect and the semi-month effect are some of the seasonal regularities that are commonly investigated. The reasons for this are that the tendency for regularities over time that are obvious on a calendar would have implications for the efficiency of markets and the nature of the behavior of investors (Thaler, 1987; Cadsby, 1992). Other research, such as the research by Karmakar & Chakraborty (2000) and Mangala & Lohia (2017) in emerging markets and India respectively also has documented evidence of semi-monthly and turn-of-the-month patterns in stock returns.

The traditional literature on calendar anomalies, however, has largely focused on market phenomena like stock returns, volume, volatility and other financial phenomena. Less has been done, however, to determine whether calendar-related regularities also show up in the information-seeking of investors in general and the public in particular. This separation is relevant because information is often acquired prior to making financial decisions. People can look for financial information before they invest, before they watch the market, before they do a comparison of financial products, and before they change their expectations. Ganesh et al. (2021) in their study of IPO advertisements, examined how information presented through advertising can appeal to prospective investors and contribute to investor attention in the context of new equity issues. The behavioural financial literature further demonstrates that investor attention and decision-making may be associated with systematic behavioural tendencies. Ganesh et al. (2020) and Ganesh et al. (2022) stated Overconfidence bias and disposition effect in the investors were examined in India and highlighted the behavioural perspectives of investors in decision making but failed to find the timing of online information searches. Consequently, whether such information-seeking behaviour itself exhibits recurring calendar patterns remains and underexplored question. Online search activity offers a potentially useful behavioural dimension in which periodic patterns in financial attention can be explored, as a result.

The study of economic and financial behaviour has been given new dimensions with the increasing availability of information on internet searches. It is well established that the number of searches from Google is a good measure of the public interest in and need for information. Da, Engelberg, and Gao (2011) have shown that the number of searches made for a product is a

useful proxy for investor interest, as search behaviour is a direct reflection of what investors are actively seeking information on. Google Trends data can thus be used to study financial attention from a research angle other than the traditional market-based approach.

The use of search data to calendar anomalies is also of great relevance since there might be other calendar patterns, which are not restricted in financial outcomes. Also, if calendar-related factors are recurrent, these can affect financial planning, information acquisition, investment decisions, and market monitoring, and these influences can manifest themselves in the timing of online search. For instance, personal financial cycles might play a bigger role in search interest for investment products, while market developments and news events might lead to a more significant search volume for market indices. This means that the calendar effects in the online search behaviour for financial information could vary significantly depending on the category of financial information.

The semi-month feature offers a particularly interesting context for the consideration of this possibility. The semi-month effect is a popular term used to describe the difference between the first half of a month and the second half, traditionally in terms of financial behaviour or outcome. Previous study has mainly focused on the first half versus the second half of a month and studied the semi-month patterns in stock market returns (Karmakar & Chakraborty, 2000; Mangala & Lohia, 2017). This idea of a month-long return cycle is extended to online search behaviour to ask another related but different question: do people search for financial information more intensively during one half of the month than the other?

There are at least two reasons why this is an important question. First it extends the notion of calendar anomalies beyond realized market outcomes and investigates whether calendar regularities might also exist in terms of the information demand and investor interest. Second, multiple financial keywords allow for a study to determine if the semi-month effect that is observed is consistent for different categories of financial information. The pattern that is observed with an investment-product keyword may not necessarily apply to a market-related keyword or a stock-market index. Recognition of such differences can give a more differentiated understanding of the financial attention/calendar timing relationship.

In this background, the present study examines the semi-month calendar effect in Google search pattern of six financial terms namely Investment, Stock Market, SIP, Mutual Fund, Sensex, and Nifty. The study compares the search interest of the first half of calendar months to the second half, based on weekly observations made in Google Trends from 2021 to 2025. Descriptive statistics, one-sample t-test and sign test are used for each key word and examine the differences in the month and semi-month data. Analysis is then extended by breaking it down by year to see if any patterns are persistent over time.

The study adds to the literature in a number of ways. First, it extends the study of calendar anomalies from financial market variables to financial information search behaviour on the internet. Second, it is specifically on the semi-month dimension, and this is relatively less given the context of search-based measures of investor attention. Third, it compares the six different financial keywords to determine if there is any keyword-specific results. Finally, the use of both parametric and non-parametric (directional) evidence, along with persistence analysis by year, gives a more comprehensive picture of the stability of observed search patterns.

The empirical results show that the semi-month impact is not omnipresent for financial search terms. The first half effect is evident and statistically significant from Mutual Fund searches, and the trend is still consistent in SIP searches towards the first half. The other keywords, however, do not show a statistically significant overall semi-month effect. The results indicate that financial attention may vary in regularity across the different categories of financial search and that this is not the case for all information.

The rest of the paper will be arranged as follows. The literature review in the following section examines the existing body of work relating to calendar anomalies, semi-month effects and investor attention as measured by online search. A discussion of the data and research method is presented next. The empirical results are then presented and discussed, followed by a conclusion, implications, limitations and future research suggestions. The rest of the paper is organized as follows: The objectives of the study are presented in the next section. This is followed by a discussion on the literature review of calendar anomaly, semi-month effect and search behaviour on the Internet as a proxy for investor attention. The data and research method are described in the next section. The results of the empirical findings are then presented and discussed, conclusions are drawn, implications are discussed, limitations are discussed, and directions for future research are discussed.

2. Objectives of the Study

The present study is undertaken with the following objectives:

1. To examine the existence of semi-month calendar effects in Google search behavior for selected financial keywords.
2. To compare the magnitude and direction of semi-month differences across different financial search keywords.
3. To test the statistical significance and directional robustness of semi-month differences using parametric and non-parametric approaches.
4. To assess the temporal persistence of semi-month search patterns across the period from 2021 to 2025.

3. Hypotheses of the Study

The study tests whether the mean Google search interest differs significantly between the first and second halves of a calendar month for each selected financial keyword. The following null and alternative hypotheses are formulated:

H01: There is no significant difference between first-half and second-half-of-the-month Google search interest for the keyword Investment

H11: There is a significant difference between first-half and second-half-of-the-month Google search interest for the keyword Investment.

H02: There is no significant difference between first-half and second-half-of-the-month Google search interest for the keyword Stock Market.

H12: There is a significant difference between first-half and second-half-of-the-month Google search interest for the keyword Stock Market.

H03: There is no significant difference between first-half and second-half-of-the-month Google search interest for the keyword SIP.

H13: There is a significant difference between first-half and second-half-of-the-month Google search interest for the keyword SIP.

H04: There is no significant difference between first-half and second-half-of-the-month Google search interest for the keyword Mutual Fund.

H14: There is a significant difference between first-half and second-half-of-the-month Google search interest for the keyword Mutual Fund.

H05: There is no significant difference between first-half and second-half-of-the-month Google search interest for the keyword Sensex.

H15: There is a significant difference between first-half and second-half-of-the-month Google search interest for the keyword Sensex.

H06: There is no significant difference between first-half and second-half-of-the-month Google search interest for the keyword Nifty.

H16: There is a significant difference between first-half and second-half-of-the-month Google search interest for the keyword Nifty.

4. Review of Literature

Extensive research has looked at calendar based anomalies in the financial market as it relates to the systematic differences in market behaviour associated with set calendar time periods. There is a number of notable calendar anomalies such as weekend effects, holiday effects, turn-of-the-month and intraday anomalies: Thaler (1987) pointed out that calendar based regularities are important in financial research. This is a part of a considerable literature and Ariel (1987) recorded that returns of stocks occurred disproportionately in the first half of calendar months on a monthly basis. These studies prove that financial behaviour might possibly show recurrent temporal pattern which cannot be explained only by, say, the aggregate long time averages.

The semi-month dimension has became a particular matter of seasonality, therefore. The semi-month effect covers the difference between the first and second half of a calendar month, as opposed to the overall month-of-the-year difference. Previous studies concerning this phenomenon have mostly focused on stock market returns and the other market indicators. But the idea that similar regularities could exist in the information seeking and investor attention level has been comparatively

underdeveloped. This provides a context to develop a new avenue of research on calendar anomalies that is larger than the actual realised market outcomes.

The development of internet search data has provided a new approach for examining investor attention. Da, Engelberg, and Gao (2011) proved that the frequency of Google searches was a direct measure of investor attention, used them to measure the importance of social networks in describing financial market outcomes, and found their usefulness for that purpose. Recently, in a systematic review of the literature, Ayala, Gonzálvez-Gallego, and Arteaga-Sánchez (2024) identified a recent trend of incorporating the Google Search Volume Index in research on investor attention, trading volume, volatility, and stock market prediction. It has been shown in these studies that use of on-line search behaviour has been proven to be useful in financial research as a behavioural indicator.

Extending the concept of calendar anomalies to new financial research areas, such as the financial field of Google trends, is relatively under explored. The existing literature has largely been dedicated to the calendar effects of the market variables or to the connection between search and the market outcomes. In this study, two research streams are combined: the exploration of whether the usage of specific financial terms in Google searches changes systematically throughout a calendar month, between the first and last half. The study also examines if there is a similar semi-monthly attention towards financial topics in the online media that is independent of keywords, or if it is distinct per keyword. The study also tests if there exists a common semi-monthly trend across financial keywords applied to the attention level, or if they are specific per keyword.

5. Data and Research Methodology

5.1 Data Source and Sample

Google Trends is the source of data analyzed in the study, which aims to investigate the semi-month trends of financial search behavior on the Internet. Google Trends doesn't show the absolute number of queries but rather normalization of relative searches over time. The degree of search interest has been scaled from 0 to 100, with higher scores indicating that search interest is relatively higher during the time period in the specified geographical context (Google Trends, n.d.).

Clouds orbiting the globe will be analyzed for the last 5 years (2021 to 2025) For this study, the authors found six crucial financial terms to study: Investment, Stock Market, SIP, Mutual Fund, Sensex and Nifty. These words have been picked based on what dimensions of financial information-seeking they represent—general investment-related information, stock market information, a systematic investment product, a mutual fund product and a major Indian stock market index.

Due to the need to extract weekly observations for the semi-month analysis Google Trend data were downloaded by year. Therefore, five sets of annual data were extracted of each of the keywords. Annual data were then amalgamated into a single dataset from 2021 to 2025. After overlaps created at the boundaries of successive years' downloads were identified and removed, there were 261 weekly observations for each of the keywords.

5.2 Semi-Month Classification

The semi-month analysis was based on the reported date of each weekly Google Trends observation. Each observation was classified into one of two calendar periods:

- **First half of the month:** observations dated from the 1st to the 15th.
- **Second half of the month:** observations dated from the 16th to the end of the month.

For every month, the mean Google Trends search interest was calculated separately for observations belonging to the first and second halves of the month. The semi-month difference was then calculated as:

$$D_m = \bar{S}_{FH} - \bar{S}_{SH}$$

where: D_m = semi-month difference for a particular month,

$\bar{S}_{FH}$ = mean search interest during the first half of the month, and

$\bar{S}_{SH}$= mean search interest during the second half of the month.

A positive value of D_m indicates relatively higher search interest during the first half of the month, whereas a negative value indicates relatively higher search interest during the second half.

Since the study covers five years and twelve months in each year, 60 month-year semi-month differences were obtained for each keyword.

5.3 Analytical Techniques

Descriptive and inferential statistical techniques were used in the study to investigate the presence of the semi-month effect and the consistency of the effect. The descriptive statistics, such as means and medians, standard deviations, minima and maxima and the number of positive differences and negative differences were firstly computed for each of the 60 month-years for these keywords. The semi-month effect was also explored in terms of percentage of differences and directionality of the differences. Second, One-sample t-test was used for evaluating the difference between the mean semi-month difference and zero. For each sown term the null hypothesis was:

$$H_0: \mu_D = 0$$

where μ_D is the mean of the differences between the two weeks. If the mean difference has a statistically significant positive value, there will be relatively more search interest in the first half of the month; if the value is statistically significant negative, there will be relatively more search interest in the second half of the month. Thirdly, a sign test was conducted as a non-parametric robustness check. The sign test testifies if positive and negative semi-month differences occur equally. If there were no differences, those differences were not included in this analysis. The year-wise mean differences between the half-months, for each keyword, were finally computed to find the temporal persistence and stability of the patterns observed during the five-year study period. Directional consistency was also quantified by the number of years in which the differences between the means had positive and negative values. Microsoft Excel was used to organize data, do calculations, descriptive analysis and perform statistical tests.

6. Results and Discussion

Table 1. Summary of Semi-Month Differences and Statistical Tests

Keyword	Mean Difference	Median	SD	Positive (%)	t-statistic	t-test p-value	Sign Test p-value
Investment	0.017	0.500	6.606	55.00	0.020	0.9845	0.3581
Stock Market	1.061	-0.583	10.327	48.33	0.796	0.4293	0.8974
SIP	1.519	1.417	7.596	65.00	1.549	0.1266	**0.0119**
Mutual Fund	**2.808**	3.917	6.827	**65.00**	**3.186**	**0.0023**	**0.0119**
Sensex	0.967	1.000	8.547	55.00	0.876	0.3845	0.3581
Nifty	0.058	0.000	9.303	45.00	0.049	0.9614	0.8939

Source; Primary data.

Note: Mean Difference = First-half mean − Second-half mean. Positive values indicate higher search interest during the first half of the month. Zero differences were excluded from the sign test.

The descriptive statistics and the results from the statistical test are shown in table 1, according to the six chosen financial keywords. We determined the semi-month difference by subtracting the mean Google search interest for the first half of a month from the mean search interest for the second half of a month. Since a positive number means relatively more people searched during the first half of the month, and a negative number means more people searched during the second half of the month, a positive number means more interest in the first half of the month.

The obtained results suggest that the semi-monthly patterns are not consistent for financial search keywords. Of the six keywords, mutual fund had the largest mean semi monthly difference of 2.808 followed by sip, stock market 1.061 and sensex 0.967. There were not many mean differences between the two halves of the month, as these appeared to be near zero for the investment and nifty crosses.

The highest Support was found for the semi-month period to be for Mutual Fund. The mean difference (2.808) was significant at the 1 sample t-test ($t = 3.186$, $p = 0.0023$). Thereby, it was also determined to be statistically significant using the sign test ($p = 0.0119$), which further validates the result. Additionally, 65 percent of the month-year observations exhibited positive differences. The results are all consistent and show that interest in the topic "Mutual Fund" on Google tends to be higher in the initial half of the month.

Different, but interesting, therefore was the pattern shown by SIP. Its mean semi-month difference is positive (1.519), but is not statistically significant at the conventional level ($p = 0.1266$) according to the one-sample t-test. The sign test was statistically significant ($p = 0.0119$); and positive differences were observed 65 percent of the time. These imply that the difference between the two types of first-half searches (i.e., consistency vs. direction) was more pronounced in terms of directional consistency rather than the average magnitude of their difference. Hence, while the evidence for SIP is mixed, it does suggest a constant trend in the first 45 minutes.

In contrast, there was essentially no difference in the mean overall between the two semimonths for Investment (with a mean difference of only 0.017). Both the t-test ($p = 0.9845$) and sign test ($p = 0.3581$) failed to provide evidence of a statistically significant semi-month effect. In the same way, the mean difference of searching the stock market was +1.061, showing a positive value, but the t-test ($p = 0.4293$) and the sign test ($p = 0.8974$) did not prove to be statistically significant.

Likewise the overall semi-month effects for the two market-index keywords Sensex and Nifty were not able to prove. The t-test and sign-test values were statistically insignificant whereas the mean difference of the Sensex was 0.967. There were virtually no differences between the first and second half of the month, with Nifty having a mean difference close to zero, at 0.058; both tests supported the hypothesis that there is no systematic difference between these two halves of the month.

Overall, the results indicate that there are a number of selective rather than universal calendar effects in financial search on the Internet. For investment-product related terms, such as Mutual Fund, to a certain degree, SIP, there is more evidence of the first half of the search patterns than with financial or market-index related terms. This difference could be due to variety in the type of information sought in the context of financial products and market monitoring. Searches related to investment products are perhaps more likely to be tied to regular financial planning processes and/or investment decision making cycles; while searches over market indices may be driven more directly by short-term changes in the markets such as developments in the news, or by changes of short-term nature.

Table 2. Year-wise Mean Semi-Month Differences

Keyword	2021	2022	2023	2024	2025
Investment	1.528	-0.472	-1.833	-0.597	1.458

Keyword	2021	2022	2023	2024	2025
Stock Market	-1.500	0.236	-2.931	5.986	3.514
SIP	**2.597**	**1.708**	**0.458**	**1.333**	**1.500**
Mutual Fund	**5.208**	**2.903**	-0.431	**1.764**	**4.597**
Sensex	-2.556	-1.944	-0.611	6.694	3.250
Nifty	-5.792	-2.139	-1.653	6.653	3.222

Source; Primary data.

Note: Positive values indicate higher first-half search interest

6.1 Year-Wise Persistence of Semi-Month Patterns

Table 2 displays the year-wise mean semi-month differences for the six chosen keywords. Patterns observed from the results give further information about how they became stable over time. The most consistent pattern was observed for SIP. The yearly average semi-month difference was favourable for all five years of study. The difference between the two was in the positive direction in each year, although this direction fluctuated in strength over the years; this direction of the difference supports the evidence of the sign test and indicates that there is a consistent tendency to have higher search interest in the first half of the year. Mutual Fund also showed good directionality. In four years, there were positive year-wise mean differences; only a small negative mean difference was observed in 2023. The overall picture, which combines all the three elements – strong statistical background and year-wise continuity – is to confirm the consistency in the year-wise tendency of Mutual Fund searches to the 1st half.

Temporal variation was larger for the other keywords displayed. The difference in investment turns positive in 2021 and in 2025, and negative in the years in between. Stock Market searches also did not follow a consistent trend, but with differences really becoming positive in 2024 and 2025.There was a clear temporal change for the keywords that were found in the market. While Sensex and Nifty showed negative difference in year-wise performance trends during the period 2021-2023, there was a positive difference during the period 2024-2025. The absence of an overall semi-month effect does not necessarily mean the absence of temporal variation. Rather, these shifts might cancel out in the direction of the effect over the course of study when looked at as a whole. The pattern should be interpreted as descriptive evidence of temporal variation, however, since this study did not formally isolate any specific structural break in the data, it should not be interpreted as evidence of a structural break.

Table 3. Directional Persistence Across Years

Keyword	Positive Years	Negative Years	Interpretation
Investment	2	3	Inconsistent
Stock Market	3	2	Weak directional consistency
SIP	**5**	**0**	Highly persistent first-half tendency
Mutual Fund	**4**	1	Predominantly persistent first-half tendency
Sensex	2	3	Time-varying
Nifty	2	3	Time-varying

Source; Primary data.

6.2 Directional Persistence Across Years

Table 3 shows the directional persistence of the semi-month differences for the 5-year study period. The findings also further validate the hypothesis that there are significant variations for keywords in the finance domain among the semi-month patterns. SIP evidenced the largest directional consistency with positive year to year differences in all five years. Mutual Fund followed closely, with positive differences in four out of five years. These findings indicate that the 1st-half bias, seen for investment product-related search, does not occur in segments of just any time but shows some persistence over time. The other keywords did not show a similar consistency, however. Investment stocks, Sensex, and Nifty had positive differences for just two years among the five years while Stock Market had positive differences for three years and negative differences for two years. These findings thus suggest that a generic sub-industrial pattern of semi-month anomaly should not be taken for granted in all fields of financial search activity. The consistency suggested by the statistical tests and the persistence analysis indicates that there are keyword-specific semi-month effects in Google search behaviour. Mutual Fund shows the strongest evidences whereas SIP exhibits strong directional bias with non-parametric evidence. The lack of significant impact results for the other keywords may indicate that factors affecting online financial attention are dependent on the nature of financial information being accessed. It is therefore possible to infer that the search regularities observed in this context are selective (spanning search patterns for content other than financial as well), and do not seem to be universal regularities linked to online financial attention generally.

7. Conclusion

The current research study analysed the presence of semi-monthly calendar effects on online financial search behaviour of six selected financial words—Investment, Stock Market, SIP, Mutual Fund, Sensex, and Nifty—between 2021–2025 by employing 'Google Trends'. The weekly posts on the search were categorized as belonging to the first and second half of a calendar month and the difference between the two halves of the calendar month, as well as the difference which is determined by comparing the posts for the same periods of 2009 and 2010 was analyzed descriptively, by one-sample t-test, sign test, and by year-wise persistence test.

The results suggest that the semi-month effect for financial search behaviour is selective and not generalized. Mutual Fund displayed the most promising signs of a 'first half effect' showing a positive mean difference as significant in both the one-sample t-test and the sign test. A significant year-wise positive difference was also noted from the perspective of the tendency in the first half of the study period in SIP; There was also evidence from the sign test for SIP from the perspective of first half tendency particularly towards positive direction over the period of 5 years of the study. The mean based t-test for SIP, however, was not significant.

Similarly, the overall seasonal semi-month effect was not statistically significant in the case of Investment, Stock Market, Sensex, and Nifty indices. It also showed significant difference in the words regarding the Sensex and nifty in form of year-wise analysis, as the direction of change in half-month to half month for these words varied across the study time period. The results suggest that the longer a period of data collection, the more years that may mask and overlook trends in search behavior over years. From this perspective, the study brings into focus calendar anomaly research that focuses on traditional financial market indicators, moving beyond their scope into an examination of periodic anomalies in an online financial information seeking environment. The results showed that calendar determinant regularities could have more impact on some types of financial searches, notably investment product searches, than on information-seeking for general market information or questions seeking market-index searches. As a result, semi-monthly trends in online investor behaviour seem to vary depending on keywords and should not be taken as evidence that they fit all types of financial information search and retrieval.

8. Implications

The study has a number of implications. The study shows that the calendar anomaly approach can be applied to other market variables apart from the stock returns and behavioural factors like online search activity can be studied as well. An alternative way to study financial attention and information demand in a periodicity manner is by using the data of Google trends.

From the results, it is also concluded that keyword selection is important in online search behaviour based studies. Curiously, the search volume for investment products showed a strong semi-month-periodicity effect and the trend of the searches for SIP products also didn't fade away, thus suggesting that searches driven by investment products might have different temporal behavior as compared to the searches related to general financial terms or market indices. It is therefore important that researchers not consider online financial attention as a monolithic aspect.

In the practical sense, financial institutions, financial education platforms, and financial educators can all be interested in the recurrent nature of online information needs. The patterns of investor interest in specific investment-related search terms can help inform the timing of investor communication, educational programs, and digital engagement strategies when certain searches are found to be of relatively greater interest during specific periods of a month. But these uses should be done with great care, as the patterns seen can differ between keywords and over time.

9. Limitations and Future Research

There are some limitations to the study. First, Google Trends reports normalized relative search interest instead of actual search volumes, and the numbers could be affected by the time frame selected. Second, weekly observations were used in the analysis, and the classification for each week was derived from the date of the weekly observation. The study thus does not measure the daily search behaviour in the two halves of a month. Third, only six financial keywords were used in the study, and it may not be possible to extrapolate the results to other types of financial information searches. Finally, the analysis is descriptive and statistical only and not adjusted for market fluctuations, significant date events, macroeconomic conditions and other factors that can affect search behaviour. Further studies could be conducted to address the above limitations, such as using a larger number of financial keywords and contrasting different types of searches. Semi-month studies could also be undertaken to see if the pattern is applicable to other countries or regions to identify whether there are any market-specific effects in these other areas. If higher frequency data are available, further studies may be conducted to investigate the daily or intraday calendar patterns. Additional studies could also use regression models which adjust for market returns, market volatility, trading volume, news events and other explanatory variables. Last, formal structural-break or time-varying models could be used to examine the apparent time variations seen in some keywords.

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