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OF SOCIAL AND POLITICAL STUDIES
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Department of Public Administration

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The informational value of the Federal Reserve Regulatory Stress Tests:

An event study on Returns and Volumes from 2013 to 2017

Konstantinos Voulgaropoulos

Supervisor: Emeritus Prof. **A. Tsamis**

Advisory Committee Members

Assoc. Prof. J. Filos

Emeritus Prof. A. Apostolou

Abstract

Banks are corporations. But, because of the magnitude of their stakeholders, they are at all times regulated. The consequent regulatory cost seems to burden their stakeholders. In our effort to assess whether regulation can at times comprise an efficient corporate mechanism by reliably informing shareholders, we examine the informational value of the annual regulatory stress tests that the Federal Reserve System is conducting. Based on the assumption of the semi-strong form of market efficiency, we conduct an event study concerning the regulatory stress tests from 2013 to 2017 to assess whether they influence the capital market by providing valuable information to shareholders and investors. We find evidence that they influence capital markets by inducing a noteworthy rise on the returns of the examined stock the day before the event, succeeded by a significant plunge in the event day. Substantial abnormal volume is observed only on the day after the event, while the majority of abnormal returns reverts towards zero, implying that the market spotted undervalued stocks and rushed to obtain them.

Key words: stress test, event study, corporate governance of bank, Federal Reserve System

Contents

Introduction

Banks are corporations. Corporations use labor and capital inputs in order to produce outputs. Both the individuals providing the inputs and those affected by the outputs constitute the corporation's stakeholders.

Their management is exerted by professionals, their equity is provided by shareholders and a multitude of stakeholders, such as the employees and local societies, is affected by their operations.

The shareholders, as with every corporation, risk their invented wealth expecting a return. Managers on the other hand are bound to maximize the corporation value, without nevertheless risking their own wealth. That risk discrepancy between leads to the principal – agent problem according to which the principal cannot completely ensure that his interest is aligned with the managers'. From that potential divergence of interest emerge agency costs which burden both sides.

In order to minimize these agency costs, they establish control and decision-making procedures, the corporate governance mechanisms. A fundamental prerequisite for the efficient function of corporate governance is credible financial information. Financial information renders possible the quantification of inputs and outputs. Without it, monitoring the outcomes of the various decisions becomes extremely problematic. From an efficient corporate governance are benefited not only the capital providers, but also the stakeholders.

Banks differ from the rest of the corporations mainly in the multitude and magnitude of their stakeholders. Their capital structure is based asymmetrically more in debt, while every individual depositor owns a very small fraction of it to maintain monitoring incentives. Additionally, because of their interconnection and their central role in an economy, banks are emanating risk of severe externalities. Finally, the quality of their assets is not readily observable and their operational activities are acutely wide and complex.

On top of these, governments constitute an essential creditor by guaranteeing a large part of their deposits. Hence, it is rather reasonable for them to constantly monitor and regulate financial systems. That monitoring, however, incurs extra cost to them, the regulatory cost.

In the present study we examine whether a regulatory monitoring mechanism, namely the stress testing, can comprise a corporate governance mechanism by providing credible information to the various stakeholders. As proxy for the quality of information is considered the capital market’s activity. If market participants receive reliable information concerning the risk level and the probability of bankruptcy of each corporation, they will seek to hold certain stocks of their preference, resulting in increased market activity.

Provided that the respective capital market is efficient in the semi-strong form, the market will become more active, resulting in an abnormal return, either positive or negative, and an abnormal volume of stocks traded.

To deduce the impact of stress tests on the stocks of the corporations legally oblige to participate, we analyze the changes they brought from 2013 to 2017. These changes are observed by conducting an event study on the returns and trade volumes of a sample of all participated institutions. That sample constitutes 48% of the whole population and it consists of the corporations that were included in all stress tests and whose stock market data from 2012 to September of 2017 is available.

What is a corporation

A corporation is constituted whenever generation of profit, namely amount of output greater than the amount of each separately used input, is possible. A corporation uses multiple inputs to produce outputs, thus rendering necessary the exact specification of each input owner’s contribution and her respective reward. Such rules are developed via the contractual structure of the corporation (Alchian & Demsetz, 1972).

According to the classical economic theory, input owners’ rewards are more efficiently configured by a market. In that sense, the employer has no incentive to rent a specific factor for a long period of time. Instead, it would be optimal for him to buy the factors needed on a regular basis benefiting from competition. What makes such a behavior irrational is the existence of transactional costs (Coase, 1937). These costs are minimized by renting factors of production on a longer-term basis.

Transaction costs consist of the search and information, the bargaining and the policing and enforcement costs. (Dahlman, 1979) . The search and information costs consist of the cost of acquiring the information, the opportunity cost of the time and the mental effort devoted on the search. The bargaining costs contain all expenditures realized in order to achieve a deal. Finally, monitor costs amount to the expenses carried to monitor and impose the agreed terms.

All relations among the individual input owners that govern a corporation’s function are originated by its’ contractual structure. That nexus of contracts between the different factors of production is the essence of the corporation (Jensen & Meckling, 1976). These contracts determine each factor's rights on the corporation's outputs and assets.

If these rights can be specified exactly, they are specific and they usually describe rewards in exchange for labor. In modern corporation, where ownership and management are separated (Berle & Means, 1932), the function of deciding is a type of labor input with semi-specific rights.

On the other hand, owners' rights are very difficult and costly to be specified completely (Teece, 1980). Hence, they purchase all the rights except those specified in the various contracts (Grossman & Hart, 1986). As a result, owners might enjoy potential surpluses, in case monetary amount generated from outputs turns out to be more than what is needed to rent the inputs, but they nevertheless constantly bear the risk of potential losses. Further, instead of losses, they also risk losing their invested amount in case of bankruptcy.

The risk of bankruptcy results in the residual risk, borne by the owners. A bankruptcy occurs when a corporation's assets don't suffice to cover its liabilities. Since liabilities to owners have the lowest priority of repayment, it is rather possible they will receive nothing from an assumed liquidation.

Despite the amount of risk borne by the owners, they are not the ones who actually control the corporation's actions. Control is exercised by the managers, who enjoy specific contractual rights in exchange for their labor.

Regardless of the specificity of most of their rights, the contracts that dictate managers' actions are not complete [(Hart, 1988), (Hart, 2017)]. That is because, primarily, it is impossible for the contracting parties to predict and describe all possible contingencies and reactions to them. In addition, even if it were close to possible, the resulting contract would be extremely complex and thus time and resource consuming. But even if these barriers did not exist, it would be impossible to be worded so precisely as to be accurately interpreted by a third party (e.g. justice) (Hart & Moore, 1988). As a consequence, the incomplete contracts that rule managers' actions leave many decisions on their discretion.

Furthermore, managers possess uneven amounts of corporation-specific information compared to the owners who do not participate in the corporation's everyday operations. This asymmetric information places the owners in a more disadvantageous position, rendering them unable to effectively monitor management's actions.

Managers' discretion, combined with the information asymmetry, allows managers to place their personal interest over the corporation's. That is the moral hazard and consists of the contingency in which, after the manager achieves to sign her contract, she acts against, or at least not completely for the owners' interest.

Besides the ineptness of effective monitoring and the presence of moral hazard, owners also face the risk-sharing problem. Managers entrust less and for a shorter term to the corporation, hence becoming more prone to risk (Eisenhardt, 1989). Based on their different risk preferences, owners prefer different actions for the same events than what managers do.

Agency Theory

The owner – manager relation is a typical principal – agent relation, with the latter being wider. Provided that each party aims to maximize its utility, the agent does not have an incentive to act always in the principal's best interest. According to Jensen & Meckling (1976), that incentive misalignment is impossible to be resolved with zero cost. As a result, agency costs arise, constituted of:

- Monitoring expenditures, undertaken by the principal in order to provide incentives, to monitor and to influence agent's actions. Such expenditures are the expenses for financial information production, the budget constraints, the remuneration policies, etc.
- Bonding expenditures, utilized by the principal to ensure that the agent will abstain from certain actions, or at least that she gets compensated in case the agent takes such actions.
- In the event of not achieving perfect incentives' alignment and the agent acts against the principal's best interest, the loss of welfare that the principal is experiencing is the residual loss. The principal is always under the threat of residual losses.

In the agency theory, also crucial is the board of directors as a mechanism intended to minimize agency costs. Acting as representatives of the agent, directors get elected in order to select, discharge and compensate critical decision makers, deter collusion between them, control agents and authorize and monitor important decisions (Fama & Jensen, 1983).

Apart from the board, a pivotal agency problem mechanism can be considered the efficient function operation of both the capital and the labor markets (Fama, 1980). Managers compete each other in the labor market. Their future wages depend on their present performance. If their actions do not maximize the value of the corporation, more and more owners will want to sell their stakes, forcing the price of its stock to plummet. That loss of competency will become obvious to signal the manager's labor market about her performance. Correspondingly, she will not be valued as much in the labor market and her future wages will be reduced.

The basic prerequisite for that incompetency to become obvious is the efficiency of capital markets.

Market Efficiency

Markets operate efficiently when the assets sold in them fully reflect all available information (Fama, 1970). Since all market participants know all the information available, it is impossible for someone to possess a surplus of information and trade based on it. Thus, the market is a "fair game", meaning that higher returns can only be achieved by taking higher amounts of risk or by chance. Therefore, no one can purchase undervalued or sell overvalued assets.

The specific subset of information incorporated and reflected on asset prices creates three alternative versions of the efficient market hypothesis:

- Weak form, in which the information absorbed is nothing more than historical prices or return sequences. Combined with the "random walk hypothesis" [(Fama, 1965), (Malkiel, 1973)], which states that future returns cannot be predicted by the evolution of past returns, there is no way for a historical prices analysis to be useful.
- Semi-strong form, where asset prices reflect all obviously publicly available information, including news, future events, currency exchange rates, governmental reports, etc.
- Strong form, where prices incorporate not only publicly available information, but also private information. Subsequently, it is impossible to profit even from using insider information.

The present study assumes that the New York Stock Exchange, the stock market under consideration, is operating under the semi-strong form of efficiency. Accordingly, the information contained in the regulatory stress tests will be quickly reflected on the stock prices of the institutions they examine.

Limitations for Banks

Agency theory cannot precisely apply on the banking sector because of its close relation to the government. No country has adopted a complete laissez–faire for its financial system (Vittas, 1992). Agency theory assumes competitive markets and informational asymmetry between only two parties, the principal and the agent.

Through the public-sector interference, the Additionally, moral hazard is faced not only from the principal shareholder, but also from the government, which acts as a lender of last resort.

Corporate Governance

While agency theory deals with the relations between principal and agent, corporate governance has a wider scope and it concerns all parties that relate with the corporation. It contains all the mechanisms and processes by which corporations are controlled and directed (Shailer, 2004), thus it is not limited to the owners – managers relations.

In literature, there have been many approaches of corporate governance. One of its fundamental points, that is, whose interest seeks to protect, depends on its definition.

Conceding that its primary goal is the maximization of the investors' return, corporate governance is defined as the practices used so that suppliers of finance get assured that they will get a return on their investment (Shleifer & Vishny, 1997). But if it is assumed the corporation is owned by all the stakeholders it affects (Dodd, 1932), corporate governance is the set of mechanisms ensuring that managers direct in a way beneficial for one or more stakeholders. The stakeholders can be the shareholders, customers, suppliers, employees, local populations and other groups with which the corporation collaborates (Goergen & Renneboog, 2006).

The shareholder supremacy against the rest of the stakeholders is basically supported by the notion that executive directors have no other social responsibility than to generate for the shareholders as much money as they can (Friedman, 1970). This belief holds its base on the nature of the shareholder's residual right. Her debt seniority is last and thus her interests are considered completely aligned with the other stakeholders'. As a result, she has the strongest incentive to pursue the value maximization of the corporation.

In addition, it is assumed that for those who possess specific rights, it is easier to protect them through contracts. Because of their distinct and finite nature, the contracts that describe them provide more effective protection against potential agency problems using provisions that minimize unfavorable actions of managers (Min, 2017).

Under any definition, corporate governance can be seen as a subset of the corporation's contracts through which the rights and obligations of the different cashflow claimants are determined. Among the claimants there is conflict of interest. A subject of corporate governance arises whenever there is conflict of interest in a corporation that cannot be resolved by contracts because of their costly nature (Hart, 1995b). Therefore, the need for corporate governance originates from the agency costs incurred by conflict of shareholders' interest with the rest of the cashflow claimants on the one hand, and on the other hand with those who decide for the cashflow allocation, namely the board and the managers.

Differences for banks

Although in general corporate governance is considered a private issue, as for the financial intermediation sector it becomes a public one due to the involvement of the public sector. Financial institutions are on one hand for-profit institutions with negotiable price of capital. To the contrary, they serve society with indispensable for its economic and social welfare functions. That is the main reason governments take various measures in their effort to efficiently regulate and monitor their domestic financial systems.

The notion of bank

The term bank is used in the relevant literature in a variety of disparate, contradictory between them senses.

To a great degree, confusion of the term derives from the fact that historically the USA law limited the activities that a deposit collecting institution could engage in. Thus, terms as commercial bank or traditional bank are used to distinguish the deposit collecting institutions from investment banks, hedge funds and other institutions oriented activities related with the capital markets (Carnell, et al., 2017). Contrarily, in Asia and Europe the deposit collecting institutions usually had the chance to engage in a greater number of activities (Calomiris, 1995). Subsequently, the term on the other side of Atlantic has been used in a much wider sense (Kim, 2011).

Under a functional approach, the term bank refers to a financial corporation that engages in banking-related functions, namely credit intermediation, money creation and payment services, or more generally in functions that utilize the deposits collected (Min, 2015).

Since 1999 and the passage of the Gramm–Leach–Bliley Act, the scope of allowed activities has drastically widened and most financial corporations have merged under bank holding companies. Bank holding companies possess nearly 80% of total banks (Federal Reserve, 2012) and control nearly every bank asset in the USA (Avraham, et al., 2012).

Despite the fact that they contain banks, they are structured as non-financial corporations and are administered by corporate boards regulated by common corporate law. Shareholders enjoy the same limited liability (Macey & Miller, 1992), board members have similar fiduciary duties to board members of non-financial corporations (Stevens & Nielson, 1994) and, like in common corporate law, these duties are owned to the shareholders [(Baxter, 1993), (Fisher, 1993)]. This is why the Federal Reserve System monitors much more institutions than the strictly defined banks.

In the present thesis, the subjects of examination are the institutions monitored by the Federal Reserve System through the regulatory stress tests. The terms bank and financial institution are used interchangeably, like in Adams (2010) and Mehran & Mollineaux (2012).

Why is corporate governance different for banks?

Principally, corporate governance differs for banks because of the multitude and magnitude of the stakeholders it involves. Additionally, their financial data are opaquer and more complex compared to non-financial corporations, rendering difficult their efficient monitoring. Furthermore, banks constantly face the risk of a bank run, an event that can lead to their bankruptcy despite their actual solvency. Finally, because of their size and central position in economic systems, getting bailed out under a stressful situation by the government is very probable. That probability can raise conflict of incentives among the various stakeholders.

Stakeholders

Directly, the solvency of each financial institution concerns its creditors, who, either junior or senior, have entrusted their wealth in the form of debt or credit. However, their solvency indirectly affects a much greater part of society in part because of the government's debt guarantee of deposits, in part because of the externalities generated in case the financial system stops working.

Externalities

Potential breakdown of the financial system can incur severe externalities to the economic system, and that is the reason why governments struggle to maintain it stable. For the impact of externalities to become comprehensible, one must comprehend the role and contribution of the financial system.

Role of financial system

In every economy, there are units with surplus of resources and units with deficit. For their best interest, the redundant resources of the former should be channeled to the later. In theory, it is possible for the units to communicate immediately between them and agree on the terms of trading wealth with debt or shares. But immediate financing needs to overcome the barrier of informational frictions (Adrian, et al., 2013) and transaction costs. This barrier renders necessary the involvement of an independent third party to intermediate and minimize the associated costs.

The informational friction consists of the informational asymmetry between the borrower and the lender. In a market where all products are characterized by divergent quality, not observable by the buyer, the price of all products is set by the buyers' perception for the median quality product (Akerlof, 1969). This way, those who provide lower than the median quality will receive a premium against those who provide higher quality product. That uncertainty about the product quality, derived from the asymmetry in information between the buyer and the seller, distorts the amount of market activities, as sellers of better quality start to retreat.

In financial intermediation, the information required consists of the return an investment can yield and its probability of failure. A well-developed financial sector reduces the costs a corporation needs to undertake for external financing and that is why industrial sectors in greater need of external financing develop much faster in countries with advanced financial sector (Rajan & Zingales, 1998).

The principal function of the financial system is the distribution and deployment of resources in an uncertain environment, both across borders and across time (Merton & Bodie, 1995). This fundamental operation can be divided in five distinctive functions (Levine, 1997):

1) Savings mobilization
2) Facilitation of the exchange of goods and services via a system of payments
3) Collection of information and allocation of resources
4) Facilitation of trading, hedging, diversifying and pooling of risk
5) Monitoring managers and exerting corporate control

These functions can positively impact the growth of an economy through capital accumulation and acceleration of technological progress.

Mobilizing Savings

Savings mobilizing is the costly procedure of accumulating capital from a heterogeneous mass of savers. It includes facing the transaction costs of collecting deposits from various disparate units and minimizing the informational asymmetries faced by depositors when they decide to lose control of their savings (Carosso, 1970).

For that process are needed multiple bilateral agreements, both with the surplus units and with the deficit ones. That cost can be vigorously mitigated through the financial intermediaries (Sirri & Tufano, 1995). To achieve this, intermediaries have to convince depositors for the safety of their savings and in order to accomplish it they establish good reputations (DeLong, 1991).

As the financial system becomes more and more efficient in collecting savings, it assists economic development by increasing the amount of savings, seizing the economies of scale and overcoming the non-divisibility of investments. Without these privileges, many productive activities would have been restricted in an economic inefficient scale (Sirri & Tufano, 1995). Many ventures need amount of capital beyond the means of a single investor. During the 19th century, a basic difference between England and poorer countries was the established financial system capable to mobilize resources towards colossal deeds (Bagehot, 1873).

Facilitating the exchange of goods and services via a system of payments

Financial systems provide the society with a system of payments. That financial facilitation reduces transaction costs, thus promoting specialization, technological innovation and development. The distribution of labor, a prerequisite for specialization, is the primary factor of productivity improvements. By specializing, workers are more apt to invent better machinery or productive processes (Smith, 1776).

In addition, the greater degree of specialization demands a greater number of transactions (Greenwood & Smith, 1997). These transactions incur cost, which is minimized through intermediation.

Monitoring and exerting corporate governance

Insufficient corporate governance in an economy can hinder the savings mobilization from multiple savers and, as a result, their channeling to profitable investments (Stiglitz & Weiss, 1981). But if the capital suppliers become capable to effectively monitor the management and influence how their capital is used, efficiency in spending corporate resources will be increased.

From that increase in efficiency, savers will be more willing to finance productive processes and innovations. Therefore, the efficiency of corporate governance mechanisms directly affects the growth rates.

Debt contracts of corporations can ameliorate such mechanisms, reducing the cost of monitoring managers' actions [(Gale & Hellwig, 1985), (Boyd & Smith, 1994)]. Moreover, debt financial instruments owned by corporations confine the free cashflows available to managers, limiting potential negligence and accelerating the rate of adopting innovations (Aghion, et al., 1999).

Risk pooling

Through advantages in differentiating cross-sectional risk, allocating intertemporal risk and minimizing liquidity risk, financial systems can optimize risk management.

Investment projects with high returns tend to be more insecure than those with lower returns. Savers do not crave risk. Financial markets that facilitate savers to differentiate their portfolios, drive investments to higher yield projects [(Saint-Paul, 1992), (Devereux & Smith, 1994), (Obstfeld, 1994)]. This facilitation of higher yield projects financing directs savings to ventures with greater positive impacts for growth (Acemoglu & Zilibotti, 1997). Additionally, it enhances innovation as innovative projects are included in the high-risk investments that the savers would not finance without differentiation (King & Levine, 1993b).

Risks that cannot be differentiated at a certain time point, like macroeconomic shocks, can be devastating for the economy. These risks can be smoothed by allocating them between generations. Financial institutions with immense lifespans can make this allocation possible by providing low returns in growth times and higher returns in recession times (Allen & Gale, 1997).

Liquidity risk consists of the inability to convert an asset to an exchange medium. Liquidity is the convenience and speed by which an owner can convert her asset to purchasing power in agreed prices levels. Information asymmetry hinders the ability of liquidation, increasing this way the liquidity risk. High yield investment projects require long-term capital commitment. Contrarily, savers are not willing to lose control of their wealth for a long period of time. Financial institutions undertake a mixture of illiquid, high yield investments and liquid, lower yield investments to satisfy their obligations for deposits. Correspondingly, they provide complete protection from liquidity risk for depositors, while at the same time finance illiquid, high yield investments, accelerating economic growth (Bencivenga, et al., 1995).

Collecting information and distributing resources

Financing decisions require estimations for corporations, managers, market circumstances and many other factors. Collecting and processing such information demands high costs, not bearable by a single investor. Provided that investors hesitate to finance activities for which not much information is available, information costs can deter capital movements towards greater value projects. Financial intermediation can reduce the costs related with collecting and processing information, resulting in resource distribution optimization (Boyd & Prescott, 1986).

Provided that the amount of capital available is less than what is demanded by corporations, the intermediaries who produce the best information will finance only the most efficient investments, enhancing the optimal resource allocation and therefore boosting economic growth (Greenwood & Jovanovic, 1990). Plus, by seeking to finance the projects with maximum success probability, they favor only those with the best production technology, adding to the overall innovation level [(Galetovic, 1996), (Blackburn & Hung, 1998) (Morales, 2003)].

Taxpayers

Governments all around the world guarantee part of the overall level of deposits of an economy. Thus, in case a financial institution goes bankrupt, taxpayers indirectly cover some losses.

For the USA, the federal government explicitly guarantees for each depositor up to 250,000$ per insured bank (Federal Deposit Insurance Corporation, 2017). Even though this has been effective enough to avoid bank runs (Friedman & Schwarz, 1963), it also distorted shareholders' and managers' incentives for risk taking and added moral hazard. Through FDIC, shareholders have the opportunity to transfer their losses to third parties, particularly the healthy institution that back up the FDIC with their reserves (Macey & O'Hara, 2003). Extra moral hazard originates from the fact that the returns the FDIC retains are equivalent of smaller risk than the actual undertaken (Hanc, 1999).

Moreover, when the government implicitly guarantees part of the housing economy, general stability is enhanced. Specifically, they avert bank panics, constrain credit bubbles and promote the origination of consumer-friendly loans that are less likely to default (Min, 2013).

Hence, the health and solvency of financial institutions is a matter that indirectly affects and concerns all taxpayers. Governments collect money from them to finance stability policies for financial systems. The amount of risk an institution undertakes can be indirectly transferred to the taxpayers.

Creditors

Incentives among the different creditors and shareholders of a bank vary, primarily because of their diverse risk appetite. By taking a great amount of risk, shareholders can realize unlimited profits, but losses limited up to the amount invested. Their appetite for risk is observable from the fact that when corporations invest in high volatility assets, their valuation increases, despite the corresponding higher risk of insolvency (Merton, 1973). Creditors, on the other hand, do not realize any extra profit from extra risk, and thus they are much more risk averse.

While depositors are considered to exert part of the overall monitoring, a single depositor owns such a small stake of the total debt that her effort will benefit the others asymmetrically more. That's the 'free rider problem' and arises when someone is benefited by resources, goods or services that she has never paid for (Baumol, 1952). According to the 'free rider problem', every single depositor abstains from monitoring because expects from the rest of the stakeholders, the 'free riders', to monitor finding the idea of becoming a 'free rider' himself appealing.

For banks, leverage is a factor of production. Over 90% of their balance sheet is debt, with a great percentage of it in the form of deposits. This renders even more intense the conflict of interest among stakeholders, as bank capital relies asymmetrically more on debt than equity.

Opacity

As opacity is considered the loss of corporation-specific information that external observers experience. The opaquer a corporation is, the more negative data can be concealed (Jin & Myers, 2006).

Even though information asymmetry is observed in all sectors, in the banking sector it is much more intense (Furfine, 2001). Loans are, in general, opaque (Diamond, 1991). The same goes for other collaterals financial institutions invest on, like Asset Backed Securities (ABS), Collateralized Debt Obligations (CDOs) and Credit Default Swaps (CDS) (Mülbert, 2009). Their quality is not readily observable and can be easily concealed. In addition, banks can alter the risk structure contained in their assets faster than non-financial corporations (Levine, 2004).

Plus, they are able to conceal problems by lengthening payback time and maintaining their balance sheet values. Indicative of their opaque nature is the fact that bond rating agencies are more likely to disagree over financial corporations than over non-financial (Morgan, 2002). Accordingly, bank equity returns embody less corporation-specific information than industrial matching corporations (Haggard & Howe, 2012).

Consequences of opacity

Opacity hinders the efficiency of corporate governance mechanisms, giving insiders the opportunity to exploit outsiders and the government.

Managers are given the option to influence asset prices in the short-term. Especially if their remuneration depends on outcome-based contracts, they have a strong incentive to deprive cashflows from stakeholders, undermining the institution's long-term solvency.

Correspondingly, large creditors can exploit inside information against less informed investors (Calomiris & Powell, 2000). In Mexico, from 1995 to 2001, 20% of the loans of the 19 biggest banks was tunneled to insiders with lower than regular rates, longer payback periods, fewer collaterals and greater default rates (La Porta, et al., 2001). Accordingly, in Russia, bank insiders tunneled loan flows to themselves to later report insolvency in 71% of the cases (Laeven, 2001).

Complexity

Increased complexity inhibits the duties of boards and managers. The number of activities they need to manage has multiplied. The expertise needed to effectively manage them has also increased. The techniques used until now to handle them have become incompetent.

Additionally, because of the financial derivatives and collaterals they hold, their assumed risk level can change at any time (Stulz, 2008). That originates from their exposure to risk factors extremely sensitive to market conditions. As a result, their value can significantly change by very small changes in market conditions.

Shadow banking

Traditional financial intermediation, although it efficiently allocates risk, creates new risks, such as the liquidity and bank run risk. From that derives the need for monitoring. Monitoring incurs extra costs in the form of asset taxation, additional information disclosures and capital requirements. Shadow banking emerges from the financial system's effort to avoid these costs.

Shadow banking is considered the credit intermediation system that includes entities and activities outside the regular, regulated banking system (Financial Stability Board, 2011). All credit obligations the public sector explicitly guarantees are not part of the shadow banking system. Thus, if an uninsured obligation is consolidated in the balance sheet of a government-insured institution, it is not considered a shadow banking intermediation (Pozsar, et al., 2010; Pozsar, et al., 2010).

The shadow banking industry, with the securitization it induced, increased the total amount of lending and merged information. Subsequently, the value estimation of securities was based completely on credit rating agencies (Mehran, et al., 2011).

Exposure to risk of bank run

Banks are in a large degree interconnected via inter-bank loans and over-the-counter derivatives. Even though this way risk can be optimally allocated (David & Lehar, 2017), a minor liquidity failure of one institution can threaten the solvency of the whole system [(Allen & Gale, 2000), (Zawadowski, 2010)].

Due to the nature of a bank run, that insolvency can occur even if the institution is actually solvent. If some depositors create the expectation that their savings are in risk, they will immediately rush to withdraw them. That rush is contagious, triggering the same expectations to more and more depositors. The more deposits withdrawn, the greater becomes the need for the bank to liquidate its assets. That urgent need forces the bank to liquidate assets in lower than their actual value prices and bankrupt.

Because of the interconnection, a massive deposits withdrawal experienced by one institution can quickly and easily transform into a generalized bank panic. Bank panic can cause real economic harm by rendering insolvent the rest of the system’s institutions, disrupting the monetary system and restraining growth (Diamond & Dybvig, 1983).

Size (too-big-to-fail)

The bigger an institution is, the greater the impact it can deliver to the rest of the economy by a potential bankruptcy. Therefore, along with its size increases the possibility of the government to intervene and save a near insolvent institution, in their effort to minimize externalities. That implicit guarantee of the big institution’s solvency allows shareholders to neglect it and increases the moral hazard faced by the government (Stern & Feldman, 2004). Shareholders, confident with the safety of a government bailout, will prefer between a safer and a riskier investment the later one (Gong & Jones, 2010).

Although the direction of causality of engaging in excessive risk-taking because of the confidence the size provides has not been proven (Schwarcz, 2017), it is probable that a correlation between them exists. Indicative of that is the fact that the institutions bailed out by the federal government during the 2008 Financial Crisis, had returned in high levels of risk taking after one year of the bailout (Graham, 2010).

Stress Tests

Because of the significant role financial systems have and the multitude of their stakeholders, every government utilizes a variety of measures to efficiently monitor and regulate them. One such measure established by the US government after the 2008 financial crisis is the supervisory stress testing and the Cumulative Capital Analysis Review (CCAR) it induces.

Supervisory stress testing was imposed by the Dodd- Frank Act. The Federal Reserve is obliged to conduct them in a yearly basis and publicly disclose their results. It includes Bank Holding Companies (BHCs), Intermediate Holding Companies (IHCs), Savings and Loans Holding Companies (SLHs), state member banks and nonbank financial institutions that the Financial Stability Oversight Council (FSOC) has determined shall be supervised by the Federal Reserve System.

The goal of the regulatory stress testing is for the Federal Reserve System (Fed) to assess whether financial corporations with $50 billion or more in total consolidated assets are sufficiently capitalized to absorb losses during stressful conditions, while meeting obligations to creditors and counterparties and continuing to be able to lend to households and businesses. This assessment takes place in order to inform the Federal Reserve, BHCs, and the general public of how institutions' capital ratios might change under a hypothetical set of stressful economic conditions.

For the stress testing process, the Fed prepares two stressful macroeconomic scenarios, the adverse and the severely adverse, assuming recession both in the US and in the rest of the world. Each scenario assumes different values of estimated parameters, such as unemployment rate, real GDP growth rate, Dow Jones Total Stock Market Index, National House Price Index etc.

Under these specific assumptions various measures indicating the strength of each institution are quantified by their future estimated projections. Such measures are Capital Ratios, Risk-Weighted Assets, Projected Losses, Loan Losses, etc. Based on these quantified measures, is issued one week later the Comprehensive Capital Analysis Review, containing evaluations for a corporation's capital adequacy and planned capital distributions, such as dividend payments and stock repurchases.

Shareholders are particularly interested on the capital distribution their corporation is allowed to conduct and on its solvency. Because of the opaque nature of the bank balance sheet, information contained in the stress tests was not observable to them. By their disclosure, they should reveal a clearer image of each institution's actual economic condition.

Under the assumption of the semi-strong form of market efficiency, shareholders quickly assess the contained information and trade based on them. There is evidence that the price adjustment of stocks lasts 90 (Mitchell & Netter, 1989), or even only 15 minutes (Dann, et al., 1977). Thus, stock prices of the institutions under scrutiny will probably adjust to shareholders' expectations and will fully reflect them within the day of disclosure.

Their expectations are not assumed to be rational. This is why there is a high probability the price formed by the expectations will be abnormal and will quickly return to its earlier levels.

The present study is examining the impact of stress tests and not of the Cumulative Capital Analysis Review because it is presumed that the CCAR results can be estimated, even though not precisely, from the stress test results.

Event Study

An event study is an attempt to quantify the impact of the disclosure of a certain amount of information to an observed set of value data. In most event studies, the observed data are financial or accounting data. The first complete event studies were conducted in late 1960s [(Ball & Brown, 1968) (Fama, et al., 1969)], when the Center for Research in Security Prices (CRSP) of University of Chicago was established. CRSP made available a large amount of stock market data.

Fundamental in the event study literature have been two studies by Brown and Warner [(1980), (1985)], largely influencing future researchers and rendering them popular in fields other than Accounting and Finance. Indicative of the event studies popularity is the fact that between 1974 and 2000, 5 only financial journals had published 565 entries containing event study results (Kothari & Warner, 2005).

Research Methodology

Event studies fall under the sphere of quantitative research. Quantitative is the research concerned with systematic empirical investigation of observable phenomena via statistical, mathematical or computational techniques (Given, 2008). It intends to establish and utilize mathematical models, theories and hypotheses relative to phenomena. Central is the process of measurement which connects empirical observations to quantitative relationships. The data processed is always numeric, analyzed by the researcher with statistical techniques. The researcher is trying to provide unbiased results, capable to be generalized to larger than the sample populations.

In a typical financial event study, the researcher attempts to examine the reaction of capital markets to an event either predictable or not. By scrutinizing a sample of shares, the researcher tries to conclude in an unbiased manner about the whole population.

On the other hand, qualitative research is conducted by asking open questions to study participants and collecting the word data used. The researcher seeks themes and patterns which apply exclusively on the set of the examined participants. Qualitative researchers try to explain or decode the phenomena based on the meaning people give to them (Denzin & Lincoln, 2005).

Abnormal Returns

The primal measure of estimating the impact of an event is the abnormal returns. A return is calculated by dividing the price change of a stock during a day by its previous price level. The return *R* of stock *i* is:

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}} \qquad (1)$$

where $P_{i,t}$ and $P_{i,t-1}$ are the prices of day *t* and *t-1* respectively.

The abnormal return ($AR_{i,t}$) is the difference between the observed return $R_{i,t}$ and the estimated return $E[R_{i,t}|\Omega_{i,t}]$ provided that no information is produced

$$AR_{i,t} = R_{i,t} - \mathrm{E}[R_{i,t}|\Omega_{i,t}] \qquad (2)$$

where $\Omega_{i,t}$ is the absence of new information.

The estimated return $E[R_{i,t}|\Omega_{i,t}]$ is computed according to historical prices of each stock. In the present study are used three considerably widespread models, according to Draper and Paudyal (1999) :

i) <u>Constant Mean Adjusted Returns</u>

In the constant mean adjusted returns model is assumed that estimated returns differ per stock, but they remain constant over time.

The abnormal return $AR_{i,t}$ of stock *i* in day *t* is estimated as:

$$AR_{i,t} = R_{i,t} - \bar{R}_i \quad (3)$$

where mean return $\bar{R}_i$ is computed by the arithmetic mean of all returns of the estimation window:

$$\bar{R}_i = \frac{1}{M_i} \sum_{i=T_{0+1}}^{T_1} R_{i,t} \quad (4)$$

where M_i is the number of days in the estimation window.

ii) <u>Market Adjusted Returns</u>

In the market adjusted returns model is assumed that the return of every individual stock is the return of its wider market. Thus, the abnormal return is the difference between the observed return $R_{i,t}$ and the market return $R_{m,t}$:

$$AR_{i,t} = R_{i,t} - R_{m,t} \quad (5)$$

where $R_{m,t}$ is the return of a market index.

As a market index is used the *New York Stock Exchange Composite Index*. Fourteen out of the 16 stocks examined are sold in the New York Stock Exchange (NYSE), rendering it the most suitable option. The Composite Index contains more than 1,900 different stocks, of which 1,500 are U.S. companies. Therefore, it is assumed that optimally captures the American economic reality.

iii) <u>Market Model Adjusted Excess Return</u>

The market model adjusted returns model presumes a linear correlation between the returns of a stock and the market returns. Using the least squares regression on the estimation window observations it calculates the parameters α_i and β_i. Therefore, the estimated $R_{i,t}$ return of a day *t* is:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t} \quad (6)$$

with $E[e_{i,t}] = 0$ and $VAR[\varepsilon_{i,t}] = \sigma_{\varepsilon i}^2$.

Correspondingly, the abnormal return $AR_{i,t}$ of day t is:

$$AR_{i,t} = R_{i,t} - \alpha_i - \beta_i R_{m,t} \quad (7)$$

where $R_{m,t}$ is, as before, the *New York Stock Exchange Composite Index.*

Abnormal Trade Volumes

Similar to the returns, an abnormal volume $AV_{i,t}$ of stock *i* in day *t* is the difference between the observed level $V_{i,t}$ of volume traded and the estimated on the condition of no new information. The estimation of the volume traded is based on the same assumption with the constant mean adjusted returns model of estimation. That is, for each stock *i* there is a level of volume $\bar{V}_i$ constant over time:

$$\bar{V}_i = \frac{1}{M_i} \sum_{i= T_{0+1}}^{T_1} V_{i,t} \quad (8)$$

where M_i is the number of days in the estimation window.

Accordingly, the abnormal volume $AV_{i,t}$ will be the difference between the observed $V_{i,t}$ and the estimated $V_{i,t}$.

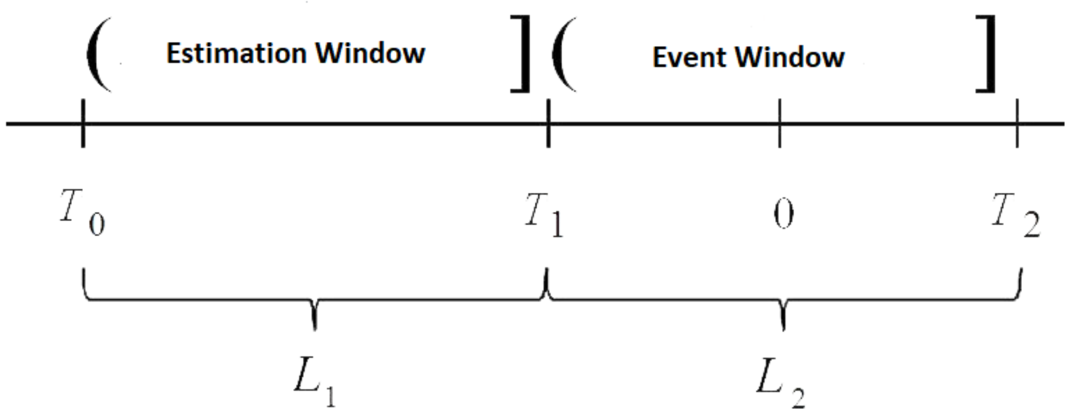
$$AV_{i,t} = V_{i,t} - \bar{V}_i \quad (9)$$

Periods and Cumulative Abnormal Returns/Volumes

A good measure to estimate the overall impact of the event to the stock is the cumulative result of abnormality, which is the sum of all abnormal values.

For the Cumulative Abnormal Returns (CAR), the abnormal returns of each day are summed throughout the event window. The same goes for the Cumulative Abnormal Volumes (CAV). Crucial in that, is the length of the event window. The event window size suggests the time the researcher believes the stock market participants need to absorb information and form the adjusted prices.

Figure 1 - Time windows



As figure 1 illustrates, the event window L_2 starts from $T_1 + 1$ day and includes all observations up to T_2.The estimation window starts from $T_0 + 1$ and includes all observations up to T_1. For instance, the 5-day event window starts 4 days before the event and its last observation is the return of the 5th day after it.

L_1 depends on the number of maximum available observations before the event. Its size is not fixed, as the stress test results do not get published on the same day every year. This is why some estimation windows are greater than a year, while others are smaller.

Therefore, the Cumulative Abnormal Returns (CAR) are calculated as:

$$CAR = \sum_{t=T_1}^{T_2} AR_{i,t} \quad (10)$$

And, accordingly, the Cumulative Abnormal Volumes (CAV) are:

$$CAV = \sum_{t=T_1}^{T_2} AV_{i,t} \quad (11)$$

Confidence Intervals

In order to expand the computed mean (or median) of the sample to the whole population, it is necessary to calculate the variance of these estimation points and thus their respective confidence intervals.

The inference strategies used to estimate them are the Bootstrap and the Wilcoxon Signed Rank Test.

Bootstrap

Bootstrap is a non-parametric inference strategy invented by Efron (1979) in his effort to infer without having to assume normal distribution. Exploiting the law of large numbers, bootstrap assumes that the empirical distribution extracted by a large dataset approximates the true distribution of population. Sampling multiple times with replacement from the original sample to create multiple same-sized samples, creates an empirical distribution that is supposed to have the same attributes with the true probability density function.

Nevertheless, the bootstrap cannot improve the initial point estimate of the true population mean μ. If the sample mean $\overline{x}$ is not a good approximation of μ, bootstrap is not making it more accurate.

Therefore, although the true probability function is unknown, on the condition that the original sample sufficiently resembles the population, the empirical distribution F^* that will emerge from a large number of resamplings resembles the true density function F. Essentially, the original sample is treated like the population.

Based on that, the various sample means x_1^*, x_2^*, …, x_n^* that arise from n samplings determine the distribution of sample $\overline{x}$ and therefore the probability for each value to appear. The confidence intervals of the sample mean $\overline{x}$ are estimated according to that empirical distribution.

The estimation of confidence intervals is an effort to estimate the variance δ of the deviation of the sample $\overline{x}$ around the true mean μ:

$$\delta_i = \overline{x} - \mu \tag{12}$$

Bootstrap substitutes (12) with:

$$\delta_i{}^* = \overline{x}_i{}^* - \overline{x} \tag{13}$$

where $\overline{x}_i{}^*$ the mean of every sample from the resampling process.

A $\delta_i{}^*$ is produced with every resampling. In the present study are conducted 1,000 resamplings, hence there are 1,000 different $\delta_i{}^*$. Ranking them in ascending order, every $\delta_i{}^*$ has a percentile. From that percentile arise the confidence intervals.

For instance, for a 95% confidence level, $\delta^*_{.025}$ and $\delta^*_{.975}$, are subtracted from the sample mean $\overline{x}$:

$$\overline{[x} - \delta^*_{.025}, \overline{x} - \delta^*_{.975}] \quad (14)$$

Wilcoxon Signed Rank Test

Wilcoxon Signed Rank Test is also a non-parametric inference strategy invented by Wilcoxon (1945) for comparisons of paired samples coming from the same population.

Each observation x_i produces a difference δ_i from the median *M:*

$$\delta_i = x_i - M \quad (15)$$

For a sample size *n*, the number of the differences that arise is $\frac{(n/2)*(n/2+1)}{2}$.

After ranking these difference in ascending order, the smallest is paired with the greatest $\delta_{\frac{(n/2)*(n/2+1)}{2}}$, the second smallest δ_2 with the second greatest $\delta_{\frac{(n/2)*(n/2+1)}{2}-1}$ etc.

These pairs of differences form the potential confidence intervals needed to estimate:

$$(\delta_1, \delta_{\frac{(n/2)*(n/2+1)}{2}})$$

$$(\delta_{1+1}, \delta_{\frac{(n/2)*(n/2+1)}{2}-1})$$

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$$(\delta_{1+k}, \delta_{\frac{(n/2)*(n/2+1)}{2}-k})$$

Each *k* refers to a specific confidence interval. After finding the *k* for the applicable confidence intervals, the appropriate pair of differences immediately arises.

Data

For the event study, primary, publicly available data concerning the opening and closing prices of stocks, as well the daily volumes traded, was collected from the finance.yahoo.com website.

The institutions examined are the ones participated in all stress tests from 2013 up to 2017 and have available data from January the 3rd of 2012 up to September the 8th of 2017 online.

Table 1- Participating Institutions & Dates of Events

Participating Institutions			
1	American Express Company	**9**	Morgan Stanley
2	Bank of America Corporation	**10**	Regions Financial Corporation
3	BB&T Corporation	**11**	State Street Corporation
4	Capital One Financial Corporation	**12**	The Bank of New York Mellon Corporation
5	Citigroup Inc.	**13**	The Goldman Sachs Group, Inc.
6	Fifth Third Bancorp	**14**	The PNC Financial Services Group, Inc.
7	JPMorgan Chase & Co.	**15**	U.S. Bancorp
8	KeyCorp	**16**	Wells Fargo & Company
Dates of Events			
1	March 7, 2013		
2	March 20, 2014		
3	March 11, 2015		
4	June 23, 2016		
5	June 22,2017		

Each of the 16 institutions experienced 5 events from the 5 respective stress tests. In this event study, 80 events are included from a total of 166. Hence, the sample covers 48% of the whole population.

Event study results

Returns

1-day Event Window

In the 1-day event window, the returns of event day are at least 0.5% lower than normal, while the respective confidence intervals, which reach in width up to 0.83%, contain only negative values.

As for the day after the event, in most cases the observed return goes back to normal levels. In cases where it does not, that is because of some extreme negative values that hold the arithmetic mean down.

In addition, the median abnormal return of the event day is always lower than the respective mean abnormal return. Accordingly, for the day after the event, the median abnormal return, never exceeding -0.2%, is always higher than the respective mean, signifying that the majority of stock returns revert to normal levels.

Constant Mean Adjusted Excess Return

According to the constant mean adjusted returns model, the mean abnormal return on the event day is lower than normal by -0.5%, indicating a significant deviation from the normal. In the next day it remains on similar levels.

Figure 2 – Arithmetic Means of Mean Adjusted Abnormal Returns

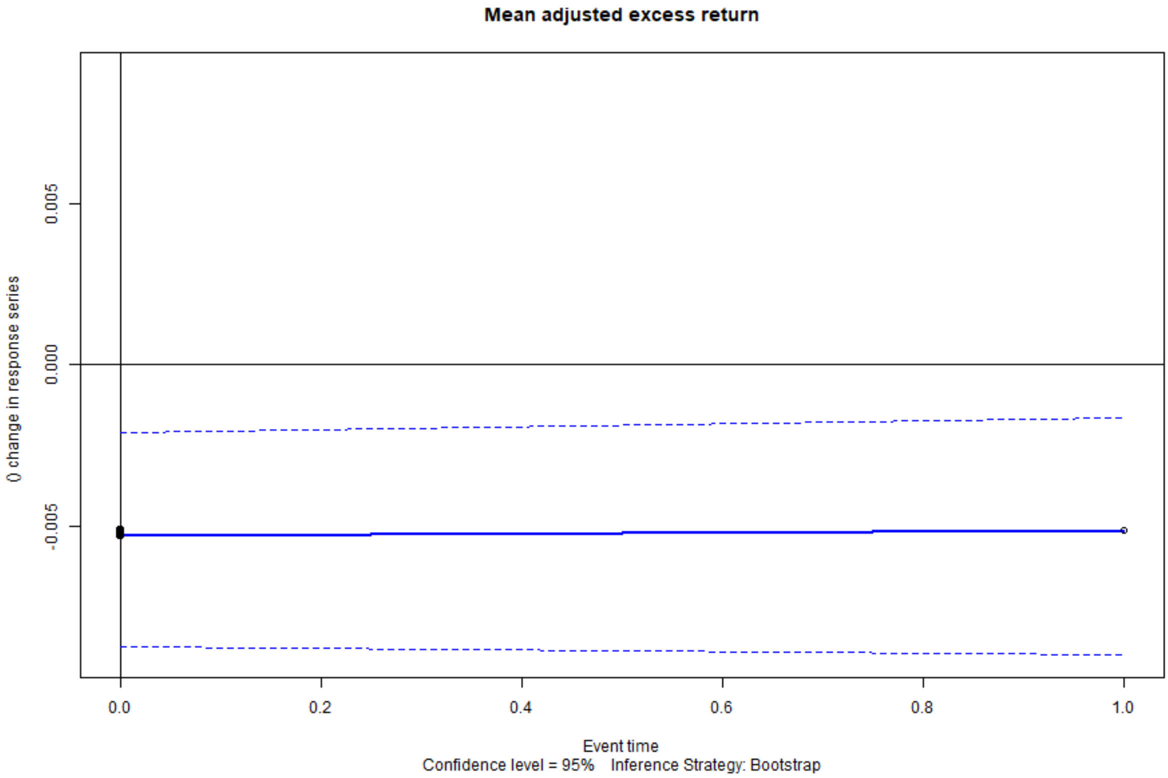


Table 2 - Constant Mean Adjusted Abnormal Returns

	Constant Mean Adjusted Excess Returns (Bootstrap)		
	2.5%	M.O.	97.5%
0	**-0.839%**	**-0.532%**	**-0.208%**
1	-0.890%	-0.515%	-0.134%

Median abnormal returns present a more negative abnormality of -0.6% on the event day, while in the next day there is a significant upsurge of 0.44%.

Figure 3 - Medians of Constant Mean Adjusted Abnormal Returns

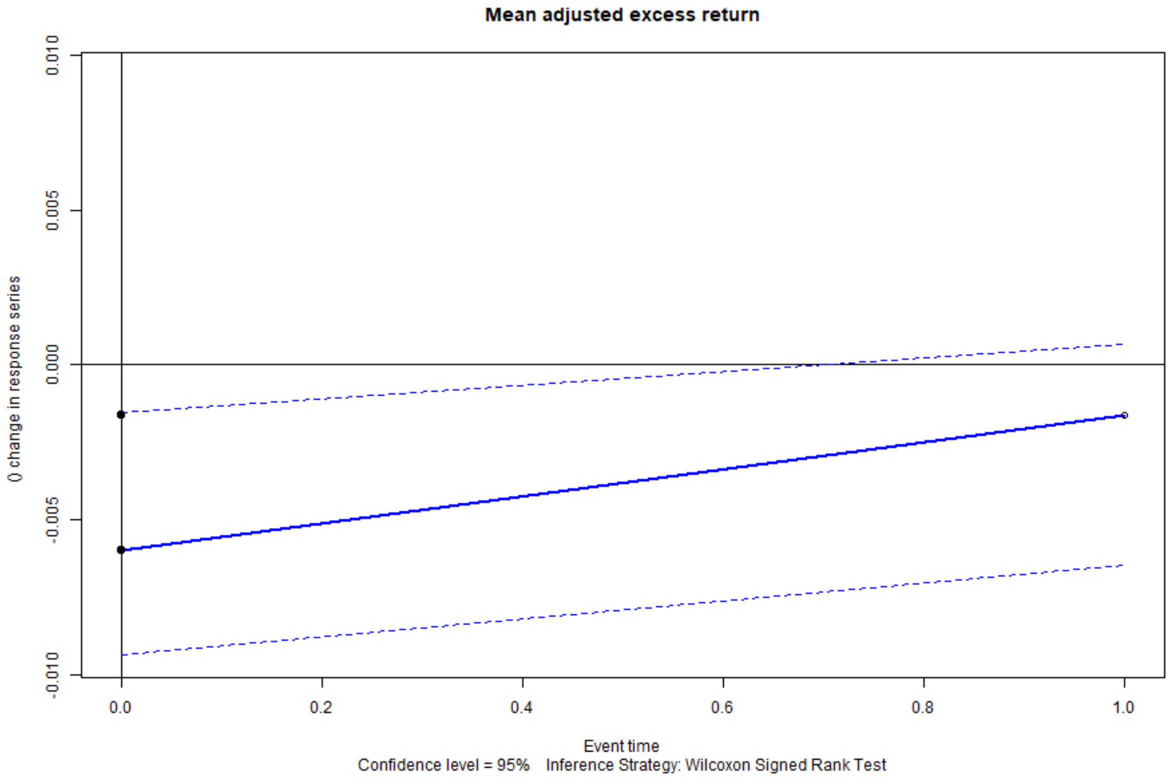


Table 3 - Medians of Constant Mean Adjusted Abnormal Returns

	Constant Mean Adjusted Excess Returns (Wilcoxon)		
	2.5%	Median	97.5%
0	**-0.935%**	**-0.600%**	**-0.155%**
1	-0.645%	-0.165%	0.065%

That noteworthy difference between mean and median abnormal returns is the result of a severe disparity on the various returns the day after the event. As it becomes obvious from the histograms below, in the day after the event the density plot of the abnormal returns exhibits an intense negative skewness forcing the mean to succumb to lower than the median values. That implies that in the majority of stocks, the stock market overreacted and undervalued them in the event day, hence correcting its mistake in the next day. For some stocks, it didn't take place a correction towards higher level, but towards lower ones, hence the more negative lower boundary of 0.6% of their range.

Figure 4 - Histogram of Constant Mean Adjusted Abnormal Returns (Event day)

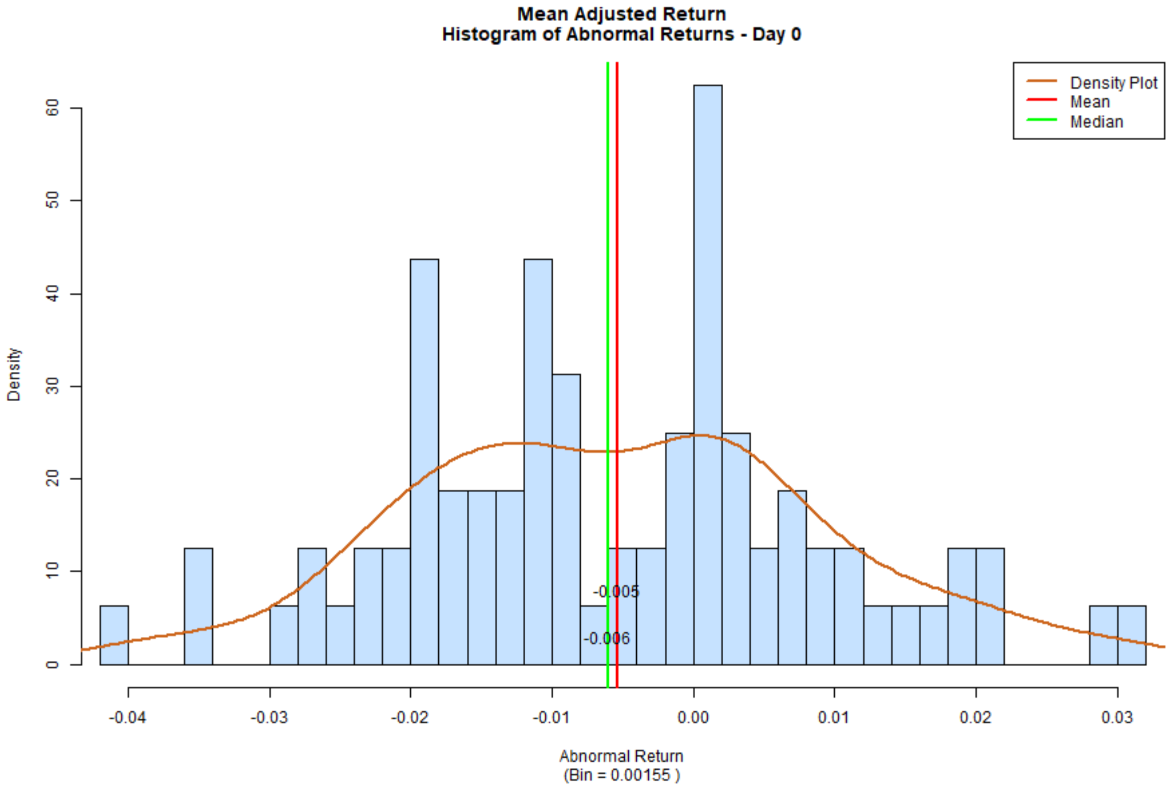
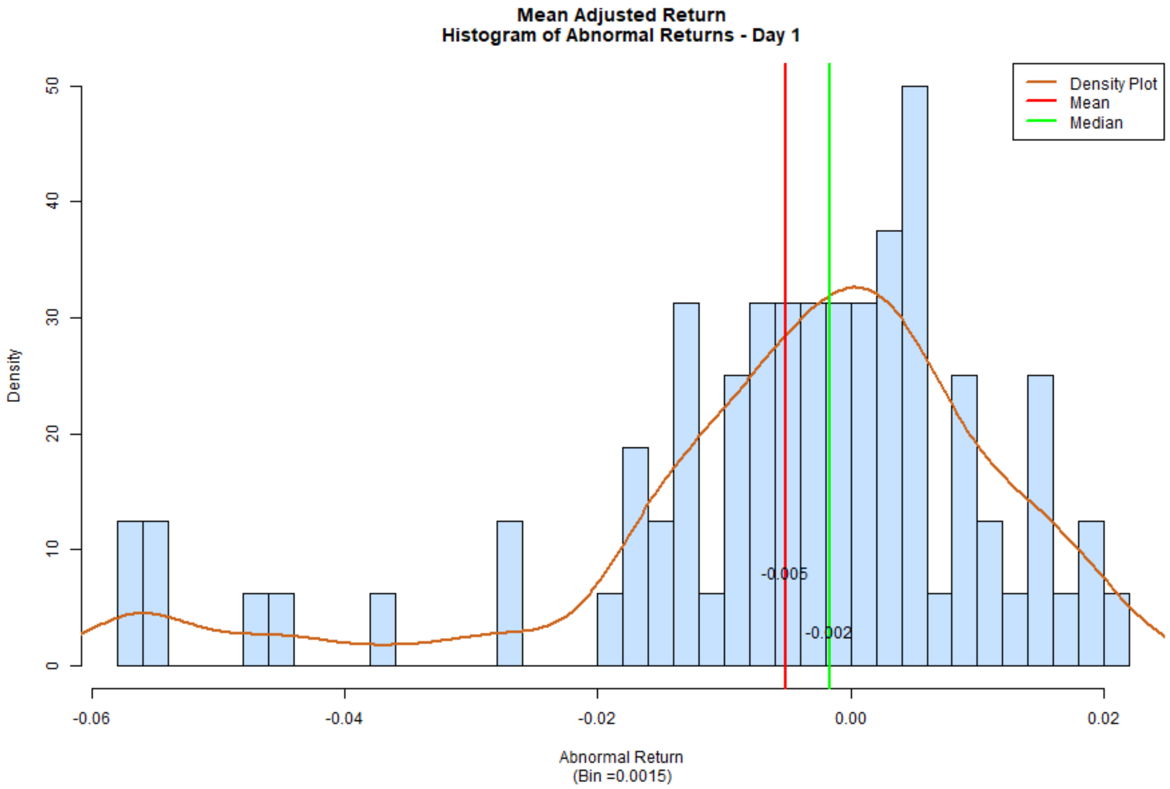


Figure 5 - Histogram of Constant Mean Adjusted Abnormal Returns (Day after the event)



Market Adjusted Excess Return

In comparison to the constant mean adjusted excess returns model, the adjustment to the market results in a 0.27% lower mean abnormal return on the event day, reaching the 0.8%. The previously endured low mean abnormal return of the next day, now escalates for 0.5%, reaching 0.3% lower than the normal return.

Figure 6 – Arithmetic Means of Market Adjusted Abnormal Returns

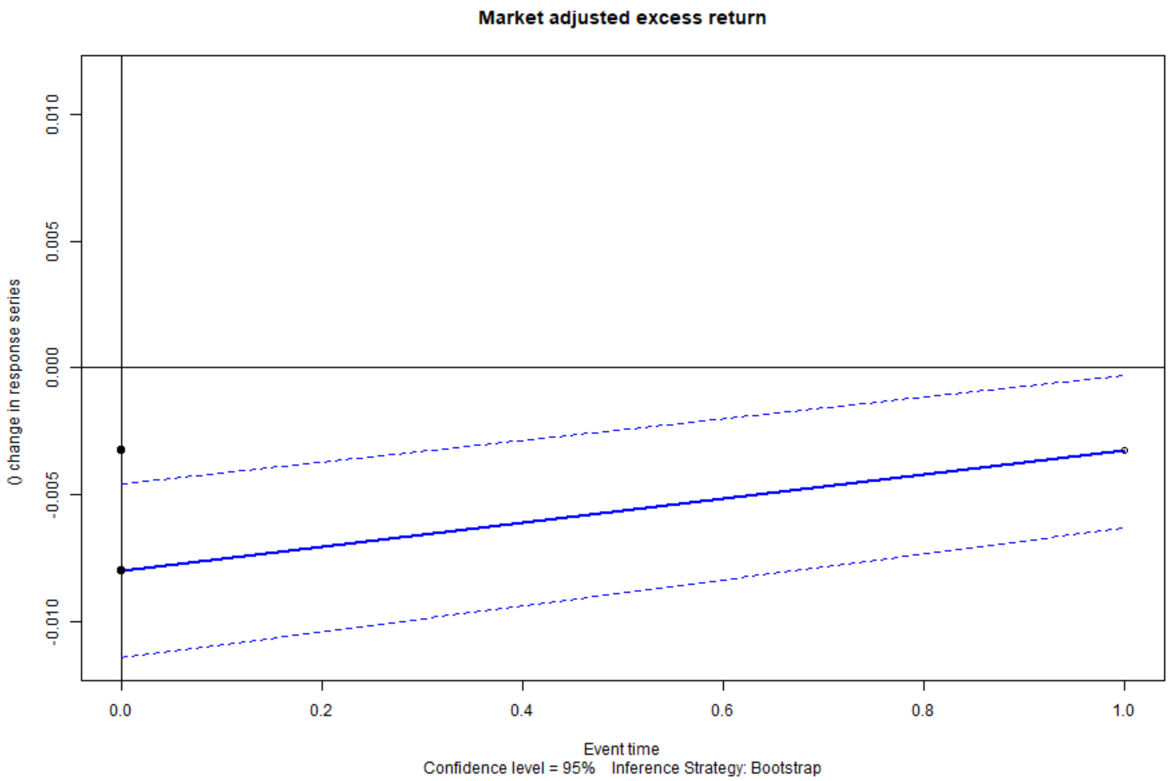


Table 4 - Arithmetic Means of Market Adjusted Abnormal Returns

	Market Adjusted Excess Returns (Bootstrap)		
	2.5%	Mean	97.5%
0	**-1.135%**	**-0.804%**	**-0.435%**
1	-0.612%	-0.325%	-0.010%

The median return on the event day displays the most negative abnormal return of all in the 1-day window and subsequently the most positive change the next day. Particularly, the median abnormal return starts at -1% and reaches 0.017% the next day after an escalation of nearly 0.9%.

Figure 7 - Medians of Market Adjusted Abnormal Returns

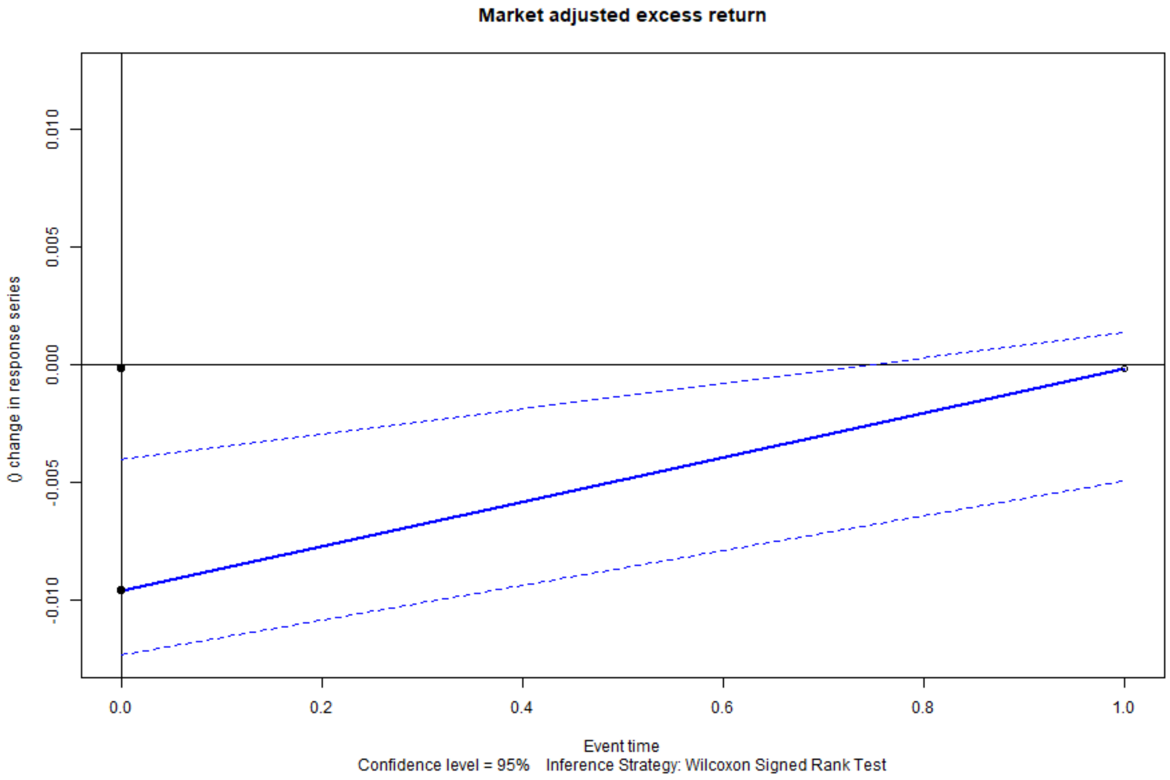


Table 5 - Medians of Market Adjusted Abnormal Returns

	Market Adjusted Excess Returns (Wilcoxon)		
	2.5%	Median	97.5%
0	**-1.229%**	**-0.957%**	**-0.403%**
1	-0.493%	-0.017%	0.140%

Market Model Adjusted Excess Return

Similar with the constant mean adjusted model, the means of the market model present an intensely negative abnormal return that remains in the same levels the next day. The positive variation depicted is only 0.07%.

Figure 8 - Arithmetic Means of Market Model Adjusted Abnormal Returns

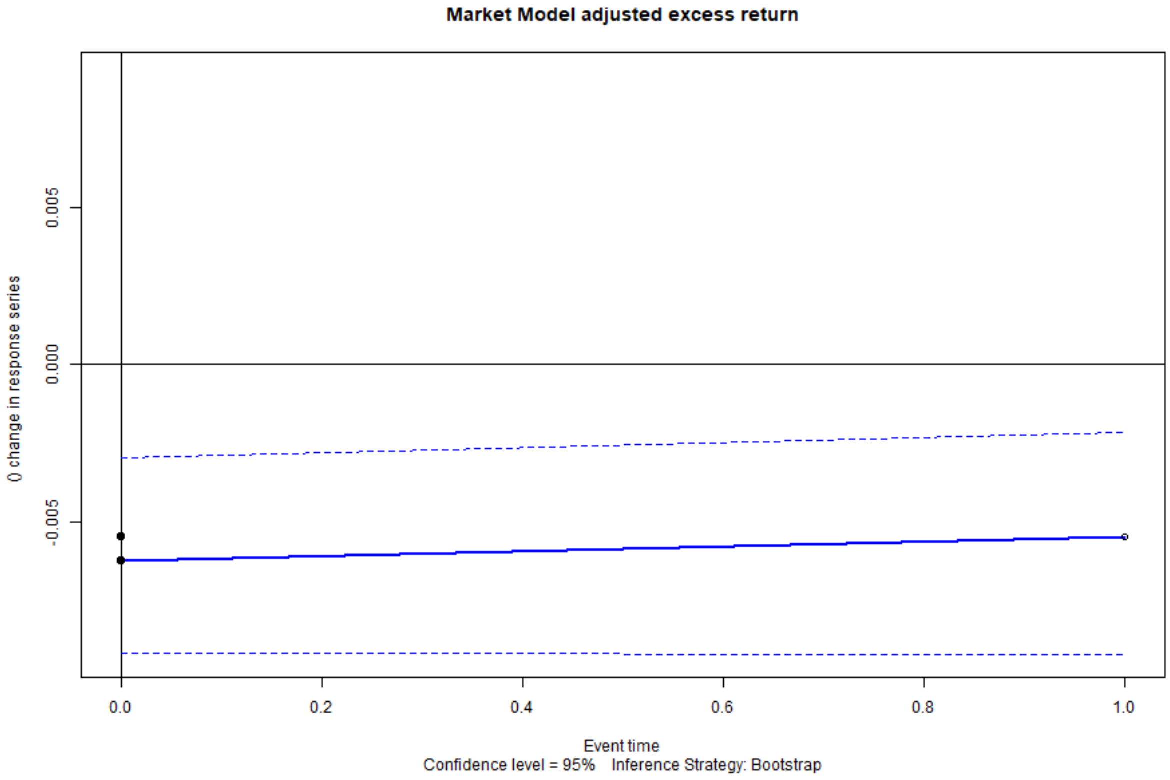


Table 6 - Arithmetic Means of Market Model Adjusted Abnormal Returns

	Market Model Adjusted Excess Returns (Bootstrap)		
	2.5%	Mean	97.5%
0	**-0.947%**	**-0.624%**	**-0.298%**
1	-0.945%	-0.550%	-0.201%

Exactly as with the previous models, here too the median abnormal return of the event day is lower than the respective mean in the event day and higher in the next day. From a -0.66% on the event day, the above mentioned positive change of 0.07% is now 0.5%, stretching the median abnormal return of the next day to -0.19%.

Figure 9 - Medians of Market Model Adjusted Abnormal Returns

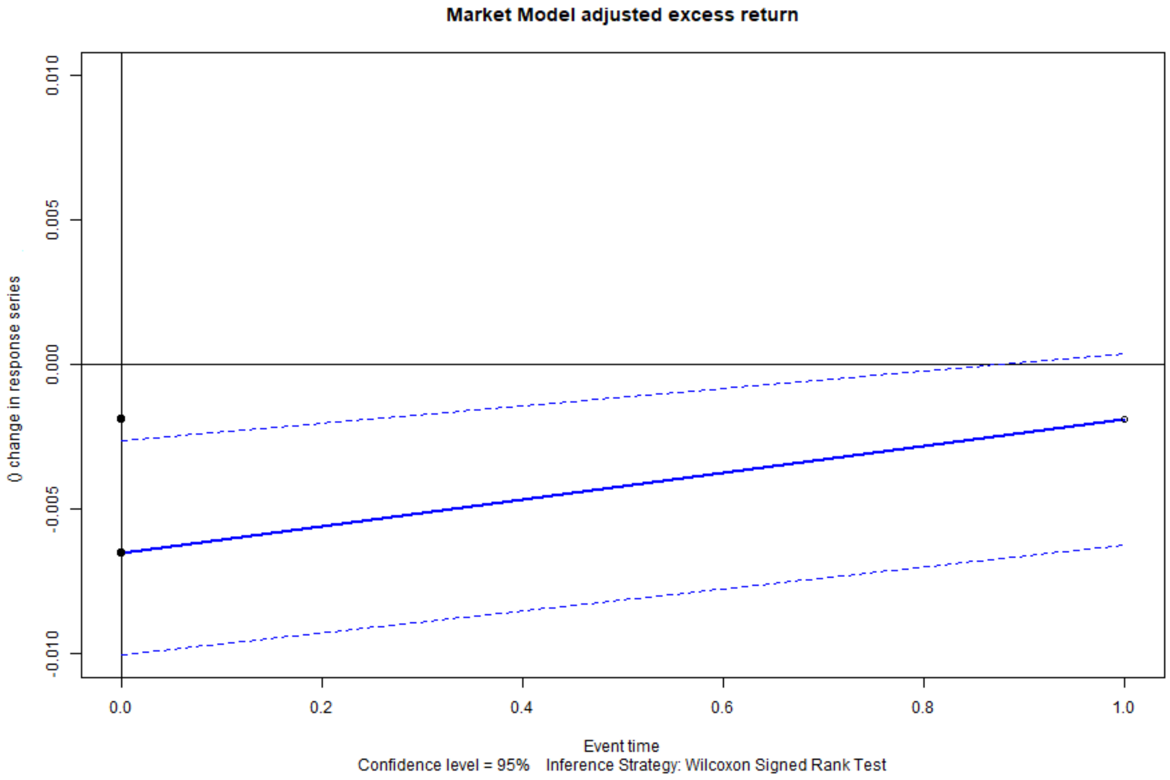


Table 7- Medians of Market Model Adjusted Abnormal Returns

	Market Model adjusted excess return (Wilcoxon)		
	2.5%	Median	97.5%
0	**-1.001%**	**-0.653%**	**-0.260%**
1	-0.621%	-0.189%	0.039%

As with the constant mean excess returns model, here too is observed a significant divergence between the mean and the median abnormal return of the day next to the event. As the histograms below illustrate, a set of extreme negative returns on the day after the event causes a negative skewness to the density plot, influencing the mean asymmetrically more than the median.

Figure 10 - Histogram of Market Model Adjusted Abnormal Returns (Event day)

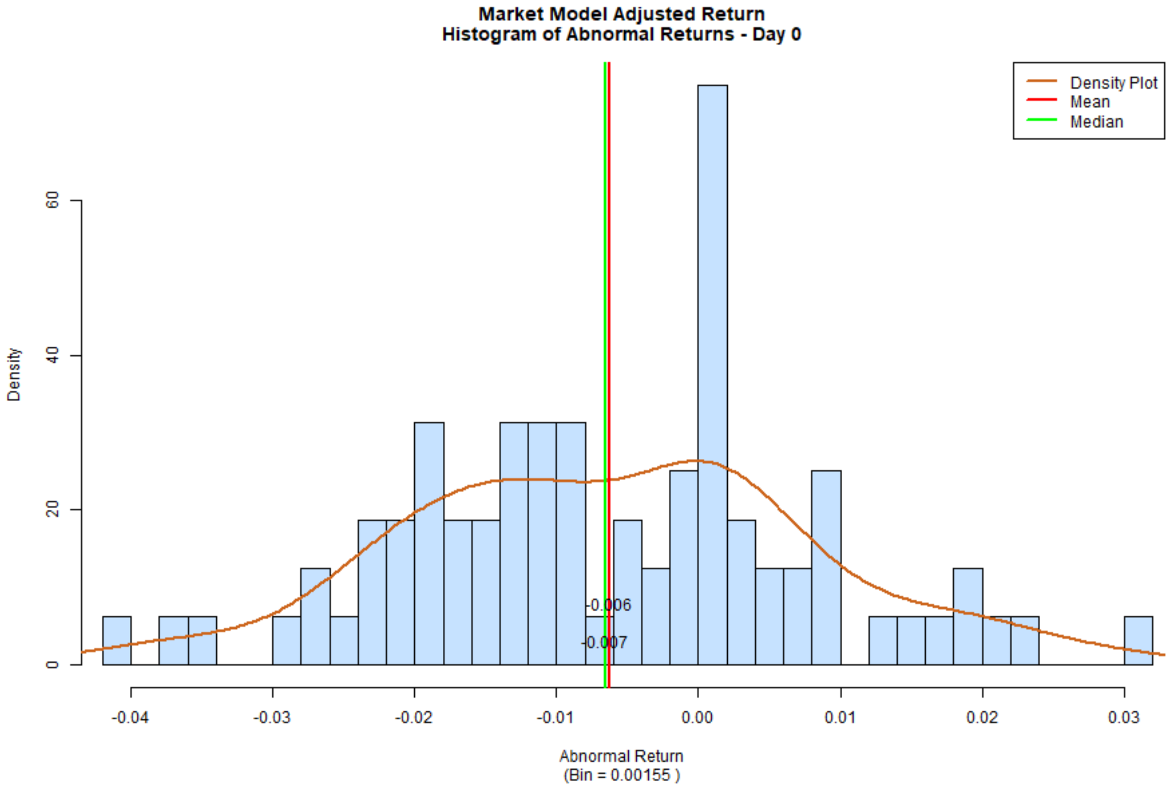
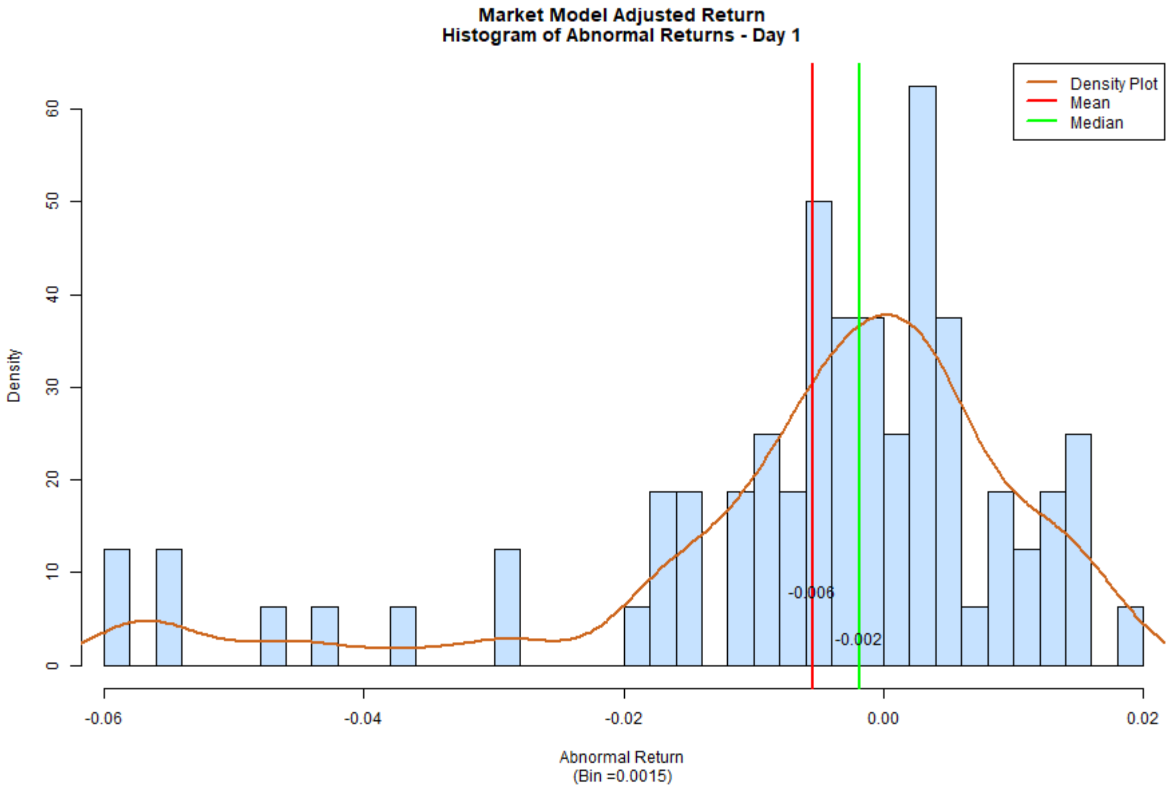


Figure 11 - Histogram of Market Model Adjusted Abnormal Returns (Day after the event)



3-day Event Window

The 3-day event window is taken in an effort to compare the returns of interest with similar returns of a wider time-horizon. Hence, more information is provided about the possibility the observed return to be abnormal because of a general uncertainty in that period or, at least, in that industry.

The days common with the previous window exhibit almost identical values, with the means and medians remaining the same, but with the confidence intervals slightly changed. That is a result of a modest change in the estimation window. Some values that are now included in the event window, previously were in the estimation window influencing the estimated return and thus the abnormal return derived from it.

Under any model, a notable change from the previous to the event day is observed, fluctuating from 1.25% to 2.17%. This could imply that the market expected the results of the stress tests to raise the prices and rushed to buy before their release. On the release, perhaps reality did not meet their expectations, hence the subsequent considerable plunge.

As also happened previously, in the confidence intervals of the event day, no positive value is included, while the median abnormal return is always lower than the mean in the same day.

Constant Mean Excess Return

With the constant mean excess returns model, the new information added by the larger window shows a small variation around 0. Abnormal return on day -2 is only -0.16%, on day +2 is even smaller at 0.07%, while on day +3 it reaches 0.26%.

The day before the event manifests a strongly positive abnormal return succeeded by a notable plunge of 0.88%.

Figure 12 - Arithmetic Means of Mean Adjusted Abnormal Returns (3-day window)

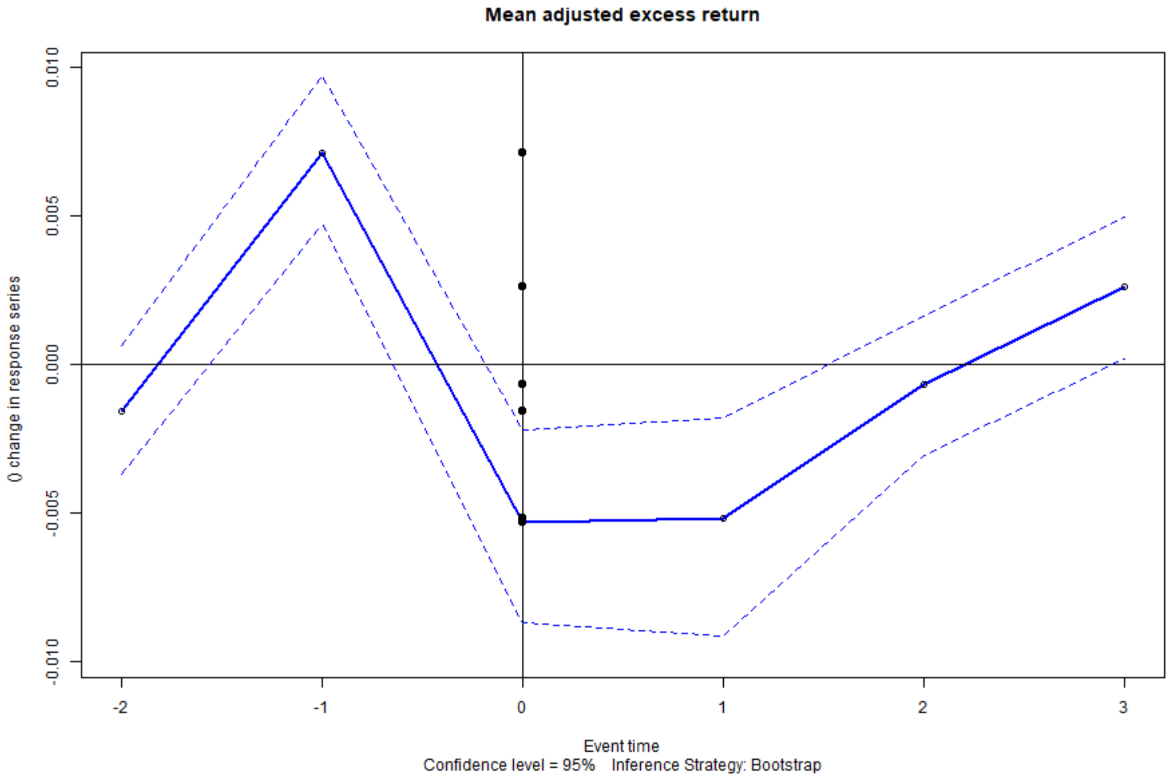


Table 8 - Arithmetic Means of Mean Adjusted Abnormal Returns (3-day window)

	Constant Mean Adjusted Excess Returns (Bootstrap)		
	2.5%	Mean	97.5%
-2	-0.354%	-0.157%	0.057%
-1	0.478%	0.715%	0.955%
0	**-0.829%**	**-0.532%**	**-0.189%**
1	-0.911%	-0.515%	-0.151%
2	-0.294%	-0.066%	0.149%
3	0.043%	0.264%	0.497%

The median returns evolve almost identically with the mean returns, with their basic difference captured on the last day. The previous 0.26% return is inflated by nearly 0.1%, reaching 0.35%.

Figure 13 - Medians of Mean Adjusted Abnormal Returns (3-day window)

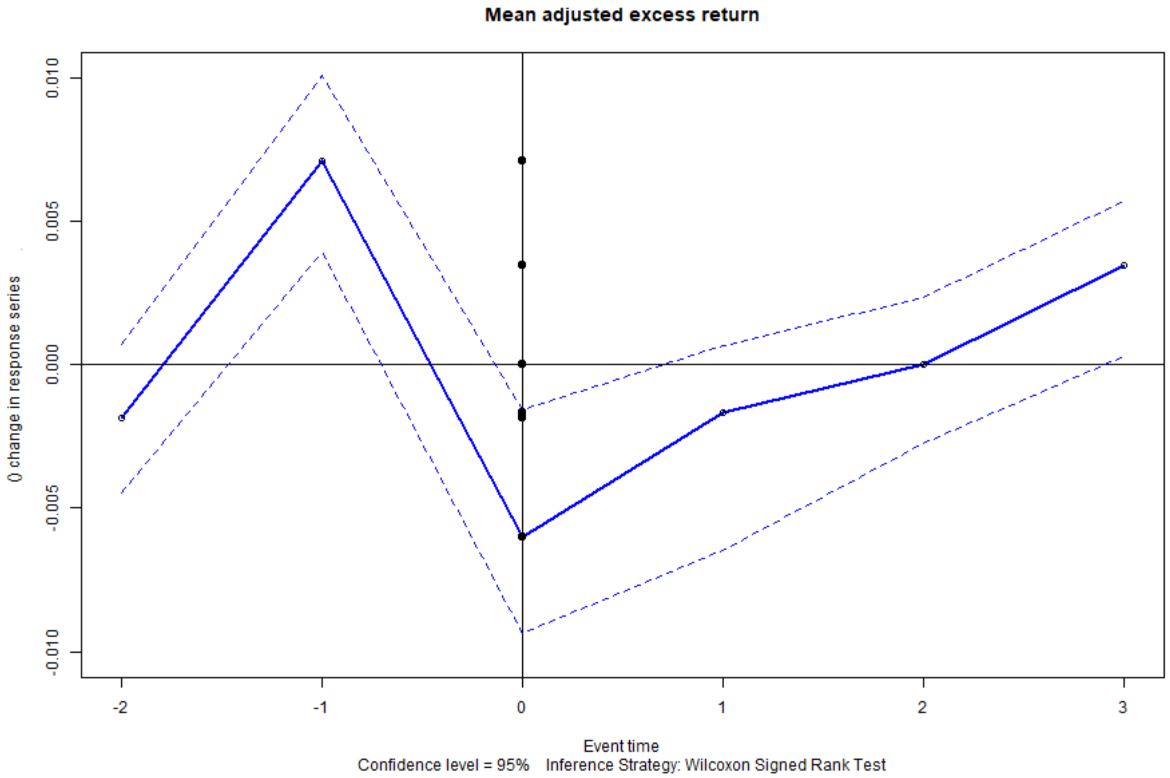


Table 9 - Medians of Mean Adjusted Abnormal Returns (3-day window)

	Constant Mean Adjusted Excess Return(Wilcoxon)		
	2.5%	Median	97.5%
-2	-0.445%	-0.185%	0.070%
-1	0.395%	0.710%	1.010%
0	**-0.935%**	**-0.600%**	**-0.155%**
1	-0.645%	-0.165%	0.065%
2	-0.275%	0.000%	0.235%
3	0.030%	0.349%	0.569%

Market Adjusted Excess Return

The market adjustment, though it maintains the same pattern, results in greater variation between each observed return. The former change of -1.24% between the day before and the event day, has now increased by 0.8% to -2%.

The rest of the days do not present any significant fluctuation.

Figure 14 - Arithmetic Means of Market Adjusted Abnormal Returns (3-day window)

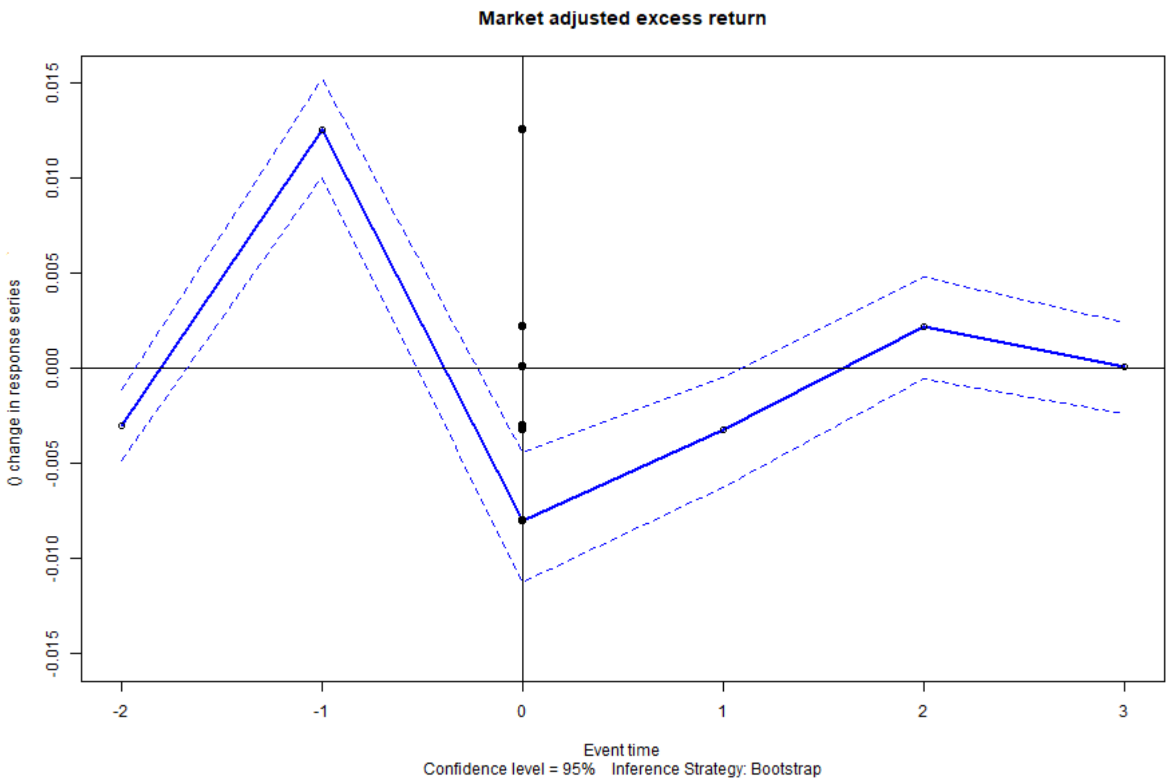


Table 10 - Arithmetic Means of Market Adjusted Abnormal Returns (3-day window)

	Market Adjusted Excess Returns (Bootstrap)		
	2.5%	Mean	97.5%
-2	-0.501%	-0.302%	-0.122%
-1	1.010%	1.258%	1.512%
0	**-1.169%**	**-0.804%**	**-0.453%**
1	-0.622%	-0.325%	-0.050%
2	-0.025%	0.217%	0.467%
3	-0.235%	0.006%	0.233%

The medians display a notable difference in the day before the event. Compared to the mean, the median abnormal return is 0.15% higher, resulting in a -2.17% drop towards the return of the event day.

Figure 15 - Medians of Market Adjusted Abnormal Returns (3-day window)

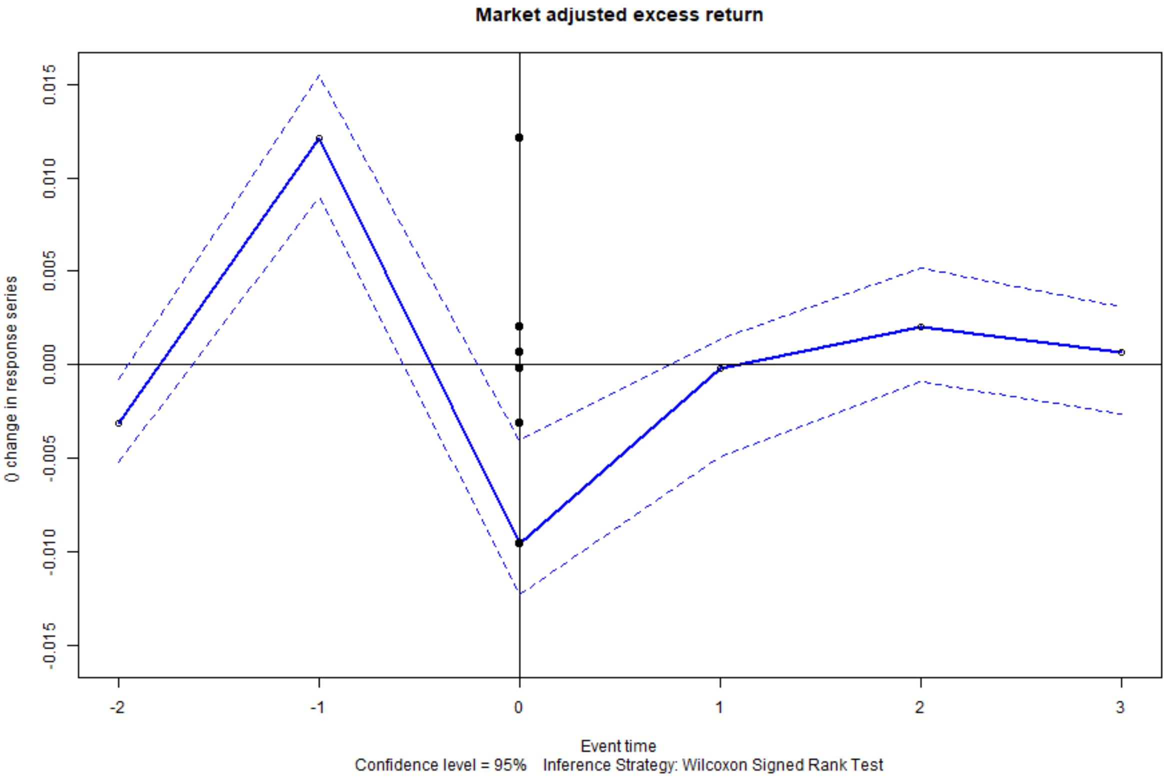


Table 11 - Medians of Market Adjusted Abnormal Returns (3-day window)

	Market Adjusted Excess Returns (Wilcoxon)		
	2.5%	Median	97.5%
-2	-0.521%	-0.313%	-0.076%
-1	0.895%	1.213%	1.549%
0	**-1.229%**	**-0.957%**	**-0.403%**
1	-0.493%	-0.017%	0.140%
2	-0.091%	0.206%	0.515%
3	-0.260%	0.064%	0.311%

Market Model adjusted excess return

The mean abnormal returns of the market model feature almost identical values with those from the constant mean model. The plunge from the day before to the event day now rises to -1.35%, while the rest of the days added with the 3-day window do not fluctuate more than 0.23% from zero.

Figure 16 - Arithmetic Means of Market Model Adjusted Abnormal Returns (3-day window)

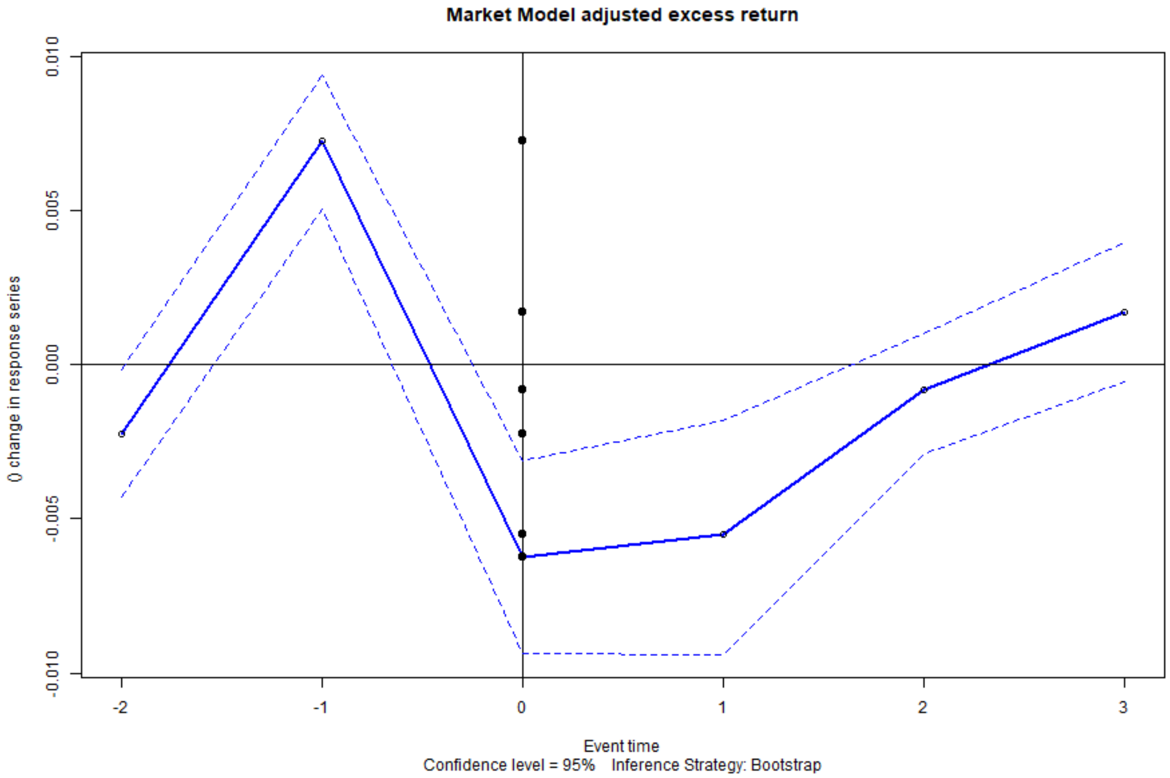


Table 12 - Arithmetic Means of Market Model Adjusted Abnormal Returns (3-day window)

	Market Model Adjusted Excess Returns (Bootstrap)		
	2.5%	Mean	97.5%
-2	-0.437%	-0.225%	-0.014%
-1	0.486%	0.727%	0.933%
0	**-0.917%**	**-0.623%**	**-0.299%**
1	-0.921%	-0.548%	-0.215%
2	-0.287%	-0.083%	0.113%
3	-0.063%	0.171%	0.403%

Apart from the next day after the event, no notable difference surpassing 0.046% is observed between the mean and median returns.

Figure 17 - Medians of Market Model Adjusted Abnormal Returns (3-day window)

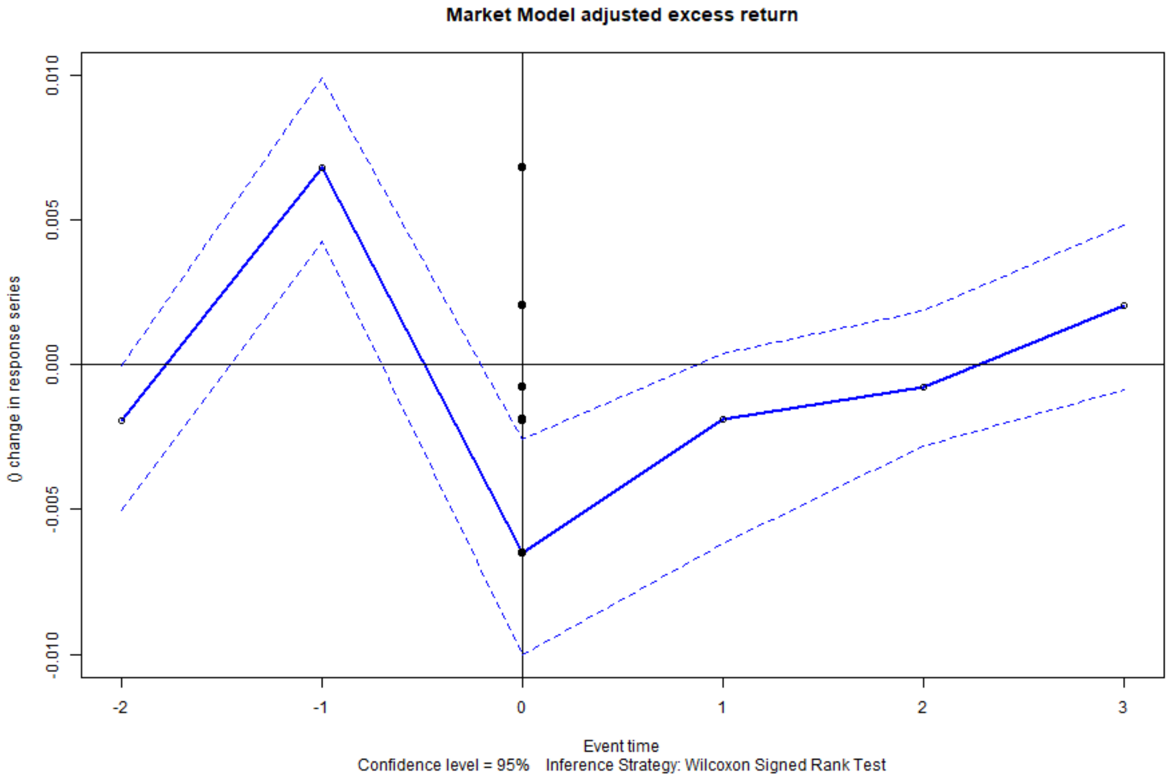


Table 13 - Medians of Market Model Adjusted Abnormal Returns (3-day window)

	Market Model Adjusted Excess Returns (Wilcoxon)		
	2.5%	Median	97.5%
-2	-0.504%	-0.194%	-0.003%
-1	0.427%	0.681%	0.991%
0	**-1.001%**	**-0.650%**	**-0.260%**
1	-0.619%	-0.188%	0.040%
2	-0.283%	-0.077%	0.187%
3	-0.088%	0.204%	0.484%

5-day Event Window

With the 5-day event window, the abnormal returns of four extra days are provided. Again, the event day return is always the lowest out of the total 10 abnormal returns, while its previous day exhibits the highest, higher for at least 0.36% than the second highest.

Constant Mean Excess Return

With the constant mean excess returns model, the extra days do not oscillate more than 0.27% around 0.

Figure 18 - Arithmetic Means of Mean Adjusted Abnormal Returns (5-day window)

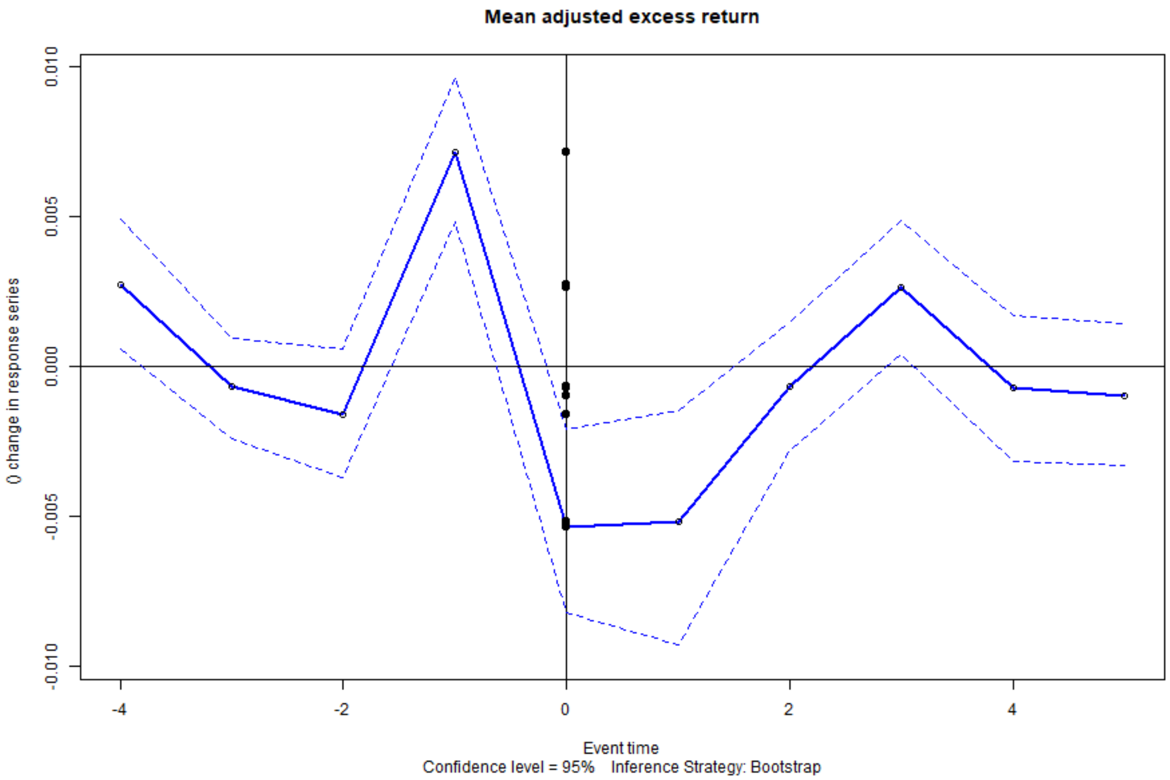


Table 14 - Arithmetic Means of Mean Adjusted Abnormal Returns (5-day window)

	Constant Mean Adjusted Excess Returns (Bootstrap)		
	2.5%	Mean	97.5%
-2	0.048%	0.275%	0.502%
-1	-0.222%	-0.066%	0.101%
-2	-0.377%	-0.157%	0.057%
-1	0.478%	0.715%	0.958%

0	**-0.864%**	**-0.532%**	**-0.194%**
1	-0.912%	-0.515%	-0.153%
2	-0.292%	-0.066%	0.152%
3	0.040%	0.264%	0.482%
4	-0.310%	-0.071%	0.192%
5	-0.317%	-0.098%	0.136%

The same goes also for the median abnormal returns, which differ only on the +4-day. While the mean is slightly negative at -0.071%, the respective median is slightly positive at 0.045%, articulating a minor 0.1% difference.

Figure 19 - Medians of Mean Adjusted Abnormal Returns (5-day window)

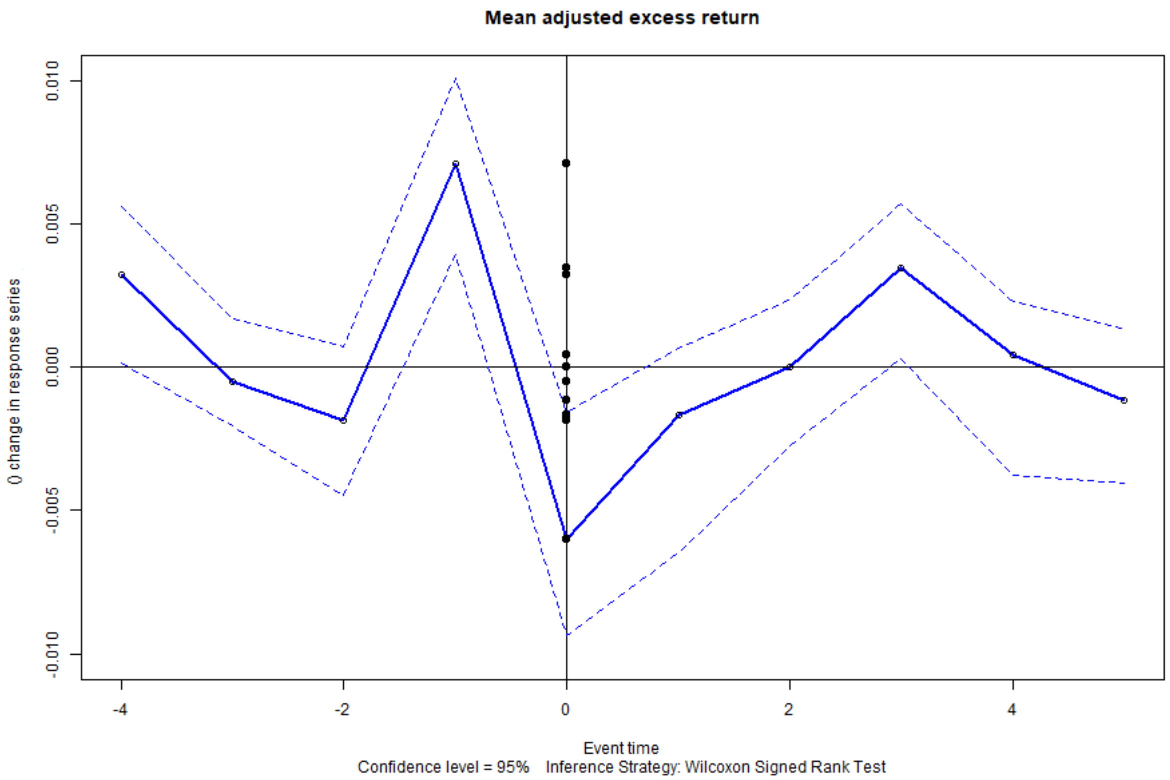


Table 15 - Medians of Mean Adjusted Abnormal Returns (5-day window)

	Constant Mean Adjusted Excess Returns (Wilcoxon)		
	2.5%	Median	97.5%
-4	0.015%	0.325%	0.560%
-3	-0.205%	-0.050%	0.168%

-2	-0.445%	-0.185%	0.070%
-1	0.395%	0.710%	1.010%
0	**-0.935%**	**-0.600%**	**-0.155%**
-0	-0.645%	-0.165%	0.065%
-1	-0.275%	0.000%	0.235%
0	0.030%	0.349%	0.569%
4	-0.375%	0.045%	0.230%
5	-0.405%	-0.115%	0.130%

Market Adjusted Excess Return

The market adjustment incurs a notable difference on the last day of the 5-day event window. Its corresponding return is 0.6% lower than normal and 0.5% lower than the respective from the constant mean adjusted model. Perhaps this change is originated from a disparity between the stock and the market return, causing their difference to become considerable. Still, the return of the event day, the most negative of all, is 0.18% lower.

Figure 20 - Arithmetic Means of Market Adjusted Abnormal Returns (5-day window)

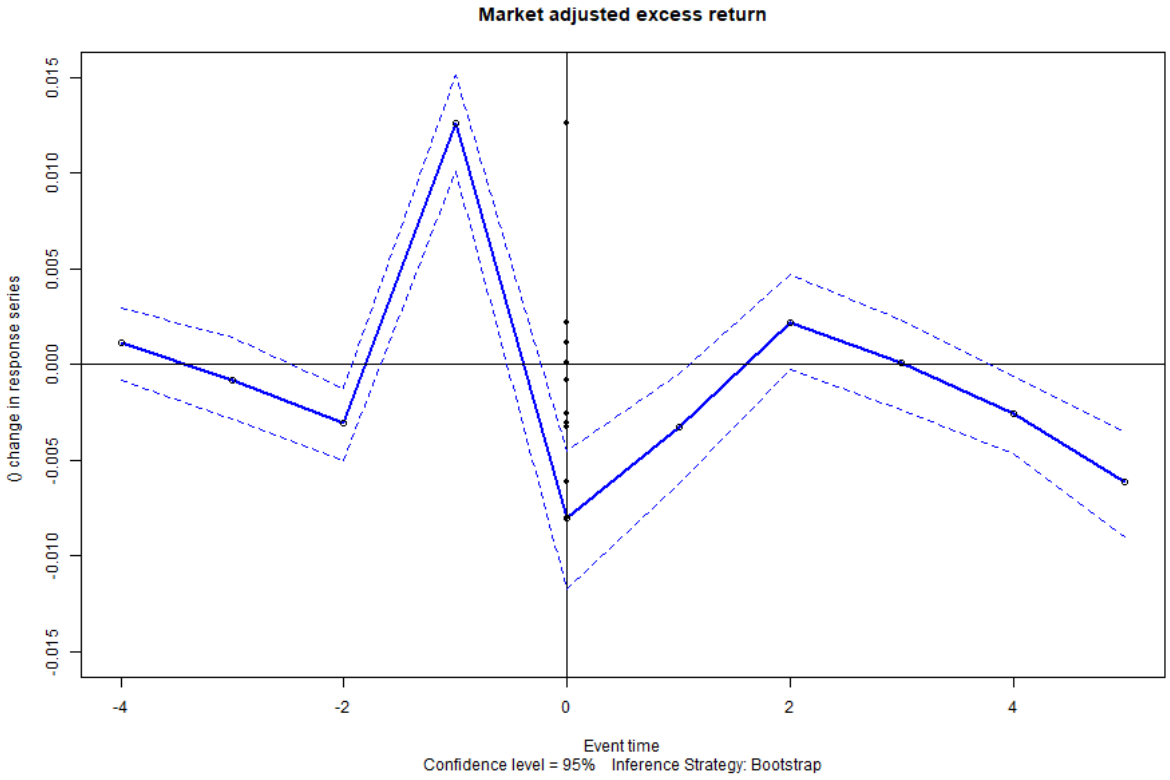
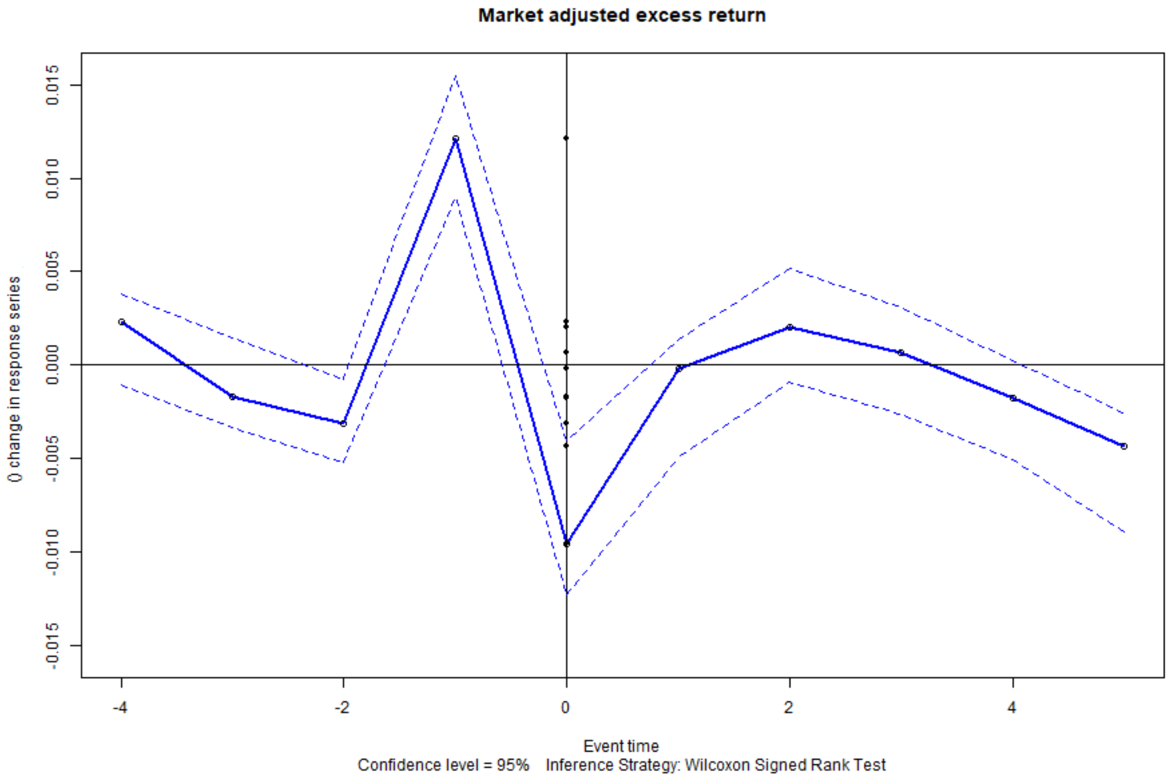


Table 16 - Arithmetic Means of Market Adjusted Abnormal Returns (5-day window)

	Market Adjusted Excess Returns (Bootstrap)		
	2.5%	Mean	97.5%
-4	-0.072%	0.111%	0.312%
-3	-0.283%	-0.080%	0.130%
-2	-0.500%	-0.302%	-0.124%
-1	1.001%	1.258%	1.525%
0	**-1.149%**	**-0.804%**	**-0.480%**
1	-0.627%	-0.325%	-0.031%
2	-0.058%	0.217%	0.464%
3	-0.250%	0.006%	0.248%
4	-0.479%	-0.259%	-0.061%
5	-0.900%	-0.616%	-0.361%

The median of the last day, compared to equivalent mean, is by 0.18% closer to 0. Contrarily, on the first day of the window it exhibits a greater variance from 0 by 0.12% in comparison to the respective mean.

Figure 21 - Medians of Market Adjusted Abnormal Returns (5-day window)

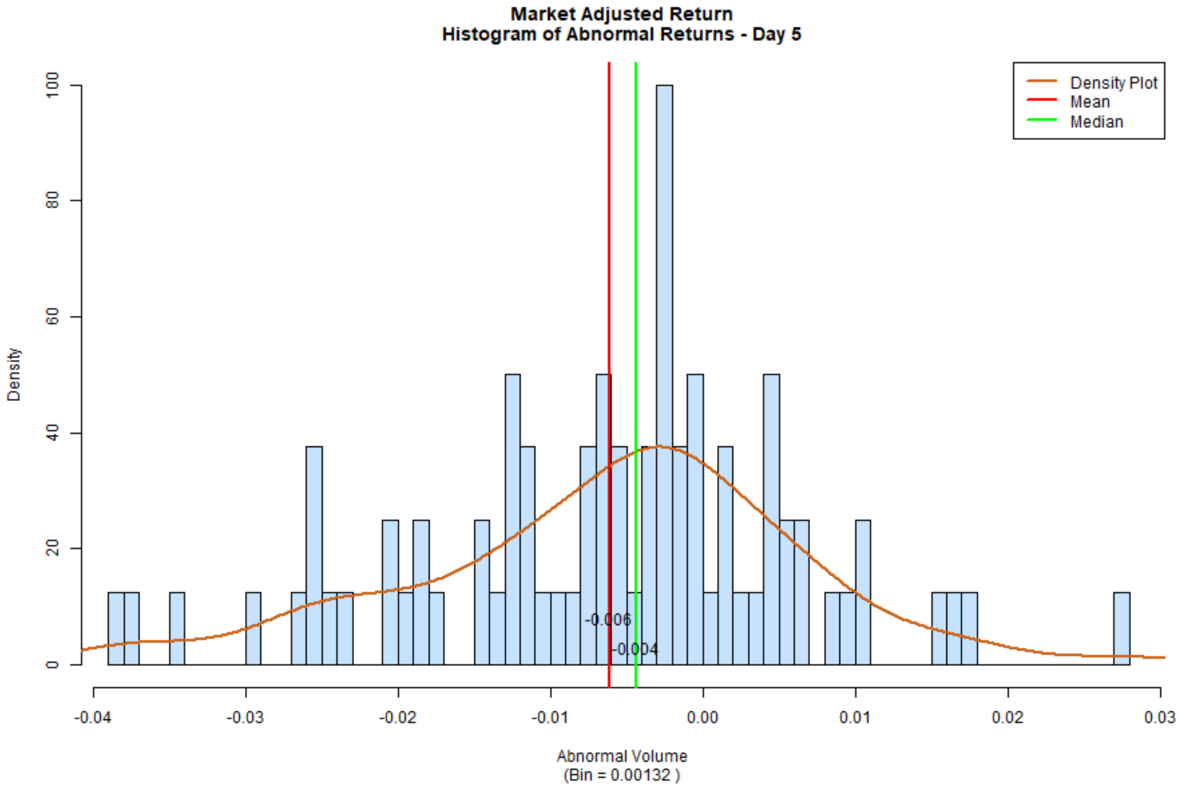


	Market Adjusted Excess Returns (Wilcoxon)		
	2.5%	Median	97.5%
-4	-0.106%	0.232%	0.383%
-3	-0.337%	-0.169%	0.144%
-2	-0.521%	-0.313%	-0.076%
-1	0.895%	1.213%	1.549%
0	**-1.229%**	**-0.957%**	**-0.403%**
1	-0.493%	-0.017%	0.140%
2	-0.091%	0.206%	0.515%
3	-0.260%	0.064%	0.311%
4	-0.510%	-0.180%	0.021%
5	-0.896%	-0.436%	-0.252%

Table 17 - Medians of Market Adjusted Abnormal Returns (5-day window)

As for the last day of the window, the disparity of the various abnormal returns depicted by the histogram explains the difference between mean and median return of the day, where a slight negative skewness is apparent.

Figure 22 - Histogram of Market Adjusted Abnormal Returns (Day 5 after the event)



Market Model Adjusted Excess Return

With the Market Model, the abnormal returns of the extra days are more volatile than those of the constant mean model, but less volatile compared to those of the market adjusted model. Of the 4 days of interest, none vacillates around 0 more than 0.2%.

Figure 23 - Arithmetic Means of Market Model Adjusted Abnormal Returns (5-day window)

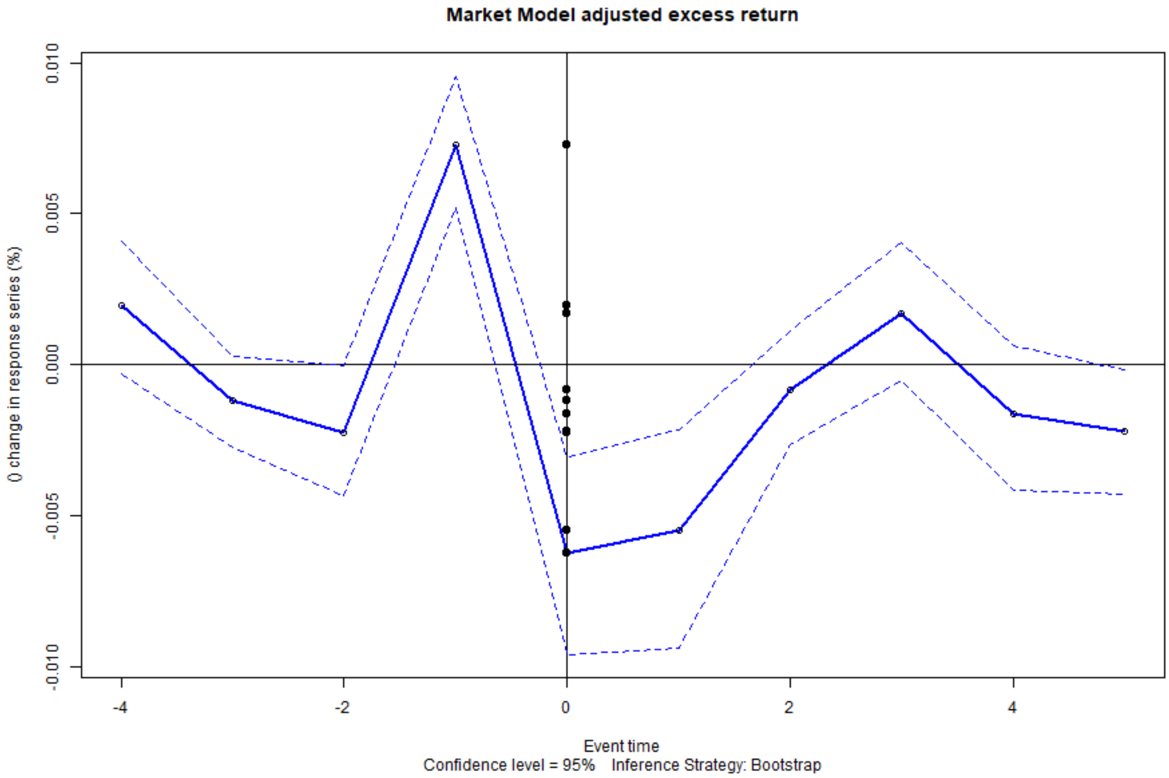


Table 18 - Arithmetic Means of Market Model Adjusted Abnormal Returns (5-day window)

	Market Model Adjusted Excess Returns (Bootstrap)		
	2.5%	Mean	97.5%
-4	-0.016%	0.198%	0.421%
-3	-0.274%	-0.119%	0.040%
-2	-0.423%	-0.224%	-0.009%
-1	0.509%	0.728%	0.944%
0	**-0.933%**	**-0.622%**	**-0.316%**
1	-0.917%	-0.548%	-0.192%
2	-0.283%	-0.082%	0.126%
3	-0.063%	0.171%	0.392%
4	-0.403%	-0.163%	0.080%
5	-0.418%	-0.221%	-0.012%

As with the mean returns, the median returns of interest do not exhibit any notable variance around 0, nor can they be considered extremely abnormal.

Figure 24 - Medians of Market Model Adjusted Abnormal Returns (5-day window)

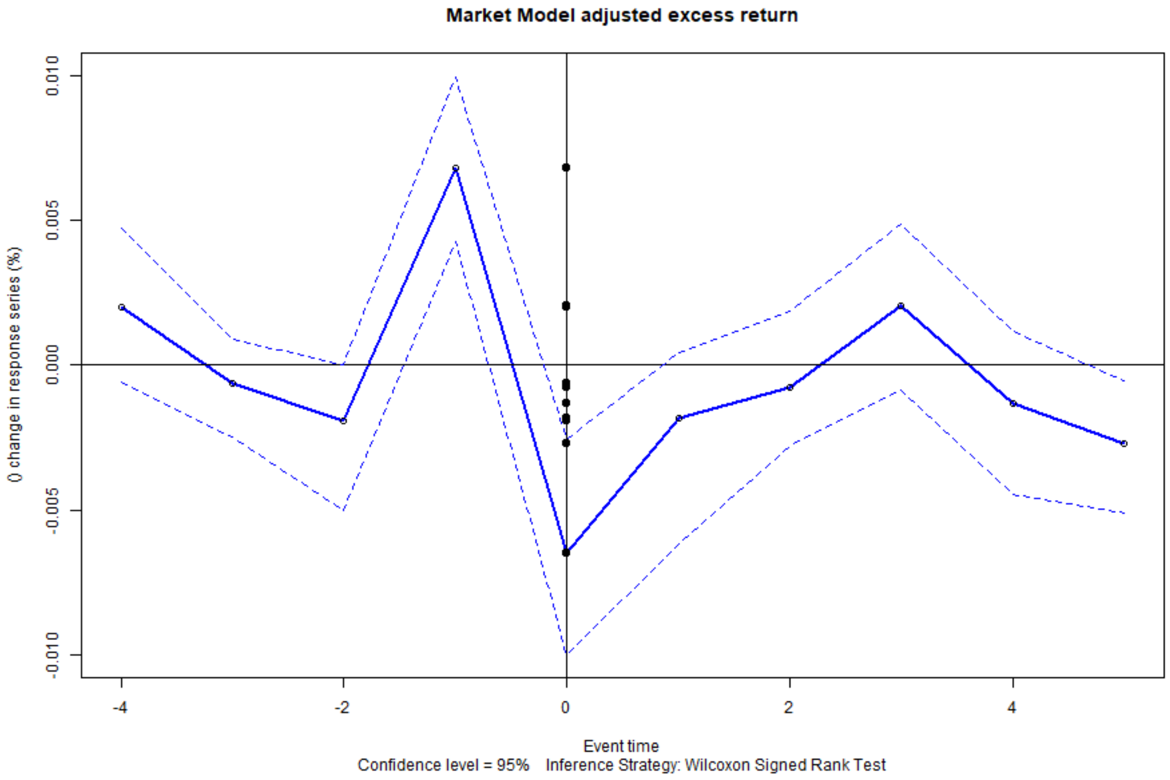


Table 19 - Medians of Market Model Adjusted Abnormal Returns (5-day window)

	Market Model Adjusted Excess Return (Wilcoxon)		
	2.5%	Median	97.5%
-4	-0.057%	0.201%	0.473%
-3	-0.246%	-0.062%	0.089%
-2	-0.502%	-0.193%	-0.001%
-1	0.428%	0.681%	0.993%
0	**-1.000%**	**-0.650%**	**-0.257%**
1	-0.618%	-0.184%	0.042%
2	-0.280%	-0.078%	0.187%
3	-0.087%	0.205%	0.485%
4	-0.448%	-0.131%	0.119%

5	-0.509%	-0.272%	-0.054%

Cumulatively

The cumulative abnormal returns (CAR) amount to the sum of all abnormal returns of each event window. They present the net return of the stocks examined in case someone held them throughout the whole window.

It is remarkable that the greatest cumulative returns are observed in the 1-day window, signifying that the event had an impact, which, in the passage of time, is softened by the not so abnormal returns of the rest of the days.

Constant Mean Excess Return

With the constant mean excess returns model, the cumulative returns of the 1-day window clearly exceed their corresponding returns.

As for mean cumulative returns, the 1-day window displays a return by -0.8% lower than its respective of the 5-day window and by 0.76% lower than that of the 3-day window. The 3 and 5-day windows manifest a slight difference of 0.04% between them.

Table 20 - Cumulative Constant Mean Adjusted Excess Returns

	Cumulative Constant Mean Adjusted Excess Returns (Bootstrap)		
	2.5%	Mean	97.5%
5 ημέρες	-2.728%	**-0.252%**	2.232%
3 ημέρες	-1.867%	**-0.292%**	1.318%
1 ημέρα	-1.729%	**-1.048%**	-0.342%

Median cumulative returns are much higher than their reciprocal means, resulting in positive values in the 5 and 3-day event windows. These windows, despite having the extremely negative return of the event day, on aggregate, they present a notable offset, connoting that the majority of stocks returns to positive yields.

Compared to the cumulative means, they feature greater differences between them. The 1-day window is by 0.87% lower than the 3-day, with that difference reaching 1% when compared with the 5-day window.

Table 21 - Cumulative Constant Mean Adjusted Excess Returns

	Cumulative Constant Mean Adjusted Excess Returns (Wilcoxon)		
	2.5%	Median	97.5%
5 ημέρες	-2.845%	**0.314%**	2.882%
3 ημέρες	-1.875%	**0.109%**	1.794%
1 ημέρα	-1.580%	**-0.765%**	-0.090%

Market Adjusted Excess Return

The market adjusted excess returns model, differs from the previous mainly because of the remarkable upsurge it depicts on the day after the event and because of the lower rates it exhibits in day +5.

Hence, by comparing the means, in the 5-day event window it manifests a much lower, by 0.5%, return, in the 3-day window a higher by 0.3% and in the 1-day lower by 0.08%.

Still, the 1-day event window yields by far the most negative return, lower than the 3-day by 1.2% and the 5-day by 0.3%.

Table 22 - Cumulative Market Adjusted Excess Returns

	Market Adjusted Excess Return (Bootstrap)		
	2.5%	Mean	97.5%
5 ημέρες	-3.316%	**-0.792%**	1.622%
3 ημέρες	-1.541%	**0.051%**	1.588%
1 ημέρα	-1.747%	**-1.128%**	-0.445%

The median cumulative returns remarkably alter in the 5-day window, yielding a 0.4% lower return. The rest do not differ more than 0.16%.

Table 23 - Cumulative Market Adjusted Excess Returns

	Market Adjusted Excess Return (Wilcoxon)		
	2.5%	Median	97.5%
5 ημέρες	-3.548%	**-0.358%**	2.332%
3 ημέρες	-1.699%	**0.196%**	2.036%
1 ημέρα	-1.722%	**-0.974%**	-0.263%

Market Model adjusted excess return

The market model generates the lowest cumulative result of all, the mean cumulative return of the 1-day event window. Differences between lengths of event windows vary from 0.5% to 0.3%.

Table 24 - Cumulative Market Model Adjusted Excess Returns

	Cumulative Market Model Adjusted Excess Returns (Bootstrap)		
	2.5%	Mean	97.5%
5 ημέρες	-3.222%	**-0.882%**	1.475%
3 ημέρες	-2.139%	**-0.582%**	0.921%
1 ημέρα	-1.892%	**-1.174%**	-0.498%

The cumulative medians exhibit a similar pattern, but with by approximately 0.35% higher values than their respective means.

Table 25 - Cumulative Market Model Adjusted Excess Returns

	Cumulative Market Model Adjusted Excess Returns (Wilcoxon)		
	2.5%	Median	97.5%
5 ημέρες	-3.319%	**-0.483%**	2.076%
3 ημέρες	-2.067%	**-0.224%**	1.440%
1 ημέρα	-1.623%	**-0.842%**	-0.221%

Trade Volumes

Data preprocessing

Without processing, numerical data of the traded volumes would not yield unbiased results. Absolute amounts would be asymmetrically affected by small changes in stocks with high average and standard trade volumes and vice versa.

Thus, the numerical amounts have been scaled in the following manner:

Each individual volume entry is centered, meaning that the arithmetic mean of the whole column is subtracted from it. After being centered, each amount is divided by the standard deviation of the whole column.

Hence, a day with 1 standard deviation above the average volume traded would yield a processed data of 1 Standard Deviation (SD). Contrarily, a day with 1 standard deviation below the average volume traded would yield a processed data of -1 Standard Deviation.

Below are cited the standard deviations and the average volumes traded for each individual stock:

Table 26 - Standard Deviations and Arithmetic Means of Traded Volumes

Corporation	Standard Deviation	Average Volume Traded
Bank of America Corporation	69.932.588	114.729.414
Citigroup Inc.	13.232.572	24.818.148
JPMorgan Chase & Co.	12.031.423	19.834.832
Wells Fargo & Company	8.916.856	19.993.408
Regions Financial Corporation	8.754.863	17.610.388
Morgan Stanley	7.935.654	14.686.041
KeyCorp	5.762.423	12.050.732
Fifth Third Bancorp	3.613.408	8.297.032
U.S. Bancorp	3.159.411	7.839.390
American Express Company	2.903.466	5.045.462
The Bank of New York Mellon Corporation	2.305.719	5.807.585
Capital One Financial Corporation	2.172.579	3.508.272
The Goldman Sachs Group, Inc.	1.773.270	3.618.992
BB&T Corporation	1.743.702	4.293.015

State Street Corporation	1.304.734	2.773.997
The PNC Financial Services Group, Inc.	1.130.797	2.624.647

1-day Event Window

In the 1-day event window the raise in volume traded from the event day to the next one is self-evident.

The mean traded volume on event day is barely below the normal, at -0.03 SD. The next day mean volumes escalates to over 1 SD, at 1.14 standard deviations, formed by a 1.17 SD upsurge.

Figure 25 - Arithmetic Means of Trade Volumes (1-day window)

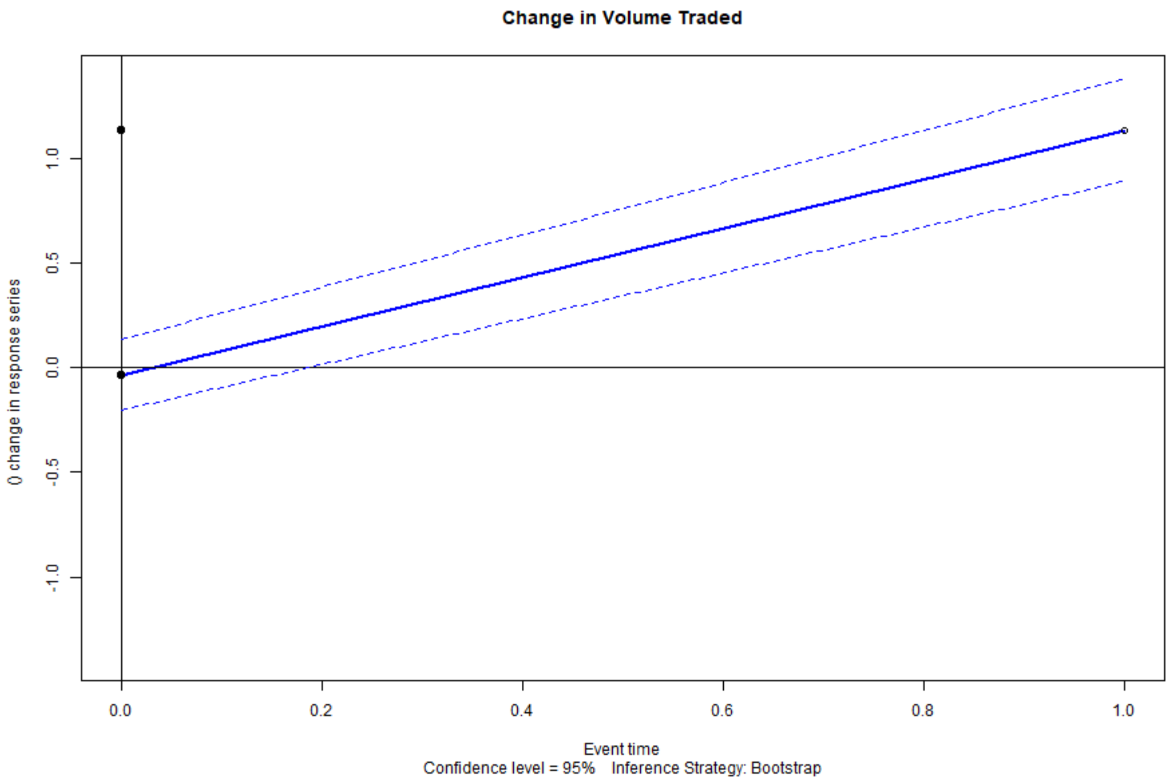


Table 27 - Arithmetic Means of Trade Volumes (1-day window)

	Mean Abnormal Volumes (Bootstrap)		
	2.5%	Mean	97.5%
0	**-0.2047**	**-0.0347**	**0.1365**
1	0.8912	1.1355	1.3839

The median abnormal volumes present an identical pattern of an upsurge of 1.16 SD, though their respective values are by 0.2 SD lower.

Figure 26 - Medians of Trade Volumes (1-day window)

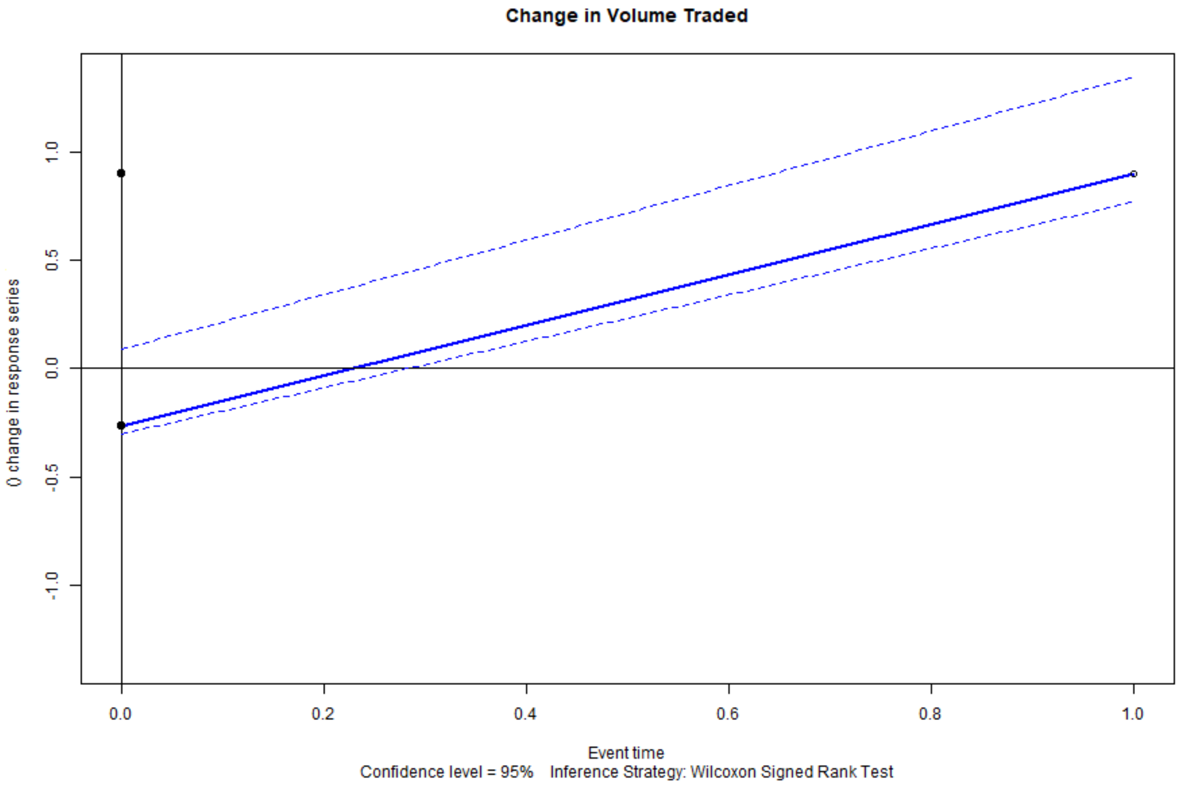


Table 28 - Medians of Trade Volumes (1-day window)

	Median Abnormal Volumes (Wilcoxon)		
	2.5%	Median	97.5%
0	**-0.3044**	**-0.2640**	**0.0860**
1	0.7653	0.9018	1.3482

The shape of a confidence interval is the distance between its upper boundary and the median divided by the distance between the lower boundary and the median and is calculated as:

$$\text{Length} = \frac{\delta[0.975] - Median}{Median - \delta[0.025]} \qquad (16)$$

The length of the median confidence interval is 8.6 on the event day, 7.5 times greater than the reciprocal derived from the mean volumes. This signifies that differences between the median and the higher 50% of volumes are much greater than the respective differences with the lower

50% of the values. That suggests a high concentration of values left of the median, and a lower concentration on the right. Indeed, the difference between the median and the highest value in the event day is a little more than 2.5, while the same amount the day after exceeds the 3.5.

That becomes self-evident by comparing the densities of the histograms below which depict the distributions of abnormal volumes on the event day and the day after it:

Figure 27 - Histogram of Abnormal Volumes (Event day)

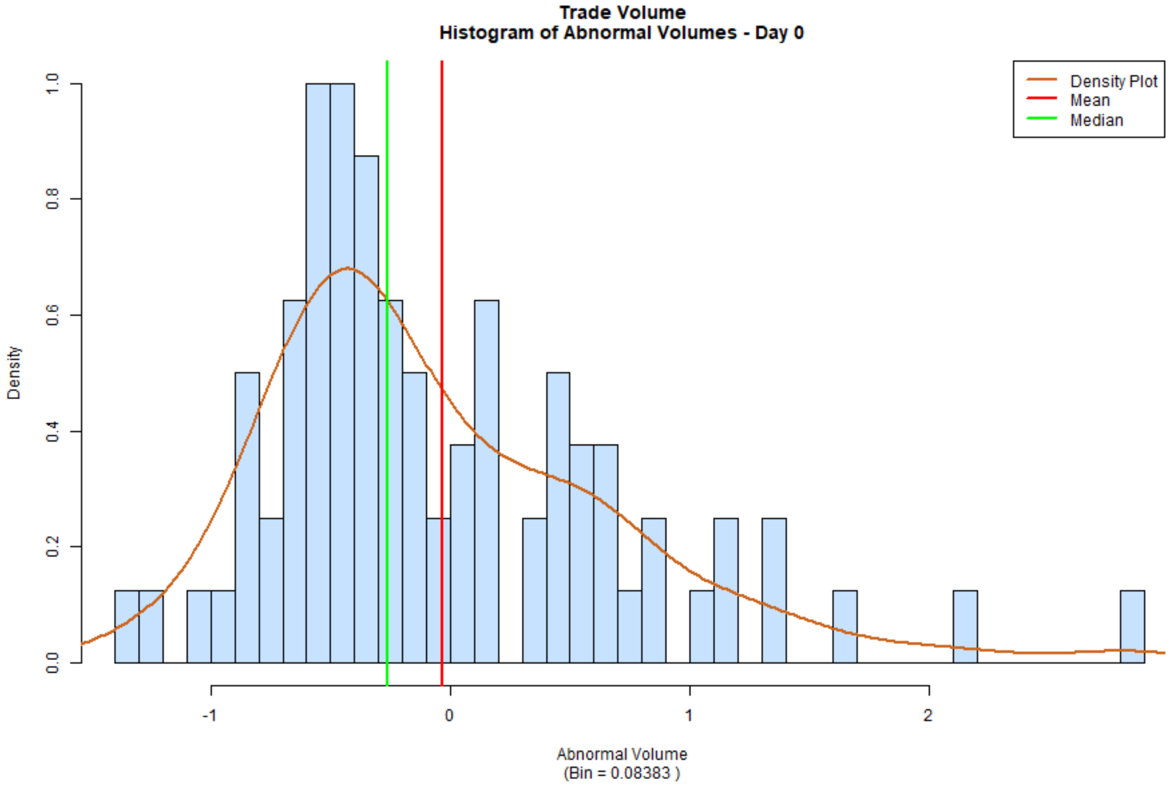
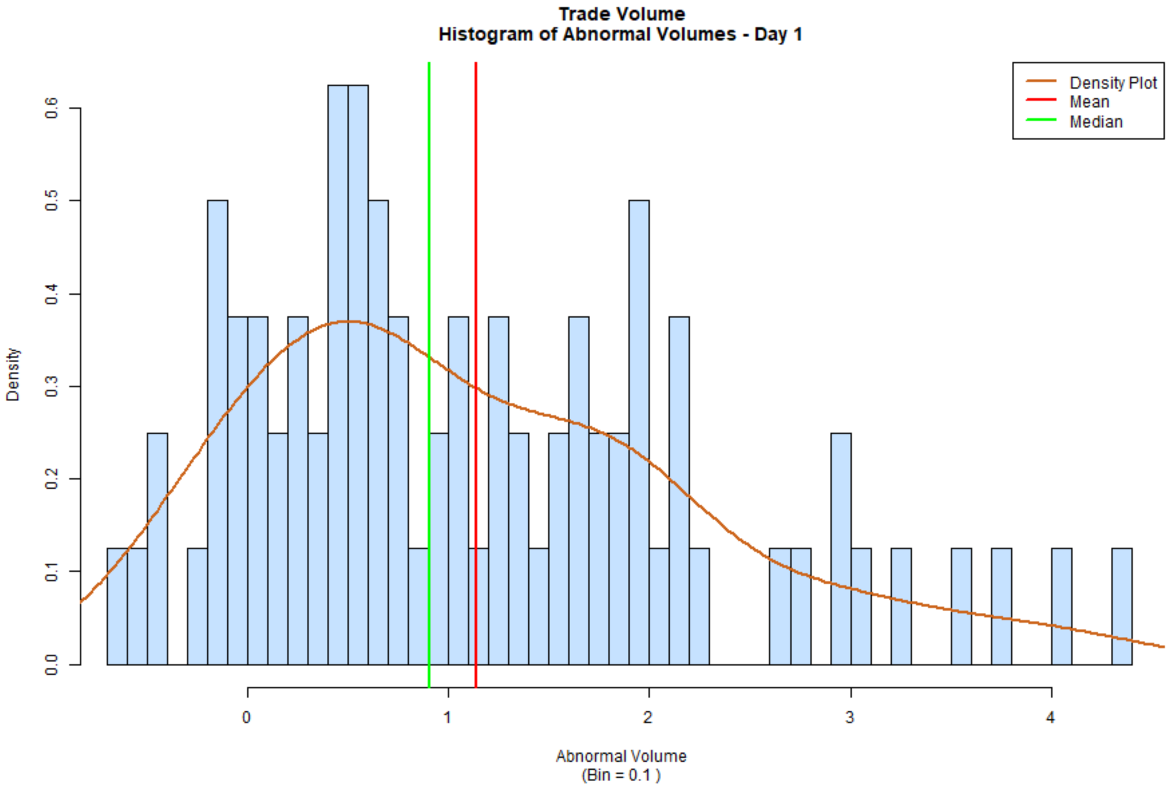


Figure 28 - Histogram of Abnormal Volumes (Day after the event)



3-day Event Window

As with the returns, the longer event windows are presented for comparison.

The extra days added do not signify any remarkable fluctuation. None of them exceeds 0.25 SD below or above the average volume.

Figure 29 - Arithmetic Means of Abnormal Volumes (3-day window)

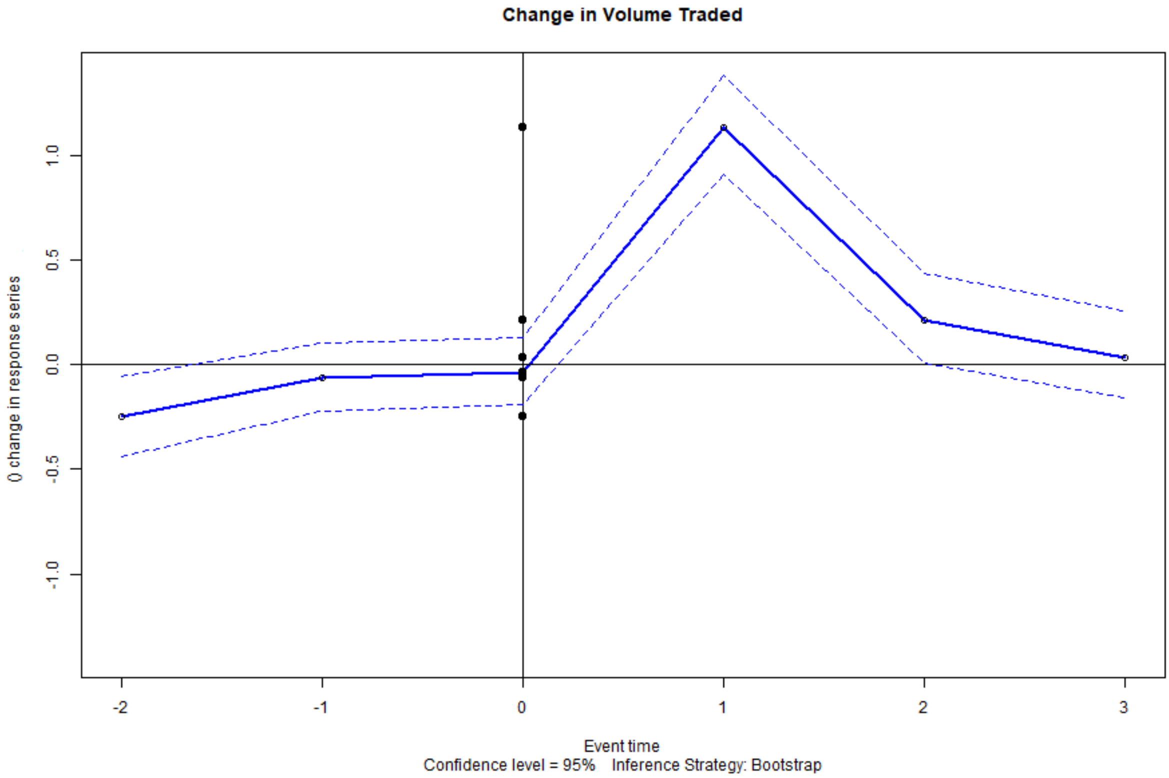


Table 29 - Arithmetic Means of Abnormal Volumes (3-day window)

	Mean Abnormal Volumes (Bootstrap)		
	2.5%	Mean	97.5%
-2	-0.4397	-0.2490	-0.0558
-1	-0.2201	-0.0603	0.1028
0	**-0.1868**	**-0.0347**	**0.1315**
1	0.9109	1.1355	1.3841
2	0.0079	0.2125	0.4354
3	-0.1572	0.0321	0.2568

Medians are much lower than their corresponding means, but still they present the same pattern. On average, each of them is 0.25 SD lower than the mean.

The day after the event remains by far the most abnormal of all.

Figure 30 - Medians of Abnormal Volumes (3-day window)

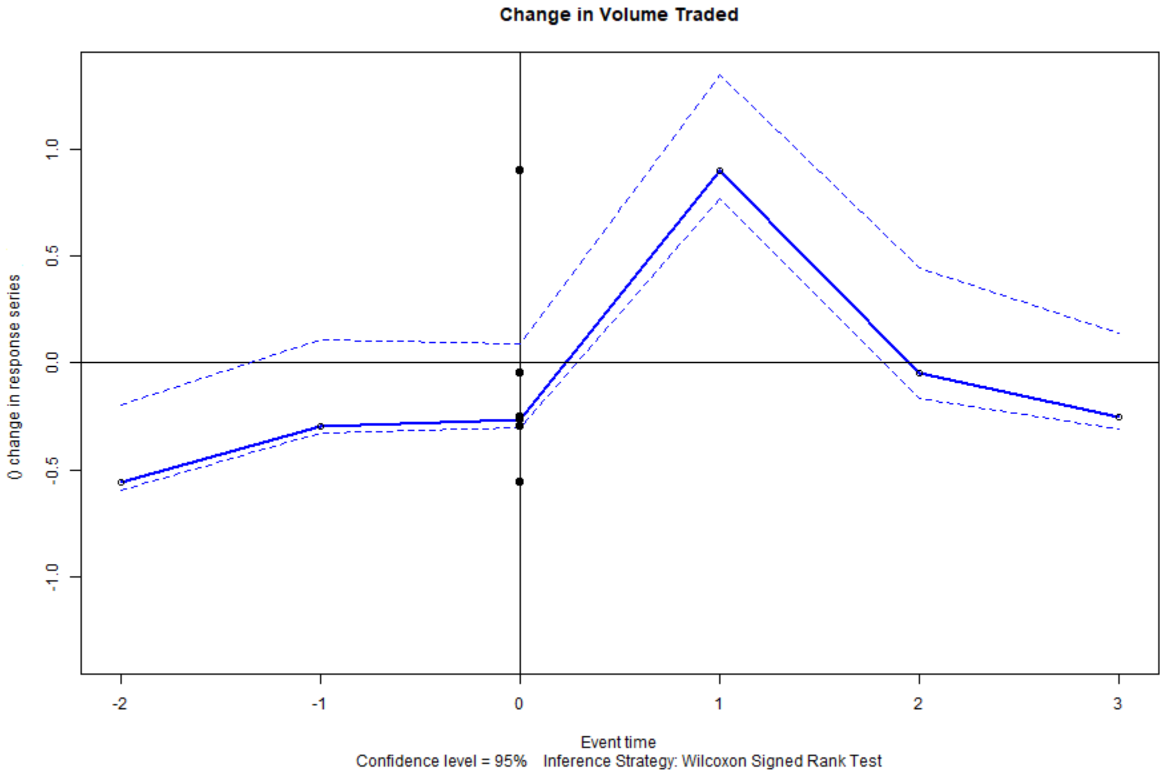


Table 30 - Medians of Abnormal Volumes (3-day window)

	Median Abnormal Volumes (Wilcoxon)		
	2.5%	Median	97.5%
-2	-0.5980	-0.5589	-0.1956
-1	-0.3274	-0.2962	0.1072
0	**-0.3044**	**-0.2640**	**0.0860**
1	0.7653	0.9018	1.3482
2	-0.1681	-0.0471	0.4433
3	-0.3104	-0.2562	0.1364

Remarkable are the lengths of the median confidence intervals, explaining much of the disparity between the median and the mean. An average of 7.5 on these lengths alludes that there are extremely positive abnormal volumes which influence asymmetrically more the mean than the median.

5-day Event Window

From the extra days obtained through the larger 5-day window, the only notable abnormal volume over 0.5 SD away from the normal is the one observed during the +5 day. Even though it is relatively high, it is not even half of the abnormal volume of the day after the event.

Figure 31 - Arithmetic Means of Abnormal Volumes (5-day window)

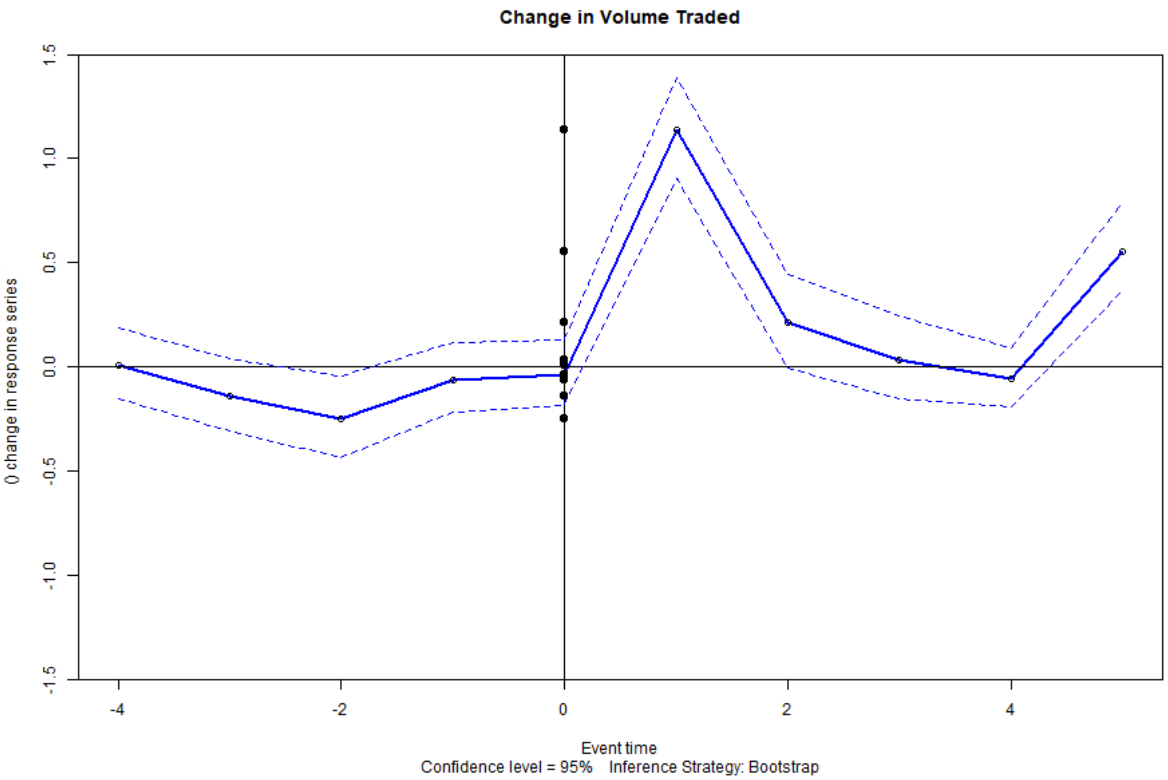


Table 31 - Arithmetic Means of Abnormal Volumes (5-day window)

	Mean Abnormal Volumes (Bootstrap)		
	2.5%	Mean	97.5%
-4	-0.1521	0.0068	0.1854
-3	-0.3074	-0.1381	0.0389
-2	-0.4328	-0.2490	-0.0427
-1	-0.2140	-0.0603	0.1155
0	**-0.1844**	**-0.0347**	**0.1308**
1	0.9088	1.1355	1.3892
2	-0.0018	0.2125	0.4425
3	-0.1503	0.0321	0.2443
4	-0.1902	-0.0538	0.0907

5	0.3696	0.5550	0.7924

The medians sustain the same pattern with the mean abnormal volumes, but with around 0.2 SD lower values and asymmetric confidence intervals of around 5.5 length.

Still, the abnormal volume of day +5 is the second highest, with a smaller, compared to the corresponding mean, size relative to the highest volume, being only 0.39 of it.

Figure 32 - Medians of Abnormal Volumes (5-day window)

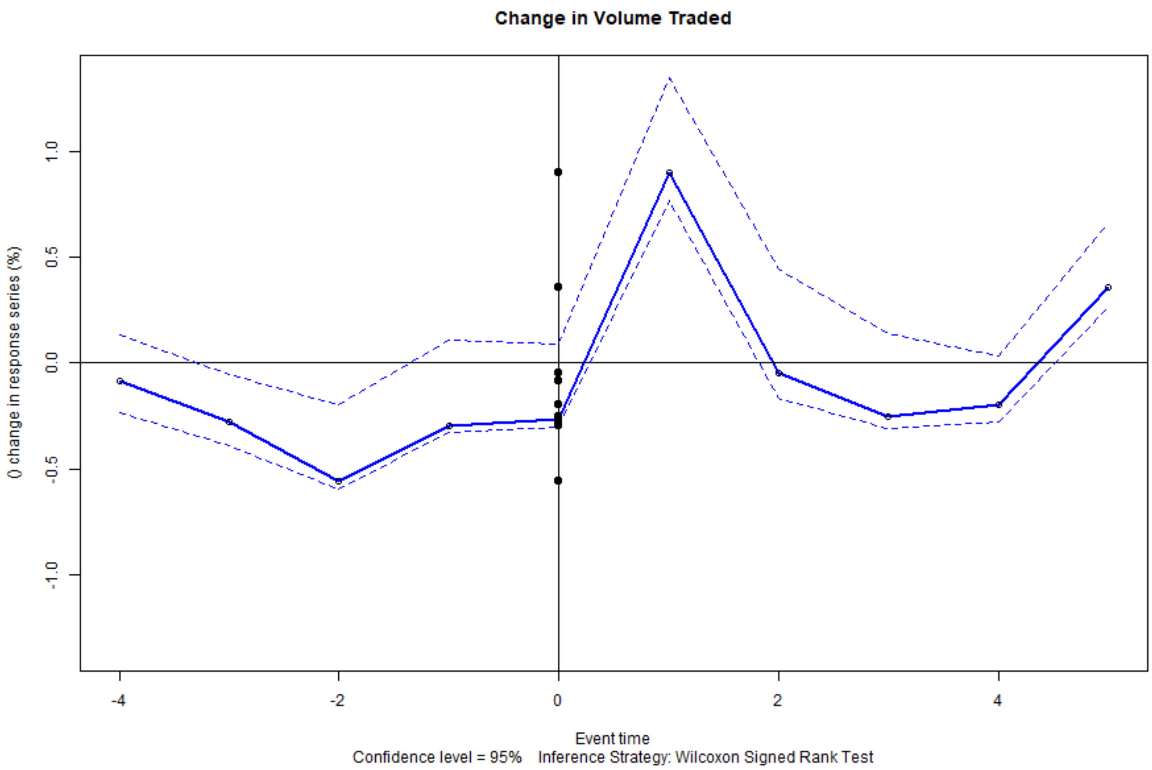


Table 32 - Medians of Abnormal Volumes (5-day window)

	Median Abnormal Volumes (Wilcoxon)		
	2.5%	Median	97.5%
-4	-0.2376	-0.0884	0.1345
-3	-0.3916	-0.2805	-0.0547
-2	-0.5980	-0.5589	-0.1956
-1	-0.3274	-0.2962	0.1072
0	**-0.3044**	**-0.2640**	**0.0860**
1	0.7653	0.9018	1.3482

2	-0.1681	-0.0471	0.4433
3	-0.3104	-0.2562	0.1364
4	-0.2760	-0.1961	0.0351
5	0.26460	0.35636	0.66370

Cumulatively

Cumulative means and medians present a significant disparity between them. That is probably attributed to corporation-specific information that sparks extreme trading volumes for a minority of the examined corporations, while the majority remains near normal levels. That minority intensely affects the mean and causes the median confidence intervals to by asymmetric.

This becomes self-evident by the histograms below which illustrate all abnormal values recorded during the 3 and the 5-day event window respectively. Both the mean and the median are on higher values than the mode of their distribution, caused by the multitude and the magnitude of the higher 50% abnormal volumes. That being said, there is also a notable discrepancy between the median and the mean of each histogram, with the former below 0 and the latter over it. It is worth noting that these two are not the sum of each day's median and mean respectively but the median and mean of all abnormal volumes recorded, as if they happened in a single day.

Figure 33 - Histogram of Abnormal Volumes during the 3-Day Window

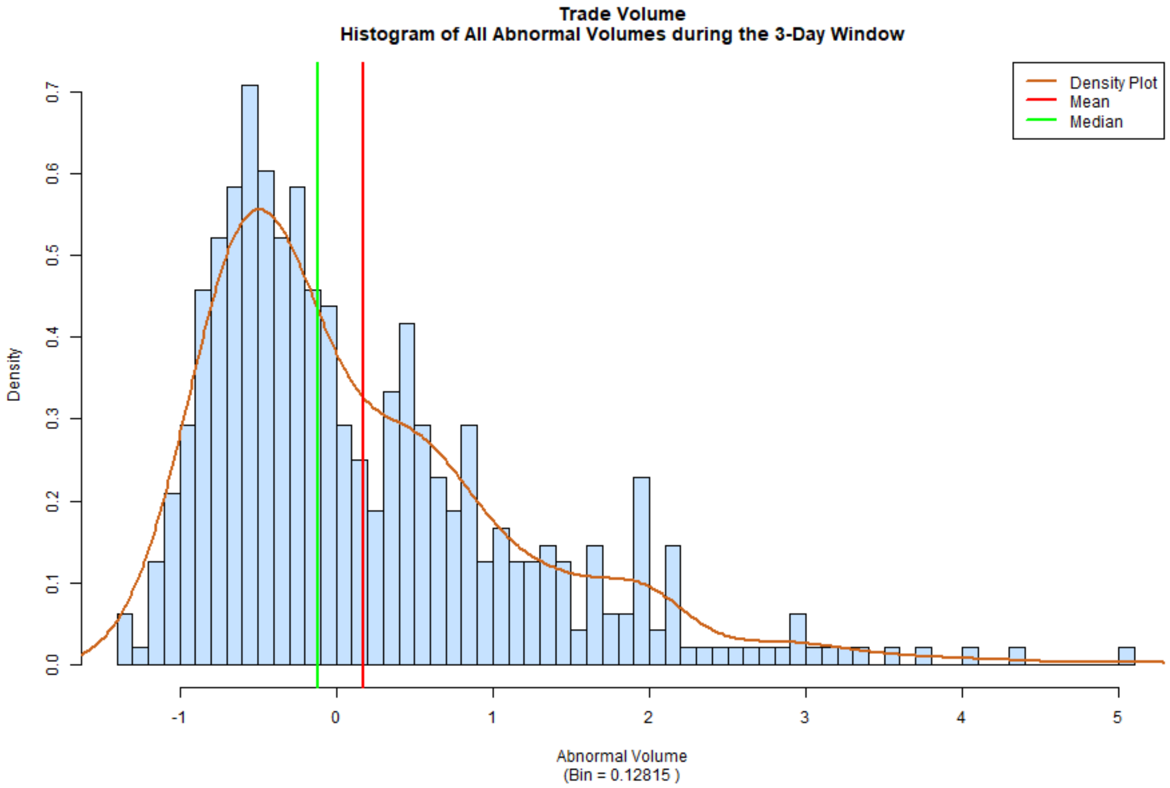
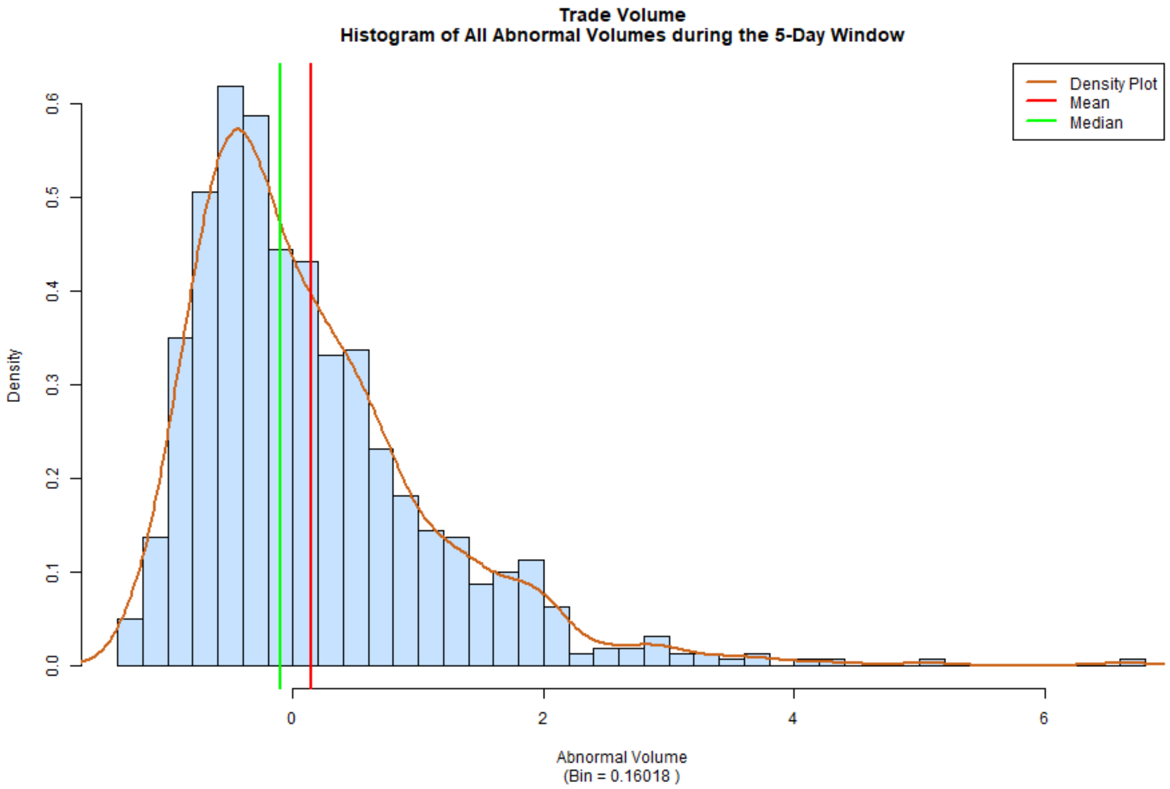


Figure 34 - Histogram of Abnormal Volumes during the 5-Day Window



All event windows contain the highest of all abnormal volumes realized the day after the event.

The extra days added with the 3-day window amount to a slightly negative sum, yielding a 0.06 SD lower than the 1-day cumulative mean. On the other hand, the notably positive last day of the 5-day event window exceeds by 0.36 SD the rest of the negative extra days added. That leads to a by 0.37 SD higher cumulative volume compared to the 3-day window and a by 0.3 SD higher cumulative volume compared to the 1-day.

Table 33 - Cumulative Means of Abnormal Volumes

	Cumulative Means of Abnormal Volumes (Bootstrap)		
	2.5%	Mean	97.5%
5 ημέρες	-0.3545	**1.4059**	3.3871
3 ημέρες	-0.0850	**1.0360**	2.2548
1 ημέρα	0.6864	**1.1007**	1.5204

At the contrary, the corresponding medians manifest noteworthy differences. Exhibiting lower than the means values at all times, the extremely positive abnormal volume of the day after the event is counterbalanced by the negative medians added with each longer event window.

Hence, the cumulative median volume of the 1-day window is 1.16 higher than its reciprocal of the 3-day window and 1.36 higher than that of the 5-day window.

Table 34 - Cumulative Means of Abnormal Volumes

	Cumulative Medians of Abnormal Volumes (Wilcoxon)		
	2.5%	Median	97.5%
5 ημέρες	-1.5587	**-0.7293**	3.6792
3 ημέρες	-0.9181	**-0.5207**	2.9006
1 ημέρα	0.4608	**0.6378**	1.4343

Conclusion

Stress tests seem to incur changes in the capital market. The day before their release, returns are escalated by market expectations of good news included in the tests. By their disclosure, market participants evaluate their contents negatively, forcing the returns to plummet in considerably low values, way beneath their normal levels. Perhaps from that derives a noticeable undervaluation of these stocks that becomes apparent the day after their release. In that day a substantially high abnormal volume ensues urging the negative abnormal return of the event day near normal levels.

That is in accordance with the ‘Mr. Market’, a metaphor introduced by Benjamin Graham (1949) to describe the over-reaction of markets. Indeed, the severe fluctuation in the price of returns during the event and their subsequent normalization signify an irrational exaggeration that the following day becomes discernible and gets corrected.

Concluding, regulatory stress tests seem to influence market participants and their evaluations of the related corporations. Apparently, they provide reliable information about the true value and risk structure of each institution. Hence, despite the extra cost it incurs, stress testing can be considered a value-adding mechanism auxiliary to the existing corporate governance framework.

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