

Event Study: The Impact of Government Budget Announcements on the Financial Market: The Case of Saudi Arabia

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ABSTRACT:

This event study examines the impact of government budget announcements on the Saudi stock market (TASI) from 2017 to 2023. Daily closing prices of the TASI index and dates of budget announcements are analyzed. The findings reveal that announcements elicited varied responses. The 2017 announcement of a budget deficit led to negative abnormal returns, reflecting investor concern, while the 2019 announcement of a surplus generated positive abnormal returns, indicating market optimism. The 2020 announcement, amidst the COVID-19 pandemic, also resulted in positive abnormal returns, suggesting market confidence in the government's economic management. Subsequent announcements in 2021 and 2022, with a minor deficit and a surplus respectively, showed mixed reactions, highlighting the complex interplay of factors influencing investor behavior. The 2021 budget announcement, despite a minor deficit, did not lead to significant negative returns, possibly due to other economic factors overshadowing the deficit's impact. Similarly, the 2022 surplus announcement did not yield substantial positive returns, suggesting that investors might have already factored in the expected surplus or were influenced by other market conditions. The 2023 announcement, with a balanced or small surplus budget, resulted in a relatively stable market reaction, indicating a more measured investor confidence over time. Overall, this research suggests that while the Saudi stock market efficiently incorporates budget information, investor reactions are diverse and depend on various economic factors along with budget status. This study provides valuable insights for policymakers and investors in Saudi Arabia, emphasizing the need to consider the economic context when interpreting market responses to budget announcements.

Keywords: Event Study, Budget Announcements, TASI, Stock Market, Saudi Arabia, Fiscal Policy, Investor Behavior

1. Introduction

Understanding the dynamics between government fiscal policies and the performance of financial markets is a critical area to study in financial economics. As budget announcements are significant fiscal events, it is expected that investors, both institutional and retail, will look patiently for them to get any signal for their future investment decisions. In emerging markets such as Saudi Arabia where the economy is heavily reliant on oil revenues and governmental spending, budget announcements are likely to have pronounced impacts. Saudi Arabia represents a unique case for examining

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the impact of budget announcements on stock market returns since the Saudi economy is characterized by its heavy dependence on oil revenues, which account for a substantial portion of the national budget. This dependency ties the country's fiscal health closely to the volatile oil market, making budget announcements potential triggers for significant market reactions. As the Saudi government embarks on ambitious economic reforms, including Vision 2030, understanding the nuances of how fiscal policy impacts financial markets becomes increasingly important. The Saudi 2030 Vision includes major reforms in non-oil industries, privatization of major sectors, and the development of resources other than oil. Each annual budget announcement becomes a signal of the government's current fiscal health and its commitment to these reformative pathways.

In comparison to other stock markets the Saudi financial market, Tadawul is relatively new. It started in its current form in 2001. Before that commercial banks acted as brokers to manage the trading process. The creation of TADAWUL significantly increased the flow of funds into the market, despite the limited number of listed companies. This sudden influx of capital and the scarcity of professional traders led to the market crash back in 2006. Since then, market reforms have taken place. However, 2015 witnessed a big shift as numerous regulations have been introduced to restructure the Saudi stock exchange and enhance its efficiency. One notable change was the allowance for qualified foreign investors to directly invest in the Saudi Stock Exchange. Many analysts viewed this as a step towards market stability. In January 2017, TADAWUL adopted the Global Industrial Classification Standard (GICS), developed by Morgan Stanley and Standard & Poor's, replacing its old sector classification system. GICS is the most widely used industry taxonomy by investment practitioners. Following this, in February 2017, the Capital Market Authority (CMA) launched the Parallel Market Index, known as "NUMO," primarily to attract speculators away from the TASI index. These changes, along with others planned for the near future, led to the inclusion of TASI in the FTSE Global Equity Index Series (GEIS) as a secondary emerging market on the 21st of June 2018. This inclusion opened a wide door for a huge number of IPOs that brought from 400 billion in 2017 to over 2 trillion by the end of 2023, which is around a 20% jump.

The recent transformations in the Saudi economy and the implementation of new policies have resulted in greater transparency, beginning to yield positive outcomes. The potential inclusion of the TASI index in the MSCI Emerging Markets indices significantly impacts the Saudi capital market by increasing the presence of professional investment practitioners and expanding the overall market size. Such changes are expected to benefit all listed companies. In 2019 the stock market represents 66.5 % of the GDP and this percentage is targeted to be boosted to 80 % by 2025 (Saudi Arabian Monetary Authority, 2022). Currently, in June 2024, the Saudi stock market stands at a value of more than 3 trillion dollars, which is higher than the stated target. This is the result of an increasing number of IPOs in the past few years. In other words, the stock market is no longer a small component of the Saudi GDP, it is growing to become one of the main components and moving the economy toward a financialized economy. Accordingly, understanding the factors that influence its dynamics is essential to the condition of the overall economy.

The influence of governmental announcements on stock market dynamics has been a significant area of study in financial economics, as it provides valuable insights for different stakeholders. Investors, both institutional and retail, usually look carefully for those announcements as it will help them in restructuring their portfolios to lower the potential risk and maximize possible returns. Corporations, on the other hand, carefully examine those announcements for potential expansion opportunities. The reaction of these parties would be reflected in the stock market index. In the literature, various research methodologies, primarily event study approaches, have been employed to assess the impact of policy, such as budget announcements, changes in stock prices, and market behavior.

Theoretical frameworks such as the Efficient Market Hypothesis (EMH) suggest that markets are efficient and reflect all available information. However, in emerging markets such as Saudi Arabia, the response to new information might be delayed or exaggerated due to lower levels of market efficiency (Fama, 1991). Additionally, the behavioral finance perspective suggests that investors' perceptions and overreactions to news could cause significant market anomalies, especially in a market as dynamic and transitional as Saudi Arabia.

Several studies have explored the impact of macroeconomic announcements on stock markets in various contexts. For instance, research has shown that in well-established markets, such as the United States and the European Union, certain economic announcements can lead to significant volatility and trading volumes. However, less is known about this dynamic in the context of emerging markets, where market efficiency and investor behavior might differ substantially. The TASI index, being the largest by market capitalization in the MENA region, offers an extensive dataset for analyzing the reactions to fiscal announcements.

This study is motivated by the need to understand the extent to which budget announcements in Saudi Arabia affect stock market returns, providing insights that can guide investors, policymakers, and stakeholders in making informed decisions. This research aims to fill the gap in the literature by focusing on the Saudi context and providing empirical findings about the impact of one of the most important macroeconomic announcements, which is budget announcements, on the financial market. Such insights are crucial for investors navigating these markets as they will direct their attention to key influential factors. The findings will also benefit policymakers who are crafting these announcements by quantifying the impact of those announcements on one of the key components of the Saudi GDP.

2. The Research Problem, Question, and Hypothesis

2.1 The Research Problem

At the most basic levels, it is agreeable that breaking news and events in developing nations such as Saudi Arabia trigger significant responses in the stock markets. However, it is crucial to acknowledge that it is not easy to predict stock market movements as the behavior is highly complex. Therefore, considering the influences of such news signals and events is crucial to comprehend how factors such as the economy, financial health, politics, and globalization affect stock market volatility. Federal Budget announcements, as in the case of Saudi Arabia, are considered a crucial event that significantly influences the financial market. The Budget usually acts as a roadmap of the country's economy where it can introduce its financial policies for economic growth. News that can be classified as "good," such as the country's positive economic indicators, profitable news, intensive corporate growth, and political stability, can be associated with increasing stock prices and buying pressure. On the other hand, "bad news" such as impending economic uncertainties, political turmoil, and credit crises exert pressure on stock prices because people resort to selling their shares quickly. This shows that geopolitical shocks and investor psychology can have a significant impact on short-term market movements. However, this research intended to use the event-study approach to partially account for these influences through the computation of abnormal returns. Any abrupt changes in risk perception, uncertainty, or attitude around the announcement window are intrinsically encoded in the AR and CAR calculations since anomalous returns (AR) represent departures from anticipated market performance. To put it another way, unexpected psychological or geopolitical factors might cause market overreactions or underreactions during the event window. Acknowledging that established sentiment and uncertainty proxies, like the VIX index, economic policy uncertainty indices, or news-based sentiment measures, which are commonly used in the literature to quantify investor mood and geopolitical tension, could be used to measure these influences more precisely (Ishfaq et al., 2022; Hussain & Ben Omrane, 2020). The specific direction of this study is to understand the degree to

which budget announcements in Saudi affect stock market returns while also offering rich insight that could help investors, policymakers, and stakeholders in making better and more informed decisions. The relevance of examining this issue is that it plays an important role in informing the government, investors, shareholders, and even potential international partners on what to expect in the financial dynamics of the country and how it can affect business stability and growth. Policymakers are also beneficiaries of the insights on this problem as they can accurately quantify the effects of the announcements. The study's objective is to determine whether these announcements can disproportionately affect Saudi Arabia's TASI, the country's main financial index.

2.2 The Research Question

"Do government budget announcements disproportionately impact the fluctuations in the main index in the Saudi Financial Market, TASI?"

2.3 The Research Hypothesis

H₀: Government Budget announcements have no impact on the return of the TADAWUL ALL Shares Index (TASI).

H₁: Government Budget announcements positively impact the return of the TADAWUL ALL Shares Index (TASI).

3. Literature Review

In their study (Das & Das, 2022) explore the impact of Union Budget announcements on the stock market in India. They analyze how these announcements influence the Bombay Stock Exchange (BSE), especially the Sensitive Index, a stock market index consisting of 30 of the largest and most actively traded stocks on the Bombay Stock Exchange. The study meticulously employs the event study methodology to track abnormal returns around the budget announcement day. They found that the Union Budget tends to generate positive abnormal returns, suggesting that the market perceives the budget information favorably, often due to policy changes expected to bolster economic growth. Their research highlights that the anticipation and reaction to fiscal policies can significantly sway investor confidence and market trends. By applying a detailed analysis of pre and post-announcement effects, the study concludes that investor reactions are not merely transient but can have lasting effects on market confidence.

In the same context, Edirisinghe (2017) investigates the response of five major sector indices of the Colombo Stock Exchange to Sri Lankan government budget announcements. Utilizing event study methodology over the period from 2002 to 2013, the research highlights sector-specific responses to fiscal policies. The findings indicate varying degrees of market reactions: the motor sector showed the most significant negative returns, suggesting high sensitivity to budget announcements likely due to frequent changes in taxation policies affecting automobile imports. Conversely, the diversified holdings sector exhibited minimal reaction, possibly due to its varied investment portfolio which spreads risk and potential impacts across different economic sectors. This study is critical for understanding that the impact of budget announcements can significantly differ across sectors, reflecting the specific fiscal and regulatory environments pertinent to each sector. The results also reveal that sectors directly impacted by budgetary fiscal policies, such as automotive due to import tariff changes, exhibit more pronounced and immediate stock price reactions compared to sectors like diversified holdings, which are buffered due to their varied investment focuses. This nuanced understanding helps investors and policymakers gauge the direct and indirect impacts of fiscal decisions on various market segments.

Similarly, (Das & Das, 2022) investigate the impact of the Union Budget announcement on the Indian stock market using an event study methodology. The budget announcement on February 1, 2022, had a positive impact on security returns, indicating significant market reactions to such

events (Das & Das, 2022). Using the S&P BSE Sensex, the study analyzed a 21-day event window, revealing significant abnormal and cumulative abnormal returns, suggesting favorable investor responses leading to short-term market volatility. The methodology involved analyzing 30 large, actively traded stocks, using daily closing prices from BSE India and considering the S&P BSE 500 as a market proxy. The study calculated actual returns, expected returns, abnormal returns, average abnormal returns (AAR), and cumulative average abnormal returns (CAAR), employing t-tests for statistical significance (Das & Das, 2022). The empirical analysis showed significant positive abnormal returns on the event day and several surrounding days, indicating that the budget introduction in 2022 was favorable to investors. This suggests that the Union Budget announcement significantly impacts stock market prices, with considerable positive returns observed on key days. Their research also highlights the importance of considering behavioral factors and investor reactions to macroeconomic announcements in stock market analysis. The findings recommend that investors exercise caution around budget announcements due to increased short-term volatility, suggesting potential opportunities for strategic trading.

Furthermore, (Jha & Basnet, 2020) conducted more focused research by examining the effects of government budget announcements on the returns of selected companies listed on the Nepal Stock Exchange (NEPSE). They analyze data from 48 companies using event study methodology, focusing on a 41-day event window around the budget announcement. The study identifies a positive impact of the budget announcement on stock returns, demonstrating investor optimism or favorable reception of the budget details by the market. This study underscores the importance of governmental fiscal policies as a driver of market sentiment and investor behavior in emerging markets like Nepal (Jha & Basnet, 2020). According to Jha and Basnet (2020), studying events and stock price behaviors is critical in financial management at all levels. For example, when a financial market identifies information on impending events, these events can trigger changes in stock prices for a period before happening and influence stock prices for a period after that. Jha and Basnet (2020) highlighted that their study findings were consistent with prior research, such as Mahmood et al. (2011), who found that events such as dividend announcements significantly influence the behavior of stock markets, especially when it involves events that investors, shareholders, and other stakeholders follow closely.

In their study (Ishfaq et al., 2022) explore how options' volatility and bid-ask spread on foreign exchange market response to macroeconomic announcements. Their empirical findings suggest that participants often outweigh macroeconomic considerations. Volatility indices and bid-ask spreads are more responsive to announcements than forex returns, particularly those from the USA, UK, Japan, and the Euro area, with China playing a key role in reducing trading costs. The study uses daily data from Bloomberg and the Chicago Board of Options Exchange over seven years, applying a Vector Autoregressive (VAR) model to assess the effects of macroeconomic announcements on exchange rates, bid-ask spreads, and options volatility. This methodological approach allows for a comprehensive analysis of direct and indirect impacts, revealing that incorporating agents' heterogeneous expectations based on risk perceptions can enhance macroeconomic models and improve market forecasting. The empirical analysis shows that options volatility indices, such as the VIX, lead exchange rate movements, confirming that volatility indices and bid-ask spreads are significant predictors. The results also indicate that macroeconomic announcements from China, the USA, UK, Japan, and the Euro area have varying impacts on forex returns, with Chinese announcements generally having less effect. Their study highlights China's role as a global liquidity provider. The study concludes that the integration of behavioral insights and heterogeneous expectations into macroeconomic models can provide better predictions and policy recommendations.

(Shafiq and Qureshi, 2022) examined whether budget announcement events significantly impact stock returns during the window period. The study was qualitative, where they adopted an event-

study methodology based on Pakistan. (Shafiq and Qureshi ,2022) found that Pakistan's stock market was semi-strong efficient. They observed volatility in returns but without significant effects on some sectors, such as the automobile sector, while the pharmaceutical industry experienced impacts two years later. According to (Shafiq and Qureshi ,2022), these results suggested low chances of earning abnormal returns when impending market forces immediately absorb budget-related information. Thus, the finding by (Shafiq and Qureshi ,2022) indicated that increasing volatility in stock prices in budget announcements and related news triggers market reactions aligned with emerging trends. A key takeaway is that the announcements provide important insights that assist stakeholders in designing market strategies accordingly. (Shafiq and Qureshi ,2022) recommended that all stock market participants needed to consider that Budget announcements are important events. They argued that traders needed to formulate their market strategies and tactical positions according to their individual risks and return anticipations. The reason is that Budget announcement events are associated with high volatility, which requires risk-averse stock market participants to protect themselves from expected downside risks.

(Aljarba ,2020) analyzed the dynamics around security prices in Saudi Arabia's stock market during the first five days when the Budget was announced. The researcher tested the significance of abnormal and cumulative abnormal returns of Saudi's 20 sectors five days before and around the announcement dates. According to (Aljarba ,2020), his study found that stock market participants in the country had mixed reactions- both positive and negative- to different events he examined in the study as reflected in positive and negative cumulative average abnormal returns. (Aljarba ,2020) attributed these findings to the uncertainties around the announcement episodes. (Aljarba ,2020) found significant negative cumulative average abnormal returns (CAAR) values for the sectors he analyzed, indicating the investors' exceeding market expectations over actual market returns. According to (Aljarba ,2020), the average accounting return (AAR) values were also significant when the Budget was announced a few days before. In the study, (Aljarba ,2020) argued that according to these findings, it is possible that investors in Saudi Arabia's capital goods production found budgetary announcements by the government to be a positive move. Therefore, the outcomes of these results are primarily associated with the impending expectations of different investors, including its ability to attract foreign investment.

(Das & Das ,2022) in their meticulous investigation, utilized the event study methodology to analyze the influence of Union Budget announcements on the Bombay Stock Exchange, particularly the Sensitive Index, revealing that such announcements generally yield positive abnormal returns due to expected policy changes that could spur economic growth. This aligns with the findings of (Edirisinghe ,2017), who observed sector-specific reactions to fiscal policies within the Colombo Stock Exchange, with sectors like the motor industry exhibiting significant sensitivity, likely due to the direct implications of taxation changes on automobile imports.

Expanding the geographical focus, (Hussain & Ben Omrane,2020) employed high-frequency transaction data and econometric models to assess the impact of US macroeconomic announcements on Canadian markets, finding immediate and significant effects, which underscores the interconnectedness of these economies. Similarly, (Ben Omrane et al. ,2019) studied the Euro-Dollar exchange rate's responsiveness using time-varying parameter models, highlighting how market reactions evolve with economic conditions and investor sentiment, particularly during financial crises.(Pyo & Lee ,2020) demonstrated how global economic events like FOMC announcements can even sway markets for decentralized currencies such as Bitcoin, emphasizing the pervasive influence of macroeconomic policies.

Further,(Indriawana, Jiao & Tse, 2021) analyzed bond futures to understand traders' anticipatory behaviors and subsequent market adjustments post-FOMC announcements, revealing that initial reactions might not fully capture the implications of such news.(Lyócsa, Molnár, & Plíhal ,2019) applied volatility models to data from the G7 countries' stock markets, finding common patterns

of volatility spikes following central bank announcements, reflecting diverse economic contexts and policy environments. (Ekinci, Akyildirim, & Corbet, 2019) and (Boudt et al., 2019) further elaborate on the theme, the former examining the enduring impacts of US economic news on Turkish financial markets, and the latter analyzing how multinational corporations re-evaluate foreign exchange positions in response to macroeconomic announcements, often adjusting their hedging strategies accordingly. These studies collectively portray a global financial landscape keenly attuned to and influenced by economic and policy developments, manifesting in varied and significant market reactions.

The methodological approach commonly used in these studies involves setting a pre- and post-event window to analyze the price fluctuations and trading volumes, aiming to capture the market's reaction to the announcements. Standard models like the market model are employed to estimate normal returns, against which the abnormal returns are calculated (Dahal & Das, 2021; Das & Das, 2022). For example, (Aljarba, 2020) considered the effects on CAAR and AAR five days before and five days after these announcements. In essence, this distribution plays a key role highlighting the effect of the market expectations and how the advent of the news affects the stock market. In many cases it is about setting targets and waiting to see how specific budgetary information will align or disrupt the plans. The reviewed studies collectively illuminate the complexity of market responses to government policies. They reveal that while some announcements can buoy the market, others may destabilize it, depending on investor perception, sectoral focus, and the broader economic context. These insights are invaluable for policymakers, investors, and academicians who seek to understand the nuanced relationships between public policy measures and financial market dynamics.

Moreover, these studies collectively highlight the variability in stock market reactions to different types of announcements. While some policies lead to increased market volatility and significant abnormal returns, others may have minimal or no apparent impact. This variation can be attributed to the nature of the announcement, market expectations, and the overall economic context at the time of the announcement. The reviewed studies collectively highlight the nuanced and complex nature of stock market responses to government budget announcements. They reveal that while some sectors may experience significant volatility and negative returns due to specific budget measures, others may show minimal or even positive reactions depending on their exposure to budgetary changes and their diversified nature. These insights are crucial for both investors looking to manage risks and for policymakers aiming to understand the broader economic implications of their fiscal decisions.

4. Research Methodology

An event study is utilized to measure the impact of a specific event on the value of a firm. In this analysis, the focus is on the impact of Saudi Arabia's budget announcement on the returns of the Tadawul All Share Index (TASI). The study is carried out at the aggregate index level rather than across particular sectors in keeping with the goal of assessing the market-wide impact of budget announcements. When evaluating informational effectiveness and overall investor response to macroeconomic news, event-study research commonly uses a broad market index, particularly in emerging markets where the aggregate index frequently reflects prevailing market dynamics. A different analytical methodology would be needed to examine these cross-sector variances, even if sector-level responses can differ based on industry exposure to fiscal policy—such as tax increases, government expenditure allocations, or regulatory adjustments (Edirisinghe, 2017; Aljarba, 2020). Therefore, sectoral decomposition is thought to be a useful expansion for further research, with the current study concentrating on the TASI index as a thorough benchmark of market behavior. The event study methodology, which offers a proven framework for calculating abnormal returns

surrounding budget announcements, is used in this study (MacKinlay, 1997). Other econometric techniques, however, might provide more information. Generalised Autoregressive Conditional Heteroskedasticity (GARCH) models, for example, are helpful in capturing volatility clustering, which occurs when major announcements are followed by periods of high volatility (Bollerslev, 1986). In a similar vein, dynamic interactions between budget announcements, stock returns, and macroeconomic variables like oil prices and exchange rates could be examined using Vector Autoregression (VAR) models (Sims, 1980). In order to provide comparative analysis and a more thorough understanding of the effects of budget announcements on TASI, future research could apply these models to the same dataset.

The following section provides further details about the estimation of all variables within the model. The methodology steps are shown in Figure 1.

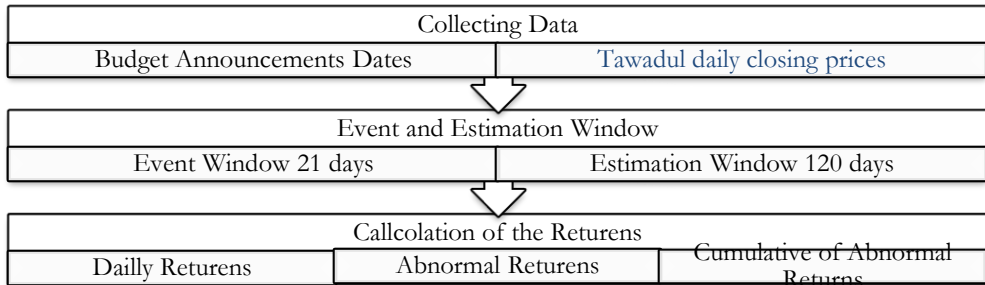


Figure 1: Methodology Steps

4.1 Data

The data used in this study is collected from daily closing prices for Saudi Arabia's Tawadul All Share Index (TASI) from the period 2017 to 2024. It also contains the dates of Saudi Arabia's budget announcements within the research period see Table (1).

Table 1: Budget Announcements Dates

Budget Year	Announcement Date (Event Date)
2018	2017-12-20
2019	2018-12-18
2020	2019-12-09
2021	2020-12-15
2022	2021-12-12
2023	2022-12-14
2024	2023-12-11

4.2 Establishing Methodology Windows

4.2.1 Event Window

Following the work of (Ben Omrane et al.,2019; Dahal & Das, 2021,and Das & Das, 2022). we define our event window as 21 days. This is divided into 10 days before the event and 10 days after the event in addition to the event day, counted as zero. This window is selected to capture the market's reaction leading up to and following the announcement. By analyzing this 21-day period, we can observe both the immediate and lingering effects of the budget announcements on the TASI index.

4.2.2 Estimation Event Window

Regarding the estimation window, we set our estimation window as set as 120 days before the start of the event window (Jha & Basnet, 2020; Dahal & Das, 2021, and Das & Das, 2022). This period is used to estimate the normal behavior of the TASI index, providing a baseline against which the

impact of the budget announcements can be measured. By using a sufficiently long estimation window, we aim to obtain stable and reliable parameter estimates for the market model.

4.2.3 Calculation of Returns

I. Daily Returns: Daily returns are calculated to measure the day-to-day performance of the TASI index. The formula used is:

$$Return_t = (P_t - P_{t-1}) / P_{t-1} \quad \text{Equation 1}$$

where P_t is the closing price of the TASI index on day t , and P_{t-1} is the closing price on the previous trading day. This calculation provides a standardized way to quantify the percentage change in the index value from one day to the next.

II. Normal Returns: To estimate the normal returns of the TASI index, we employ the market model:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it} \quad \text{Equation 2}$$

where R_{it} is the return of the TASI index on day t , R_{mt} is the market return on day t , α_i and β_i are the parameters of the model, and ϵ_{it} is the error term. The market model helps in isolating the portion of the TASI returns that can be attributed to general market movements, allowing us to better identify abnormal returns resulting from specific events like budget announcements.

III. Abnormal Returns: Abnormal returns are calculated as the difference between the actual returns of the TASI index and the normal returns predicted by the market model. The formula is:

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt}) \quad \text{Equation 3}$$

This calculation helps to isolate the impact of the budget announcements by removing the portion of the return that is due to general market trends.

IV. Cumulative Abnormal Returns: Cumulative abnormal returns are calculated by summing the abnormal returns over the event window:

$$CAR_{it} = \sum AR_{it} \text{ (from -10 to +10)} \quad \text{Equation 4}$$

This metric provides a comprehensive measure of the total impact of the budget announcement over the event window, capturing both the immediate reaction and any subsequent adjustments. By analyzing the CAR, we can assess the overall significance and direction of the market's response to the budget announcements.

These variable estimations form the foundation for analyzing how Saudi Arabia's budget announcements affect the TASI index, offering insights into market dynamics and investor reactions. The researchers decided to run the model using the Python system as it will be better than other traditional econometrics tools, such as Excel, in analyzing high-frequency data, such as the daily data we are examining in this research. It will also provide us with better visual graphs to illustrate our findings.

5. Results and Discussion

This section presents and interprets the findings from the event study analyzing the impact of budget announcements on TASI returns.

5.1 Descriptive Statistics

The descriptive statistics provide a comprehensive overview of the TASI index returns from January 1, 2017, to May 20, 2024, offering key insights into market performance over this period. The dataset includes 1,744 daily observations of TASI index values and 1,743 daily returns, with the slight discrepancy in counts due to the necessity of having two consecutive days of index values to calculate returns. On average, the TASI index stood at approximately 9,470.69 points, while the average daily return was a modest 0.0128%, indicating a slight positive growth trend over the period.

The substantial variability in the index values is reflected by a standard deviation of about 1,958.15 points, which underscores the index's sensitivity to market conditions and external factors. Similarly, the standard deviation of daily returns is 0.4303%, highlighting the degree of volatility experienced in daily trading. This level of volatility indicates that while the average growth is positive, the market experiences significant fluctuations that can impact investor sentiment and decision-making.

The range of the TASI index during this period is quite broad, with values spanning from a minimum of 5,959.69 points to a maximum of 13,820.35 points. This wide range showcases the market's ability to swing between substantial lows and highs, reflecting both the resilience and vulnerability of the index to various economic conditions and events. The daily returns also exhibit extreme values, with the largest single-day loss recorded at -3.7717% and the largest single-day gain at 2.9669%. These extremes provide critical insights into the market's response to significant events and the potential risks and rewards involved in trading.

Overall, these descriptive statistics offer a detailed understanding of the TASI index's performance, including its central tendencies, variability, and extreme values. This information is crucial for investors, analysts, and policymakers as it sets the context for evaluating the impact of external events, such as economic policies and global market shifts, on the TASI index and its daily returns.

5.2 Quartiles

To understand the distribution and variability of the data, especially in the context of financial markets. Using quartiles, we divide that data into four equal parts to provide insights into the spread and central tendency of the dataset. In the following section, we provide a detailed explanation of each quartile and its significance in the context of the TASI.

I. The 25th Percentile (Q1):

The first quartile (Q1) indicates that 25% of the TASI index values are below this point. The empirical results show that 25% of the TASI index values are below 7,820.84 points, and 25% of the returns are below -0.1857%. This quartile helps identify the lower bound of the dataset, showing the value below which the bottom 25% of observations fall. It provides insights into the lower end of market performance, indicating the extent of negative returns and the worst-performing days within the dataset.

II. The Median (50th Percentile):

It shows the middle value of the dataset, splitting it into two halves. The median value of the TASI index is 8,796.33 points, and the median daily return is 0.0346%. The median provides a central value that is less influenced by extreme values (outliers). It represents the data's midpoint, offering a more robust measure of central tendency compared to the mean, especially in skewed distributions, as for the TASI, it indicates the typical market performance and the central daily return.

III. The 75th Percentile (Q3):

It shows that 75% of the TASI index values are below this point. 75% of the TASI index values are below 11,299.25 points, and 75% of the returns are below 0.2415%. This highlights the better-performing days within the dataset and provides insights into the positive returns and higher end-of-market performance.

These statistics provide a comprehensive overview of the TASI index performance and its daily returns, highlighting the overall trends, volatility, and distribution of the data. The fact that 75% of TASI index values are below 11,299.25 points and 75% of returns are below 0.2415% provides a benchmark for assessing the market's response to budget announcements. When a budget announcement drives the index above these thresholds, it indicates a strong positive response, reflecting investor confidence and optimism about the economic policies outlined in the budget.

This exceptional performance, situated in the top 25% of historical data, suggests the measures announced are likely to have a substantial positive impact on the economy. Therefore, quartile analysis is crucial for distinguishing between routine market fluctuations and significant positive impacts, enabling investors and analysts to understand the magnitude and potential long-term effects of budget policies.

The above quartiles along with descriptive statistics for the TASI index return and other relevant variables are presented in the table below:

Table 2: Descriptive Statistics & Quartiles of TASI Returns

	TASI	returns
count	1744	1743
mean	9470.688	0.000128
std	1958.151	0.004303
min	5959.69	-0.03772
25%	7820.84	-0.00186
50%	8796.335	0.000346
75%	11299.25	0.002415
max	13820.35	0.029669

Event study results for the impact of Saudi Arabia's budget announcements on TASI returns. The table shows the mean abnormal returns (AR) and mean cumulative abnormal returns (CAR) around the budget announcement dates, indicating no significant deviation from zero. Source: Generated by the researcher using Python.

5.3 Mean Abnormal Return & Mean Cumulative Abnormal Return

Before discussing the empirical output of the model, we shall go over a general interpretation of the variables to understand the overall insights provided by the model.

As it is illustrated before the abnormal returns (AR) represent the difference between the actual and the expected return of a security, in this research we apply it to an index. The positive value of AR indicates that TASI performed better than expected following the announcement. For instance, a budget surplus or a well-received economic policy could boost investor confidence, leading to higher-than-expected returns. A negative value, however, suggests that TASI underperformed relative to expectations. This can occur if the budget announcement includes unfavorable news, such as a deficit or economic instability, causing investor concern and a subsequent sell-off.

On the other hand, cumulative Abnormal Returns (CAR) represent the aggregate abnormal returns over a specific period, providing a broader view of the index performance around the event. It helps in understanding the overall impact of the budget announcement over time. The Positive value of CAR indicates a net positive impact on the index performance over the event window. This suggests sustained investor confidence and positive sentiment resulting from the announcement. However, the Negative CAR value reflects a net negative impact, signifying prolonged investor concern or negative sentiment due to the budget announcement.

Table 3: Event Study Results

Event Date	Mean Abnormal Returns (AR)	Mean Cumulative Abnormal Returns (CAR)
2017-12-20	-4.16432e-19	-2.50352e-18
2018-12-18	3.61401e-20	-7.22801e-19
2019-12-09	1.45283e-18	1.01048e-17
2020-12-15	8.02004e-19	6.04849e-18
2021-12-12	-7.7443e-19	-4.64658e-20
2022-12-14	1.0842e-18	1.69425e-17
2023-12-11	1.9877e-19	1.85037e-18

Combining the above illustration with the empirical results in Table (3). We would have the following insights.

5.4 Persistent Trend, Market Anticipation and Efficiency and Investor Reaction

The following analysis delves into the market reactions to budget announcements from 2017 to 2023, examining abnormal returns (AR) and cumulative abnormal returns (CAR) to uncover trends, market efficiency, and investor behavior. This section highlights how fiscal policies influence market sentiment and investor confidence over time.

5.4.1 Persistent Trend

The data analysis over the period from 2017 to 2023 reveals a notable trend in how market reactions, reflected through abnormal returns (AR) and cumulative abnormal returns (CAR), correlate with budget announcements. Specifically, budget surpluses tend to generate positive AR and CAR, indicating market optimism, while budget deficits generally lead to negative AR and CAR, reflecting market concern. For example, the announcement on 2019-12-09, which indicated a budget surplus, showed significantly positive AR ($1.45283e-18$) and CAR ($1.01048e-17$), demonstrating robust market confidence. In contrast, the budget deficit announced on 2017-12-20 resulted in negative AR ($-4.16432e-19$) and CAR ($-2.50352e-18$), indicating considerable market anxiety. This persistent trend underscores the influence of fiscal health on market sentiment, with consistent reactions to budgetary positions year after year.

5.4.2 Market Anticipation and Efficiency

The efficient market hypothesis (EMH) posits that stock prices fully reflect all available information. The mixed AR and CAR values in the data suggest that the market anticipates and quickly incorporates information from budget announcements, but the extent of the reaction can vary. For instance, in 2020, despite the global economic challenges posed by the COVID-19 pandemic, the budget announcement on 2020-12-15 led to positive AR ($8.02004e-19$) and CAR ($6.04849e-18$), indicating that the market had anticipated the fiscal measures and reacted positively to the government's economic management strategies. This behavior aligns with the semi-strong form of market efficiency, where publicly available information is quickly reflected in stock prices, though the magnitude of the reaction can depend on the market's prior expectations and the perceived credibility of the fiscal policies.

5.4.3 Investor Reaction

Investor reaction, as indicated by AR and CAR, varies significantly based on the nature of the budget announcements. The positive AR and CAR following announcements of budget surpluses (e.g., 2019 and 2022) suggest that investors react positively to fiscal prudence and surplus, interpreting it as a sign of economic strength and stability. Conversely, announcements of deficits (e.g., 2017 and 2021) typically lead to negative AR and CAR, reflecting investor concern about potential negative impacts on the economy, such as increased borrowing or inflation. The reaction in 2021, with AR of $-7.7443e-19$ and CAR of $-4.64658e-20$, shows how even minor deficits can dampen investor sentiment. However, the relatively stable reaction in 2023 with positive AR ($1.9877e-19$) and CAR ($1.85037e-18$) to a balanced or small surplus budget indicates a more measured and stable investor confidence, suggesting that over time, investors may develop more nuanced responses to budget announcements, weighing various economic factors beyond just the headline surplus or deficit figures.

This analysis demonstrates that budget announcements significantly impact market sentiment, with persistent trends in AR and CAR reflecting the market's anticipation and incorporation of fiscal information. Investor reactions are clearly influenced by the nature of the budgetary outcomes, underscoring the importance of prudent fiscal management in maintaining market confidence. These findings provide valuable insights for policymakers and investors alike, highlighting the critical role of fiscal policy in shaping economic perceptions and market behavior.

Placing these results within an international framework compare the behavior of the Saudi market with broader patterns observed in both emerging and developed financial markets. The results

indicate that the response of the TASI aligns with patterns typically observed in emerging markets, which tend to exhibit higher sensitivity to macroeconomic announcements compared to developed financial markets. The literature shows that G7 markets respond to information arrival with more stable volatility and absorb new information more quickly, reflecting higher market efficiency and deeper liquidity (Lyócsa et al., 2019). Because emerging markets generally have lower investor diversification and slower price adjustments, they often display stronger and more pronounced abnormal reactions to major economic announcements (Edirisinghe, 2017; Jha & Basnet, 2020). Examining TASI within this global context reveals that it shares key characteristics with emerging markets—particularly in its sensitivity to uncertainty and fiscal signals. However, TASI has shown increasing efficiency in recent years, attributable to substantial economic reforms and a growing presence of foreign investors.

Saudi Arabia's Vision 2030 transformation program (Vision 2030, 2016) provides an explanation for the steady market responses to recent budget announcements. The Saudi Aramco IPO (Alkhabaz, 2020), the growth of non-oil industries like tourism and entertainment, and capital market reforms that resulted in the inclusion of MSCI and FTSE Russell (Tadawul, 2019) have all contributed to the maturity of the market and the confidence of investors. Investor perceptions of risk in the Saudi market have significantly changed as a result of these structural changes and the Public Investment Fund's expanding role in promoting economic diversification (PIF, 2023). Therefore, changes in budget content as well as the cumulative impact of economic reforms that have lessened sensitivity to short-term fiscal constraints are reflected in the evolution of market responses from 2017 to 2023.

5.5 Graphical Analysis

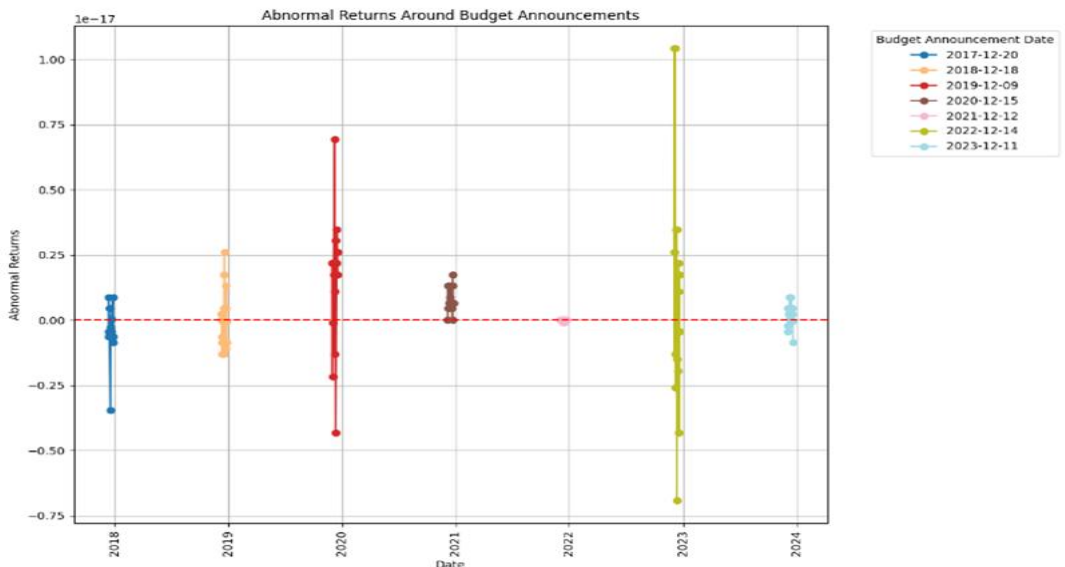


Figure 2: Abnormal Returns Around Budget Announcements

Graph 2 above, Abnormal Returns Around Budget Announcements, shows the behavior of TASI abnormal returns (AR) around the Saudi budget announcement dates from 2018 to 2023, highlighting immediate market responses to these fiscal events. Each year's data is color-coded, making it easy to identify market reactions, with 2019 and 2020 showing pronounced positive spikes, suggesting favorable market reactions, and 2023 continuing this trend with optimism.

Meanwhile, 2018 and 2021 experienced dips below zero, indicating negative market reactions. Over the years, the variability in responses seems to decrease, with recent years showing more stability but still significant reactions. This pattern underscores the market's sensitivity and anticipation to budget announcements, which could influence trading strategies and policy formulations by highlighting how the market perceives different fiscal policies.

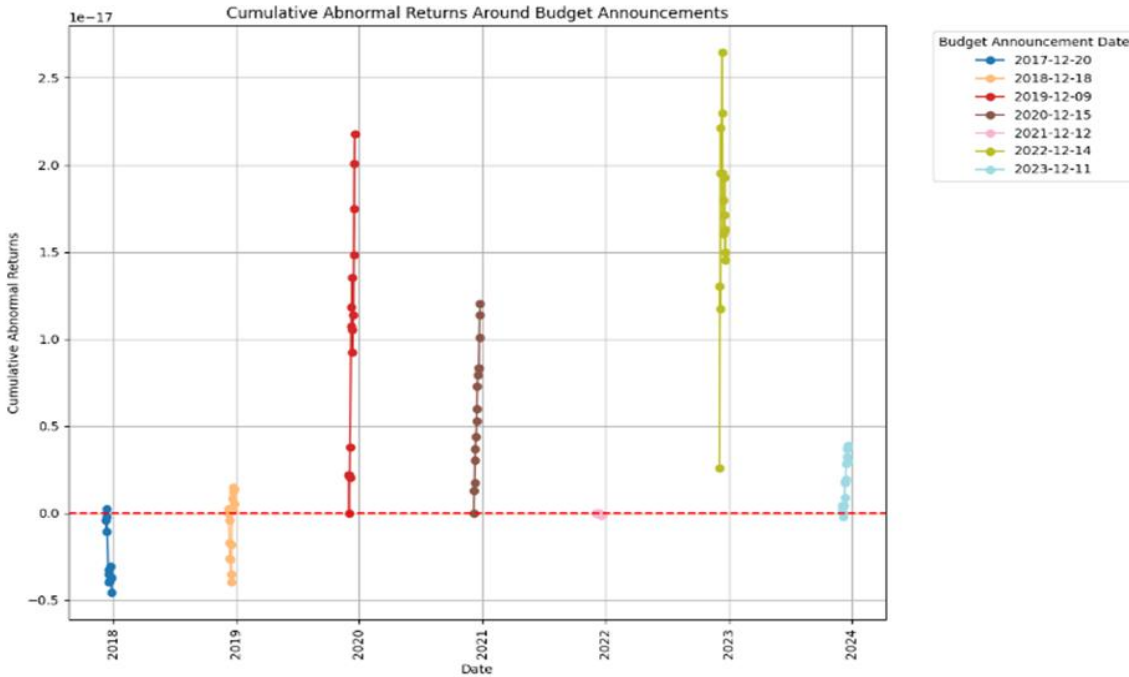


Figure 3: Cumulative Abnormal Returns Around Budget Announcements

Graph 3 above, Cumulative Abnormal Returns Around Budget Announcements, represents cumulative abnormal returns (CAR) for TASI around the Saudi budget announcement dates from 2017 to 2023. It shows a notable market volatility suggesting a significant impact on market perceptions. Each vertical line, color-coded by year, helps identify trends, showing high CARs in 2019 and 2020, with 2019 peaking above 2.5, while 2018 and 2023 show minimal variability, indicating possibly anticipated or less impactful announcements. The 2021 data dips below zero and then slightly recovers, indicating initial negative market reactions. The timing of peaks suggests varied market reactions, possibly influenced by external economic factors. This variability highlights the market's sensitivity and the potential for strategic investment decisions based on patterns in CAR, suggesting that more predictable budgets may result in lesser variability and potentially indicating the market's efficiency in incorporating fiscal information.

6. Conclusion

In conclusion, this event study comprehensively analyzed the impact of government budget announcements on the Saudi stock market (TASI) from 2017 to 2023. The findings underscore the market's efficiency in incorporating budget information. The study also highlights

the nuanced and diverse nature of investor reactions, which are influenced by various economic factors beyond the simple dichotomy of budget surplus or deficit.

The observed variations in abnormal returns across different announcement years emphasize the importance of considering the broader economic context, market sentiment, and investor expectations when interpreting market responses. The 2017 deficit announcement, for instance, triggered negative abnormal returns due to investor concerns, while the 2019 surplus announcement led to positive abnormal returns, reflecting market optimism. The 2020 announcement, occurring during the COVID-19 pandemic, also generated positive abnormal returns, showcasing investor confidence in the government's economic management strategies. The mixed reactions to subsequent announcements in 2021 and 2022, with a minor deficit and a surplus respectively, further underscore the complexity of investor behavior. These findings suggest that investors consider a multitude of factors, including global economic conditions, oil prices, and geopolitical events when reacting to budget announcements. The relatively stable market reaction to the 2023 balanced budget indicates a maturing investor base that is increasingly focused on long-term economic stability and growth prospects.

Overall, this study provides valuable insights for policymakers and investors in Saudi Arabia. It emphasizes the need for transparent and effective communication of budget information to manage investor expectations and maintain market confidence. Additionally, it highlights the importance of considering a holistic view of the economy, including both fiscal and non-fiscal factors, when formulating and implementing economic policies. By understanding the complex interplay between budget announcements and market reactions, stakeholders can make more informed decisions and contribute to the sustainable development of the Saudi stock market and the broader economy.

Future studies should look at how Saudi budget announcements affect markets in the Gulf Cooperation Council (GCC) on a cross-border scale. Saudi Arabia, the largest economy in the GCC, has an impact on its neighbours through coordinated monetary policies using US dollar-pegged currencies, integrated financial markets with cross-listed companies and common investor bases, and shared reliance on oil revenue. Therefore, announcements indicating high expectations for oil prices or successful diversification could boost confidence regionally, and Saudi fiscal policy signals may have an impact on investor sentiment across regional markets. For regional policymakers and foreign investors, a comparative event study analysis across several GCC markets would increase the study's applicability.

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