The Impact of Dividend Announcements on Stock Prices:

Evidence from the US Banking Sector

by Aliya Korganbekova

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Supervisor: Professor Adam Gabor Zawadowski

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Abstract

Dividend announcements can be interpreted by the market as a signal of a company's soundness and stability. If these announcements convey useful and reliable information, then they should influence the stock prices according to the semi-strong form of market efficiency. This study examines the impact of dividend announcements on stock prices in the US banking sector from 2000 to 2018. Event study methodology is employed to find out the significance of abnormal returns within event windows of various sizes. This paper finds that there is a noticeable, positive and significant reaction of stock prices to dividend announcements and confirms the information content of dividends hypothesis and the semi-strong form of market efficiency hypothesis.

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1 Introduction

Why do institutions pay dividends? Feldstein and Green (1983) provided five types of explanations summarized from existed literature for dividends payments. The first explanation deals with small investors and their desire to get a steady stream of dividends to finance their consumption. Another motivation for dividend payout is that there is no marginal tax on dividends. Further explanation suggests that dividends are a consistent part of shareholder equilibrium. Fourth, the existence of dividends is justified due to separation of ownership and control. In particular, company management uses dividend policy to communicate the information about income level and dynamics to investors. Finally, Feldstein and Green (1983) show that companies pay dividends to maximize the value of their shares: "*each firm can in general maximize its share price by attracting investors, and this requires a dividend policy of distributing some fraction of earnings as dividends" (p.10).*

Thus, through dividend policy and dividend announcements managers communicate to the market all the information related to the company's performance. Investors and other stakeholders consider this information as signals and make decisions based on it. This is how dividend policy influence investors' activity and provide responses from the market in the form of changes of stock prices, earnings, or another financial indicators.

According to Bessler and Nohel (1996) banks use quarterly announcements of stable or increasing dividends as a tool to provide positive information about bank's solvency to the public. The stable or growing dividends and regularity in payments support trust in management and provide information about the bank's success. The importance of dividend announcements and their dynamics can be shown by analyzing historical data. Even during financial distress banks are

very reluctant to cut dividends because a decrease in dividend amounts would be a strong signal to the market that the bank is experiencing serious financial problems and consequently it can negatively influence the bank's existence. Keen (1978) stated that from 1930s to 1970s the cutting of dividends by banks was "unthinkable" because it would lead to disastrous results. Although later some banks started to decrease dividend amounts which did not lead to severe outcomes but did influence share prices negatively. In a more recent study Acharya et al. (2011) points out that even throughout the recent crisis banks continued to pay dividends despite significant losses on asset portfolio. This supports the view that dividend policy is of high significance for the firms.

By contrast, non-banking sector companies mostly do cut their dividends during crisis. De Angelo, De Angelo (1990) and (1992) analyzed firms which experienced losses during 1980 – 1985 and concluded that companies tend to cut dividends during financial distress; however, they are reluctant to omissions.

As a dividend announcement is considered a signal, share prices should be indicators of investors' opinions about the bank. The purpose of this paper is to ascertain whether dividend announcements provide useful information to the market and can change stock prices. I examine the data on the US banking sector because - compared to the great volume of works done on industrial (non-banking) sector - the examination of dividend policy in the banking sector is relatively sparse. Moreover, financial sector companies are unique and differ from those of the non-banking sector. According to Damodaran (2009) valuation of banks, insurance companies and investment banks is more complicated than industrial companies because of the specific financial characteristics. Namely, future cash flows are harder to estimate, it is difficult to define debt and reinvestment, there is a high asymmetry between financial institutions and investments. Bessler and Nohel (1996) also mention that financial institutions are usually excluded from research

because of the uniqueness of financial institutions due to high leverage and high regulations. Because of these differences between banking and non-banking sectors the relationship between dividend policies and its impact on share price may differ as well. Overall, the empirical evidence shows that dividend changes of banks contain less information than those of industrial companies.

This paper uses event study methodology to test the impact of dividend announcements on stock prices for 26 US Banks and financial institutions listed at NYSE with dividend announcements over the 18-year period from 2000 to 2018 (for majority of banks). Overall 1438 observations of dividend increase, dividend decrease and no change in dividends announcements have been analyzed. The paper provides evidence that positive and negative dividend announcements do have corresponding impact on stock prices. In case of dividend increases the average abnormal returns increased from 0.02% on day -1 to 0.14% on day 0. Similarly, when financial institutions announced dividend cuts, average abnormal returns dropped significantly from -0.01% on day -1 to -0.11% on day 0. Moreover, consideration of event windows of different sizes provides the evidence that the impact of announcements is still present some time after the event itself. This drift can be connected with expectations about future earnings or another subsequent events. As a result, conclusions of this paper are in line with the major number of literature discussed in the literature review section.

The paper has the following structure. In the Section 2 I discuss previous studies on the relevance of dividend policy, the uniqueness of financial institutions and the impact of dividend announcements on stock prices. Section 3 contains a description of methodology, sample selection and data sources used for the empirical testing. Section 4 presents the results of the research and further implications concerning dividend policy of financial institutions. Section 5 concludes the paper.

2 Literature review

I have reviewed and grouped the most interesting research related to this paper's topic in two groups: theoretical background and empirical research. They are related to the efficient market hypothesis, relevance of dividend policy, uniqueness of financial institutions, overall strength of information content of dividends and impact of dividend announcements on stock prices. I have focused on the main studies related to this topic which investigate both banking and non-banking sectors.

2.1 Theoretical background

2.1.1 Efficient market hypothesis

The Efficient market hypothesis elaborated by Fama (1970) states that at any period in a liquid market all available information is reflected in the stock prices. Thus, at any point of time a stock price would be the good and precise estimate of intrinsic value. Fama described an efficient market as one with many rational and profit maximizing participants. There is perfect competition and all the information is freely available to all market participants. There are three degrees of efficient market hypothesis: weak, semi-strong and strong.

- The weak form assumes that current stock prices reflect all available historical information and thus excess returns cannot be achieved by implementing a technical analysis. This means that when new information is released the dynamics of stock prices cannot be predicted because it follows random walk;
- The semi-strong form assumes that the market is efficient if newly released public information is quickly digested by the market and instantaneously reflected in the market prices;

- The strong form assumes that stock prices reflect not only available public information but also private information. Because even insider information is already transmitted into the price, the achievement of excess returns is simply impossible.

After dominating for a long time, the efficient market hypothesis was criticized. The results of a large number of empirical research contradicted the hypothesis. Such factors as the tendency to over-react or under-react to news (Shleifer (2000)), herd behavior, asymmetrical judgements about causes of previous profits or losses affected market participants' decision-making process. Furthermore, such anomalies as mean reversion, the January effect and "small firm" effect affected the patterns of stock prices.

2.1.2 Relevance of dividend policy

In theory there are different views and approaches to the impact of dividend policy on companies' value. The start of a heated debates on relevance of dividend policy can be traced to a paper by Modigliani and Miller (1961). Modigliani Miller Irrelevance theory states that there is no effect of dividend policy on company's share prices: *"the current valuation is unaffected by differences in dividend payments in any future period and thus … dividend policy is irrelevant for the determination of market prices, given investment policy" (p. 429).* Thus, only successful investment policy can increase share prices. This theory works under the assumptions of perfect capital market, absence of taxes, constant investment policy and no uncertainty. Since Modigliani Miller proposition different competing dividend policy theories were elaborated by means of relaxing stated above assumptions and adding features of the "real world". For instance, relaxing the assumption of symmetrical information between managers and investors gave rise to signaling theory; the non-coincidence of interests of shareholders and investors was reason for agency cost theory; adding taxation of dividends into the model brought in discussion of whether the dividend

policy affects market value. As a result, these disagreements on dividends in theory and empirics lead to the phenomenon called "dividend puzzle" first mentioned by Black (1976): "The harder we look at the dividend picture, the more it seems like a puzzle, with pieces that just don't fit together" (p. 5).

One of the main authors who had an opposite view to the Irrelevance theory was Gordon (1963). Based on two assumptions - risk aversion and uncertainty increase with the time - Gordon showed that a firm's share price is positively dependent on dividend rate of that firm. So, even in case of perfect capital markets the higher the dividend payments are, the higher the price of share will be. Lintner (1963) and Walter (1963) concluded that the choice of dividend policy always has a positive effect on company's value. Litzenberger and Ramasawamy (1979) state that lower dividend payouts result in lower returns, which in turn will increase the firm's market value. This dividend relevance approach was also supported by later researchers. Bhattacharaya (1979), Miller and Rock (1985), John and Williams (1985) concluded that there is positive relationship between dividend changes and share prices. Moreover, according to Bhattacharaya (1979) there is informational asymmetry in this case. Namely, the decrease of dividends has a stronger negative effect on shareholders' wealth compared to scale of positive effect from dividend increase.

Overall, when the assumptions of perfect market are released, it can be concluded that dividend policy is relevant. More comprehensive and detailed reviews on theory of dividend literature are provided by Edwards (1987), Allen and Michaely (1995), and Lease et al. (2000).

2.1.3 Existence and uniqueness of financial institutions

As discussed in the introduction, the banking sector is considered to be unique. Under perfect capital market assumptions financial institutions would not exist and traditional models of

financial markets failed to explain the existence of financial institutions. That is why different capital market imperfections were analyzed to understand the existence of financial intermediaries and provide explanations to their services.

Benston and Smith (1976) considered financial intermediaries as institutions which create financial commodities, the prices of which should cover both direct and opportunity costs. The authors provided multiple examples to demonstrate the main peculiarity of financial institutions – reduction of transaction costs of consumption decisions – to explain their existence. On the other hand, Leland and Pyle (1977) stated that transaction costs can be an explanation for the existence of financial intermediation; however, their magnitude was not sufficient to be the primary and only reason. They introduced information asymmetry to the signalling model with inside information and suggested that it can be the primary reason for financial intermediation. Overall, they see causes of intermediation in the following three components connected to information asymmetry: scale of economies, credibility of information and appropriability of returns by the firm. Diamond (1984) developed a theory of financial intermediation as delegated monitoring. Particularly, the central part of this approach was based on minimization of information monitoring costs. Boyd and Prescott (1986) considered financial intermediaries as coalition of agents and showed that they are arose endogenously and needed to support private information core allocations.

It is evident from these studies that the main issues with the banking sector are information asymmetry between managers and investors and credibility of that information. Dividend policy is one of the tools that is used by managers to transmit signals to the market about the bank.

Following this discussion in theory, this paper examines the existence of semi-strong form of market efficiency for the banking sector in the US for the last 18 years.

2.2 Empirical research. Information content of dividend announcements

2.2.1 Non-banking sector

First, it is necessary to mention that in the empirical finance literature there is a wide range of research done on examining the information content of dividend hypothesis. This hypothesis (Watts 1973) states that firm managers use dividends to communicate company-related information to the public and dividend changes can influence not only stock prices, but earnings, credit ratings and other financial characteristics.

Watts (1973) and (1976) and Laub (1976) considered the overall strength of informational content of dividends on earnings. Based on the annual data Watts (1976) found that the dividend announcements contain only trivial information about future earnings, whereas Laub – by implementing different model and using quarterly data – showed contrary results. The approach of Watts was followed by research done by Nissim and Ziv (2001), who found strong evidence of information content of the dividend hypothesis. After controlling for expected earnings changes, they empirically proved that dividend changes positively influence the earnings dynamics for the following two years after dividend changes. There are other studies which do not support this hypothesis, for instance, research of De Angelo et al. (1996) and Bernatzi, Michaely and Thaler (1997). The latter study found that there is strong positive contemporaneous correlation between dividend changes and earnings; however, the authors were unable to find a positive relationship between dividend changes and future earnings.

Empirically the significance of dividend announcements of companies on stock prices have been tested in various ways. The early research mostly does not cover the banking sector. Many researchers examining industrial companies found evidence of a strong and positive response of

share price on dividends change announcements. This proves that changes of dividends are signals to the market which reflect information asymmetry and lead to further share price changes.

For instance, Pettit (1972) analyzed 625 NYSE firms for a 4-year period from 1964 to 1968 with regard to announcement dates of dividends, price and earnings information. Applying the market model to measure risk-adjusted performance, he concluded that the value of a company's share is sensitive to the announcement of changes in dividend payments. If significant dividend increase announcement is made by the company the share price will go up in response to this. The contrary situation occurs when a dividend decrease is expected. Charest (1978) examined market efficiency through the analysis of market behavior around the dividend announcement date. He focused on large dividend changes and – based on monthly data and dividend expectation model – showed that the abnormal returns around dividend announcement dates are significant. Aharony and Swary (1980) enhanced the Charest's model and found that changes in quarterly dividend announcements provide useful information beyond that provided by earnings announcements. They considered 149 NYSE industrial companies and their quarterly dividend and earnings announcements for the period 1963-1976. Their results support the semi-strong form of efficient capital market hypothesis. They also noticed that the magnitude of abnormal returns for dividend decreases is much larger than for increases.

Furthermore, Brickley (1983) examined this relationship by dividend categories. He used 165 Specially Designated Dividends (SDD: dividends labelled as "extra", "special" or "year-end") declared from 1969 to 1979 on listed stocks. By using one treatment sample, which announces SDD, and two control samples, which consist of firms announcing regular dividends and no dividends respectively, he showed that dividend increase contains positive information which positively influences market price. This result is supported by Asquith and Mullins (1983), Healy

and Palepu (1988), Madura et al. (1993) and Grullon, Michaely, Swaminathan (2002), who also found that dividend policy conveys valuable information source for shareholders and strongly influences market prices. Grullon, Michaely, Swaminathan (2002) – by significantly extending the period of research from 1967 to 1993 and using sample of approximately 8000 dividend changes announcements – found that companies experience a decrease of systematic risk as a response to increase of dividends and vice versa. Using changes in risk premium the authors generated announcement day price reactions. The result is the decline in systematic risk followed by decrease of cost of capital which leads to price increase.

Moreover, Michaely, Thaler and Womack (1995) investigated the effects of dividend omission and initiation announcements. They found that the share price response to dividend omissions is stronger compared to effect from dividend initiation (about one half the magnitude from omission).

One more interesting research done by Docking and Koch (2005) showed that the impact of dividend change announcements on stock prices is greater when the nature of news goes against the grain of the recent market direction during volatility.

2.2.2 Banking sector

The earliest empirical research on dividend policy in the banking industry was conducted by Gupta and Walker (1975). They considered the relationship between dividend changes and contemporaneous profits. They analyzed 980 financial institutions from 1965 to 1968 and found a positive relationship between dividend changes and current profits as well as dynamics of total assets and liquidity.

Boldin and Leggett (1995), using the dividend signaling argument, empirically described the role of dividend policy as a signal of market quality. On the example of 207 publicly traded bank holding companies in the US, they performed a multiple range test to cross-sectional data to show that there is strong positive relationship between dividends per share and bank quality rating. Thus, dividend policy is used by financial institutions to signal about their soundness and risk.

With respect to impact of dividend changes on stock prices as one of the first studies it is important to mention Keen (1978) and (1983). Keen (1983) concluded that banks should avoid cutting dividends as it influences negatively bank health. Based on weekly data from 1974 to 1977 he found that banks which cut dividends ended up with significantly negative abnormal returns.

Furthermore, Bessler and Nohel (1996) considered the instantaneous reaction of stock prices on dividend announcements and examined daily data. They examined 56 commercial banks listed on the NYSE, AMEX and Nasdaq which cut dividends from 1974 to 1991. Compared to the research done by Keen (1983) Bessler and Nohel increased both the sample size and the time period. They empirically demonstrated that the consequences of dividend decrease on stock prices were larger in magnitude for the banking sector than for non-financial sector. Moreover, they found that dividend announcements had a more severe effect on stock prices than other financial information such as downgrades of ratings or announcement of debt moratorium. In contrast, Black, Ketcham and Schweitzer (1995) concluded that there is no difference in reaction of stock prices on dividend cuts in banking and non-banking sectors. Overall, they also observed negative abnormal returns as a response to dividend cuts around announcement dates, which disappeared by day 30.

As in majority of the above-mentioned research I will use event study methodology and examine the effect of quarterly announced dividends on stock prices.

3 Data and methodology

The aim of this study is to examine the semi-strong form of market efficiency hypothesis which implies that share prices react to the releases of new information. According to Schweitzer (1989*) "unexpected events can change the stock prices of a firm by changing the profit potential or riskiness of that firm" (p. 17).* Moreover, sometimes, when the event is expected by financial market stock prices may react some period before the event date.

3.1 Data

This study uses the data on the US banks and other financial institutions listed at NYSE, which mostly made quarterly dividend announcements from the period from 2000 to 2018 (depending on the bank the period varies: it is shorter for banks which were established later). The information on US Banks comes from Thomson Reuters Eikon database. Financial institutions were included in the sample if they had at least 15 dividend announcements and had price history for 5 years more period before first announcement considered for this research. This condition resulted in a sample of 26 US banks which made overall 1438 quarterly announcements. All these dividend announcements were not dividend initiations, that is there were quarterly dividend payments before. The market capitalization of these financial institutions varies from 6.35 to 376.54 billion USD as of May 2018.

The data on quarterly dividend announcement dates and the amount of declared dividends in USD per share comes from the Morningstar website and is double checked with the Yahoo finance database.

Daily closing stock price data for each bank and S&P 500 (Bank Industry) index daily historical data is collected from the Yahoo Finance website. As a proxy for risk free rates I use

daily rates of T-bill from Fama-French data collection. Stocks with price less than 10 USD are eliminated from the analysis.

For the Market Model I use monthly data (adjusted stock prices, adjusted S&P 500 (Bank Industry) and risk-free rates) from the above-mentioned websites. Beta coefficients are rolled using returns of five previous years.

3.2 Methodology

I use standard event study methodology to find the relationship between dividend changes and reaction of stock prices in the US banking sector. By doing this I follow the majority of studies done on this topic. Event study methodology is widely used in finance with respect to dividend and earnings announcements, mergers and acquisitions deals, issues of new debt and equity. It is designed to examine market reactions to, and abnormal (excess) returns around specific information events. According to Bodie et.al (2011), the abnormal return approach as a technique of empirical research in finance should be used in order to estimate the impact of an event on firm's stock price.

Event studies itself has a long history. The first event study was conducted by Dolley (1933) with respect to stock splits. Brown and Warner (1985) considered the implementation issues of event studies on daily data. The majority of papers in the literature review section implemented this method, for example Pettit (1972), Aharony and Swary (1980) and others.

Figure 1 represents the typical event study timeline.

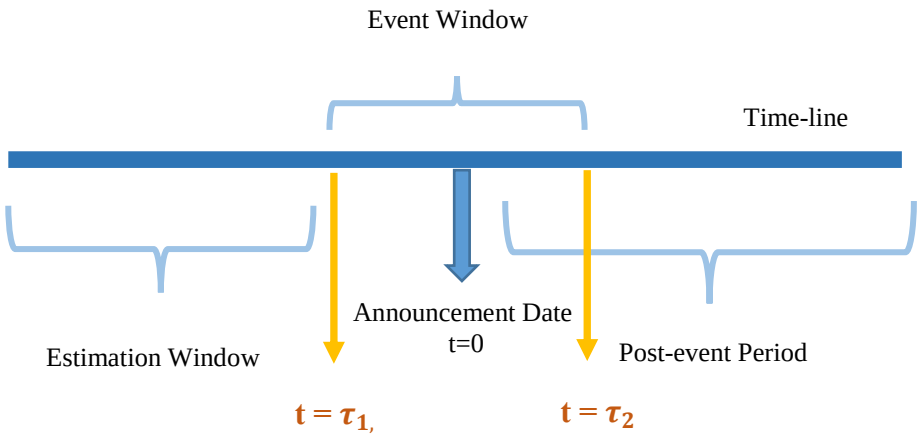

Figure 1. Event Studies. Graphical Representation.

The main idea of event study is to separate the reaction of stock prices to the announcement from the overall hypothetical dynamics which would have taken place in the absence of a dividend announcement and test the significance of the achieved results.

After examining various research on event studies applicable to this topic, the procedure is organized as follows:

1. ***Determination of the event of interest.***

The event of interest is the dividend announcement date, which is the date when the board of directors of a bank announces the amount of the next dividend payment. Because I am taking closing stock prices, then it is better to consider the stock price on the day when the event occurred (day 0) as already reacted to the news; and it is reasonable to focus mainly on the dynamics between days -1 and 0.

To make the analysis consistent the events are grouped into three categories: announcement of dividend increase, announcement of dividend decrease, and no change. To do this the dividend changes were calculated as follows:

$$\mathrm{Rdiv_{it}} = \frac{\mathrm{D_{it}} - \mathrm{D_{it-1}}}{\mathrm{D_{it-1}}},$$

where $\mathrm{D_{it}}$ is the amount of dividend announced at quarter t, and $\mathrm{D_{it-1}}$ is the amount of dividend announced at previous quarter t-1.

2. *Determination of event window:*

Overall for each announcement date an event window of 20 trading days surrounding the announcement date was considered: 10 days before the announcement date and 10 days after. Separately I am considering several various event windows to test the impact of dividend announcements: (-10 +10), (-5 +5), (-3 +3), (-1 +1), (0 +5), (+1 +5), (-10 -1), (-5 -1), (+5 +10)[1] where day 0 is the date of dividend announcement, +10 is 10 days after, and -10 is 10 days before the announcement date. (-10 -1) and (0 +5), for instance, pre-event and post-event windows respectively are considered because the information about dividends might be acquired by the market prior to announcements, or vice versa, the reaction of the market might be lagged.

3. Estimation of normal and abnormal returns.

The central part of event methodology is an analysis of abnormal returns, which represent the difference between actual return and normal (expected) return:

$$\mathrm{AR_{it}} = \mathrm{R_{it}} - \mathrm{E(R_{it})},$$

[1] () parentheses include the stated days

where R_{it} is the actual daily return on stock i on day t, and $E(R_{it})$ is the expected return on stock i at time t. The dynamics of abnormal returns is expected to show the event's impact.

The actual daily return is calculated as follows:

$$R_{it} = \frac{P_{it} - P_{it-1}}{P_{it-1}},$$

where, P_{it} is the close price on day t, and P_{it-1} is the close price on the previous day t-1. The market returns are calculated the same way.

Normal return is the return which is expected in the absence of the event. There are a lot of benchmarks to calculate the normal return within estimation window: Market Model, Constant Mean Return Model, Fama-French three factor model and others. I use the CAPM approach, which linearly relates returns on stocks to market returns and takes into account risk free rate. It is generally accepted that the larger the estimation window is, the lower is the variance of estimated parameters. This is the reason I take 5 years as a basis for calculation. However, a large estimation window has its own drawback as it is likely that unrelated events might affect the data. CAPM parameters – the constant and beta coefficients – are estimated using OLS on the rolling basis based on previous five years of returns:

$$R_{it} - r_{ft} = \alpha_i + \beta_i(r_{mt} - r_{ft}) + \varepsilon_{it} \text{ with}$$

$$E(\varepsilon_{it}) = 0 \text{ and } Var(\varepsilon_{it}) = \sigma^2_{\varepsilon i},$$

where r_{ft} is the risk-free return, r_{mt} – market return. The obtained Beta β_i^* coefficients are BLUE and consistent. Once the coefficients are estimated, they can be used to calculate abnormal returns:

$$AR_{it} = R_{it} - r_{ft} - \beta_i^* (r_{mt} - r_{ft}).$$

4. *Grouping of abnormal returns.*

In order to analyze the impact of dividends on stock prices the Cumulative Abnormal Returns (CARs), Average Abnormal Returns (AARs) and Cumulative Average Abnormal Returns (CAARs) are calculated. The sum of abnormal returns over specific event window gives cumulative abnormal return:

$$\mathrm{CAR}_{\mathrm{i}(\tau_1,\ \tau_2)} = \sum_{\mathrm{t}=\tau_1}^{\tau_2} \mathrm{AR}_{\mathrm{it}}\,,$$

The cross-sectional average abnormal returns are acquired by averaging the abnormal returns across all banks in the sample on day t:

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it}\,,$$

Similarly, by cumulating AARs over the specific event window Cumulative Average Abnormal Returns are obtained:

$$CAAR_{(\tau_1,\ \tau_2)} = \frac{1}{N}\sum_{i=1}^{N} CAR_{i(\tau_1,\ \tau_2)}$$

Since the stock prices might not react instantaneously to dividend announcements CAARs are needed. CAARs show average stock price dynamics over considered time and thus are better indicators of the reaction to the event.

5. *Checking the significance of abnormal returns.*

The purpose of this study is to identify if the abnormal returns around the dividend announcement date are significant. To do so I define the following hypotheses:

H0 – There is no significant effect of dividend announcement on the average abnormal return.

H1 – There is a significant positive effect of dividend announcement on the average abnormal return.

So, under efficient market hypothesis CAARs and AARs should be zero and otherwise in case of semi-strong efficiency form. To check these hypotheses, I use a standard two-tailed t-test:

$$t = \frac{CAAR_{(\tau_1,\ \tau_2)}}{\sigma_{CAAR_{(\tau_1,\ \tau_2)}}},$$

where $\sigma^2_{CAAR_{(\tau_1,\ \tau_2)}} = \frac{1}{N^2}\sum_{i=1}^{N}(CAR_{i(\tau_1,\ \tau_2)} - CAAR_{(\tau_1,\ \tau_2)})^2$

Similarly, the calculations were made for AARs.

6. Estimation of the impact of dividend announcements on stock prices based on the Gordon Growth Model.

Additionally, along with the event study methodology, I try to approximately estimate the impact of dividend announcements on stock prices based on the Gordon Growth Model (1962):

$$P_t = \frac{D_{t+1}}{r - g} = \frac{D_t\,(1+g)}{r-g},$$

where P_t is the price per share at time t, D_t is the dividend at time t, g is the dividend growth rate, r is the expected stock return. Considering r and g as constants, it is possible to rewrite the previous equation using changes:

$$\Delta P_t = \frac{1+g}{r-g}\,\Delta D_t,$$

where ΔD_t is the change in dividends after dividend announcements, and ΔP_t is the corresponding change in stock prices. Dividing both sides by previous period price P_{t-1} results the following equation:

$$\frac{\Delta P_t}{P_{t-1}} = \frac{1+g}{r-g}\frac{\Delta D_t}{P_{t-1}},$$

Using available daily data on stock prices and dividend announcements dates, it is possible to regress the right-hand side (price growth rate) of the equation on left-hand side (deflated change in dividends) and estimate the coefficient. This will give very rough long-run average estimation of dividend announcement impact on stock prices. The purpose is to check an approximate relationship between the two variables of interest and confirm the results from event study.

4 Empirical testing and results

As it mentioned above, it is more informative to examine the impact of each direction of dividend announcements on stock prices. Thus, the dividend increases are analyzed first as there were more dividend increase events (284 events) compared to dividend reductions (60 events). Table 1 summarizes the information on number of observations.

Table 1. Number of Observations in the Sample

Number of observations	Number of dividend increase announcements	Number of dividend decrease announcements	Number of dividend announcements with no change
1438	284	60	1094

Figure 2 graphs the AARs for dividend increase announcements. It is evident that there is no consistent pattern of Average Abnormal Returns. However, on day 0 (the day of announcement) there is a significant and large increase of Average Abnormal Returns from 0.02% on day -1 to 0.14% on day 0.

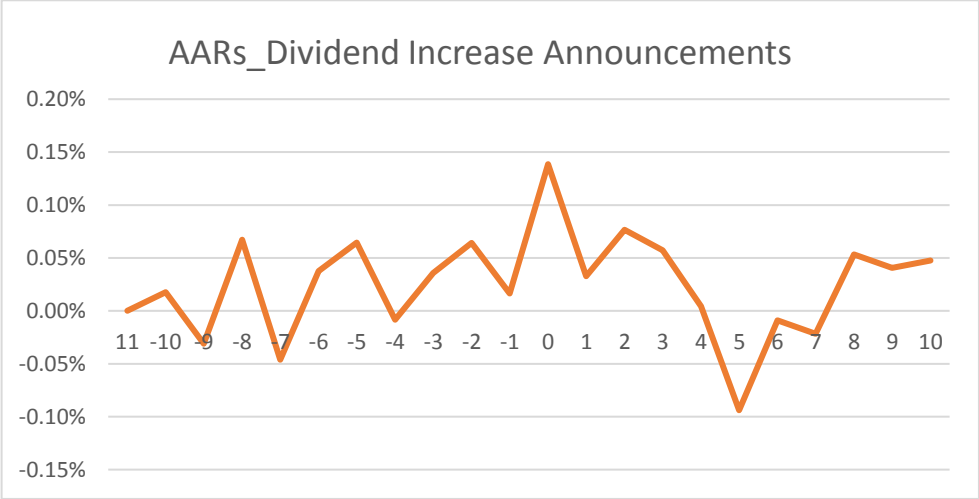

Figure 2. AARs for Dividend Increase Announcements

Table 2 represents abnormal returns (AARs and CAARs) around the dividend announcement day and corresponding t-statistic for each day. It can be seen that the large increase of AAR from day -1 to day 0 is statistically significant at 1% level. This AAR is the largest within the studied event window. Average Abnormal Returns at other days are not statistically significant. This means that the H0 hypothesis is rejected and it can be concluded that positive dividend announcements are informative and lead to a positive stock price reaction.

Table 2 Abnormal Returns Around Dividend Increase Announcement

time	AAR	t-stat	CAAR	t-stat	N
-10	0.02%	0.36	0.02%	0.36	284
-9	-0.03%	(0.63)	-0.01%	(0.61)	284
-8	0.07%	1.37	0.05%	1.60	284
-7	-0.05%	(0.94)	0.01%	0.27	284
-6	0.04%	0.76	0.05%	1.64	284
-5	0.06%	1.31	0.11%	1.85	284
-4	-0.01%	(0.17)	**0.10%****	**2.18**	284
-3	0.04%	0.73	**0.14%****	**2.55**	284
-2	0.06%	1.30	**0.20%*****	**2.90**	284
-1	0.02%	0.33	**0.22%*****	**2.73**	284
0	**0.14%*****	**2.82**	**0.36%*****	**3.21**	284
1	0.03%	0.67	**0.39%*****	**2.94**	284
2	0.08%	1.56	**0.47%*****	**2.98**	284
3	0.06%	1.16	**0.52%*****	**2.92**	284
4	0.00%	0.09	**0.53%*****	**2.73**	284
5	-0.09%	(1.91)	**0.43%****	**2.22**	284
6	-0.01%	(0.18)	**0.42%****	**2.17**	284
7	-0.02%	(0.44)	**0.40%****	**2.08**	284
8	0.05%	1.08	**0.46%****	**2.35**	284
9	0.04%	0.82	**0.50%****	**2.53**	284
10	0.05%	0.97	**0.54%*****	**2.78**	284

Note: Significant results are represented in bold. p<0.01 or 0.05, (***) 1%, (**) 5% significance levels.

CAARs are statistically significant from day -4 on. Figure 3 graphs the pattern of Cumulative Average Abnormal Returns. The figure shows that there was some positive trend before the event, followed by further noticeable increase at the dividend announcement date. The positive pattern before the event may indicate that market participants anticipated the dividend increase or there

was some insider trading. At the dividend announcement date CAAR increases as well which means that the market has adjusted to the news.

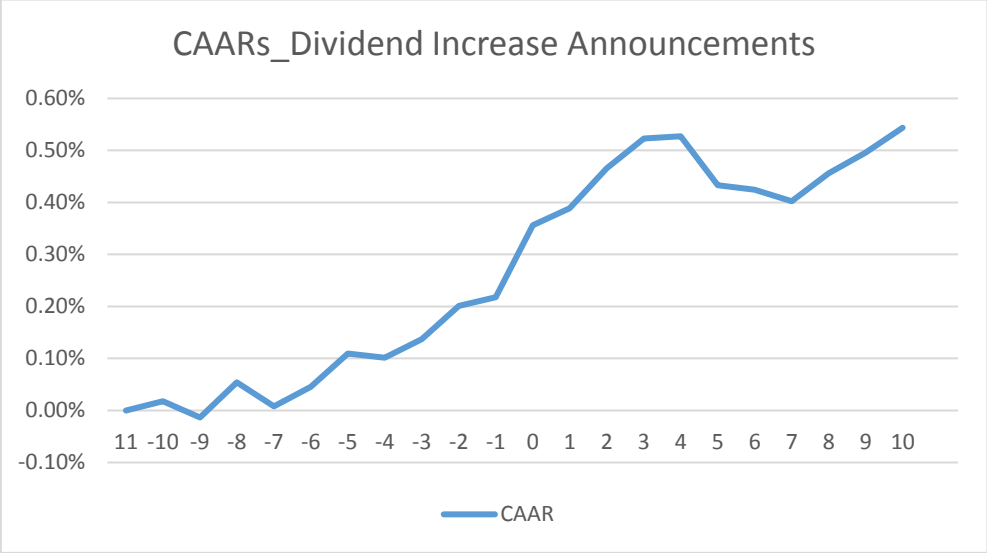

Figure 3. CAARs for Dividend Increase Announcements.

Note: Summation of AARs starting 10 days prior to the event.

After the event the positive trend is still observable, however with a sharp decline on day 4. This means that a positive impact of dividend increase announcements is present for some days after the event itself. This might be explained by the fact that dividend increase could make market participants expect an increase in the bank' future earnings. On the other hand, the further dynamics of CAAR can also be explained by other events which could happen after the dividend announcement. Another explanation of such positive dynamics can be a phenomenon similar to "post-earnings-announcement drift", which was first mentioned by Ball and Brown (1968). Post-announcement drift works in case of dividends as well. In practice the drift can last even until the next announcement date. To check this, I calculate CAARs within event windows of various size.

Table 3 represents the CAARs for different event windows. It is evident that dividend increase announcements generate positive and statistically significant CAARs during all event

windows, except for (-10 -1), (+1 +5) and (+5 +10). This means that there might have been some expectations of dividend increases from day -5, but not before. Post announcement drift is not significant for CAARs starting from day +1 but is significant in case of cumulation from day 0. Moreover, after day 5 the effect of dividend announcements fades out. For the majority of event windows, results again support the fact that market reacts positively to good news concerning dividends, which is reflected in higher prices and possibility to generate abnormal returns.

Table 3. CAARs within Event windows. Dividend Increase.

Event window	N	CAAR	t-stat
(-10 +10)	284	**0.54%*** **	**2.78**
(-5 +5)	284	**0.39%** **	**2.34**
(-3 +3)	284	**0.42%*** **	**2.91**
(-1 +1)	284	**0.19%** **	**2.06**
(-10 -1)	284	0.22%	1.84
(-5 0)	284	**0.17%*** **	**3.24**
(0 +5)	284	**0.33%*** **	**2.76**
(+1 +5)	284	0.08%	1.30
(+5 +10)	284	0.05%	0.91

Note: Significant results are represented in bold. p<0.01 or 0.05, (***) 1%, (**) 5% significance levels.

I calculate CAARs for dividend increase announcements before and after the financial crisis in 2008 to see how abnormal returns within event window (-10 +10) have changed. Table 4 summarizes this information and shows that CAARs before the crisis were much higher than those observed after it.

Table 4. CAARs Before and After Financial Crisis 2008

Period	CAAR (-10 +10)	t-stat
Before crisis	**0.50%*** **	**3.75**
After crisis	**0.26%*** **	**3.05**

Note: Significant results are represented in bold. p<0.01 or 0.05, (***) 1%, (**) 5% significance levels.

Similarly, dividend decrease announcements are examined. Table 5 represents calculated AARs and CAARs for 60 negative announcements. In theory as well as in empirical studies, there is strong evidence that companies which cut dividends or do not pay dividends suffer from negative market response. This study confirms this statement. Both Table 5 and Figure 4 show that there is a clear negative and significant reaction of stock prices on dividend cuts. At the announcement date the average abnormal return is significantly negative, and the null hypothesis can be rejected at the 1% level. After the announcement date the AARs are not statistically significant whereas CAARs are. Also, the reaction is stronger to negative news than to dividend increases discussed before, even though the dividend cuts were done mostly during the financial crisis years and were somehow expected by the market as it is seen from dynamics of CAARs from day -9.

Table 5. Abnormal Returns Around Dividend Decrease Announcements

time	AAR	t-stat	CAAR	t-stat	N
-10	-0.02%	(0.56)	-0.02%	(0.56)	60
-9	-0.01%	(0.28)	**-0.03%*** **	**(4.24)**	60
-8	-0.03%	(0.85)	**-0.06%*** **	**(2.88)**	60
-7	0.04%	1.13	-0.02%	(1.06)	60
-6	-0.01%	(0.28)	-0.03%	(1.83)	60
-5	-0.02%	(0.56)	-0.05%	(1.21)	60
-4	-0.03%	(0.85)	**-0.08%*** **	**(3.53)**	60
-3	0.01%	0.28	**-0.07%*** **	**(3.00)**	60
-2	-0.02%	(0.56)	**-0.09%*** **	**(3.40)**	60
-1	-0.01%	(0.28)	**-0.10%*** **	**(3.39)**	60
0	**-0.11%*** **	**(3.10)**	**-0.21%*** **	**(3.85)**	60
1	-0.04%	(1.13)	**-0.25%*** **	**(3.39)**	60
2	-0.02%	(0.56)	**-0.27%*** **	**(3.09)**	60
3	-0.03%	(0.85)	**-0.30%*** **	**(3.01)**	60
4	0.05%	1.41	**-0.25%** **	**(2.44)**	60
5	-0.03%	(0.85)	**-0.28%*** **	**(2.63)**	60
6	0.02%	0.56	**-0.26%** **	**(2.41)**	60
7	-0.04%	(1.13)	**-0.30%*** **	**(2.70)**	60
8	0.01%	0.28	**-0.29%** **	**(2.57)**	60
9	-0.01%	(0.28)	**-0.30%*** **	**(2.62)**	60
10	0.05%	1.41	**-0.25%** **	**(2.26)**	60

Note: Significant results are represented in bold. p<0.01 or 0.05. (***) 1%, (**) 5% significance levels.

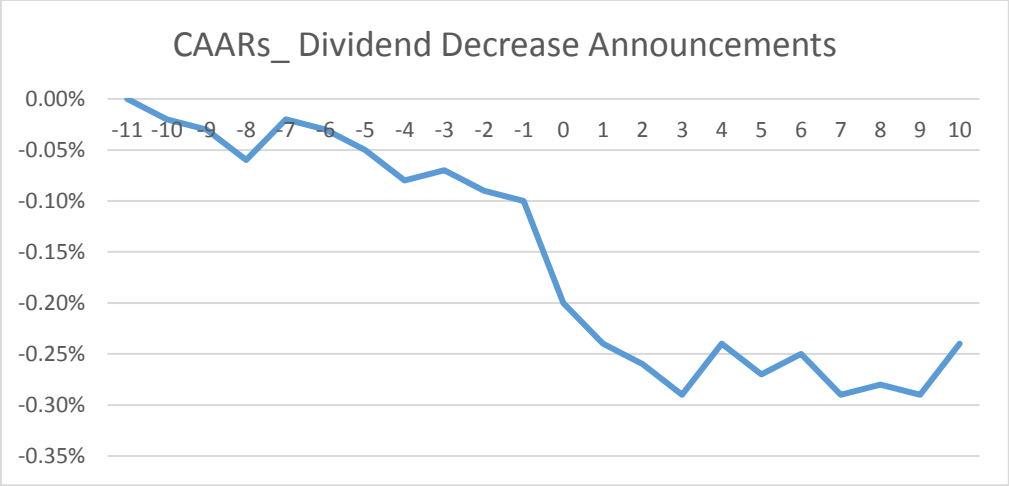

Figure 4. CAARs for Dividend Decrease Announcements.

Note: Summation of AARs starting 10 days prior to the event.

Table 6 represents the calculated CAARs for event windows of different sizes. For dividend decrease announcements CAARs are negative and significant within these windows, except for the windows (-5 -1) and (+6 +10). Thus, there is an evidence that the decrease in dividends could be expected earlier than day -5. And the negative pattern of CAARs right after the announcement date is still observable for some period and then fades out as in case of dividend increases.

Table 6. CAARs within Event windows. Dividend Decrease.

Event window	N	CAAR	t-stat
(-10 +10)	60	**-0.25%****	**(2.26)**
(-5 +5)	60	**-0.25%****	**(2.54)**
(-3 +3)	60	**-0.22%****	**(2.10)**
(-1 +1)	60	**-0.16%****	**(2.06)**
(-10 -1)	60	**-0.10%*****	**(3.39)**
(-5 -1)	60	-0.07%	(1.21)
(+1 +5)	60	**-0.07%*****	**(3.30)**
(+6 +10)	60	0.03%	1.28

Note: Significant results are represented in bold. p<0.01 or 0.05, (***) 1%, (**) 5% significance levels.

When financial institutions announce no change in the dividend amounts compared to the previous quarter, market participants react neutrally to this information. As it can be seen from the Table 7 there is no statistically significant influence of such announcements on average abnormal returns at any day within the whole event window. Thus, it can be concluded that neutral announcements do not influence stock prices. There are significant CAARs which might be explained as the fact that the market may later consider unchanged dividends as "good news" to some extent. Another possible explanation – expectations of higher earnings in the future.

Table 7. Abnormal Returns Around No Change Dividend Announcements

time	AAR	t-stat	CAAR	t-stat	N
-10	0.04%	1.75	0.04%	1.75	1094
-9	-0.03%	(1.35)	0.01%	0.24	1094
-8	-0.03%	(1.19)	-0.02%	(0.50)	1094
-7	0.01%	0.43	-0.01%	(0.23)	1094
-6	0.02%	0.70	0.01%	0.20	1094
-5	0.02%	0.92	0.03%	0.77	1094
-4	0.01%	0.55	0.04%	1.11	1094
-3	-0.01%	(0.32)	0.03%	0.92	1094
-2	-0.01%	(0.48)	0.02%	0.62	1094
-1	-0.02%	(0.96)	0.00%	0.03	1094
0	0.01%	0.65	0.02%	0.43	1094
1	0.03%	1.41	0.05%	1.30	1094
2	-0.02%	(1.03)	0.02%	0.66	1094
3	0.03%	1.34	0.05%	1.50	1094
4	-0.01%	(0.24)	0.05%	1.35	1094
5	0.02%	1.11	**0.07%****	**2.04**	1094
6	-0.03%	(1.27)	0.05%	1.25	1094
7	0.01%	0.55	0.06%	1.59	1094
8	0.04%	1.72	**0.10%****	**2.65**	1094
9	0.01%	0.52	**0.11%*****	**2.98**	1094
10	0.01%	0.45	**0.12%*****	**3.26**	1094

Note: Significant results are represented in bold. p<0.01 or 0.05, (***) 1%, (**) 5% significance levels.

Figure 5 gives graphical representation of CAARs with respect to announcements of unchanged dividends. It can be seen that the trend is almost stable with slow upward dynamics.

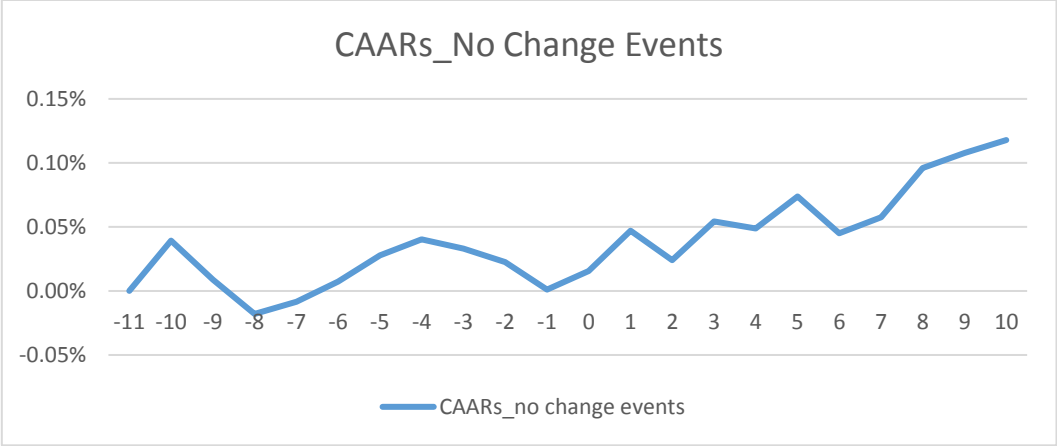

Figure 5 CAARs for No Change Dividend Announcements.

Note: Summation of AARs starting 10 days prior to the event.

Figure 6 summarizes the dynamics of CAARs for three cases considered above. This figure illustrates the results of the research: in case of dividend increase and decrease announcements the market reacted positively and negatively to this news respectively. Whereas unchanged dividend announcements did not lead to any significant reaction. Based on the obtained results the H0 hypothesis is rejected at the 1% level and information content of dividends is confirmed.

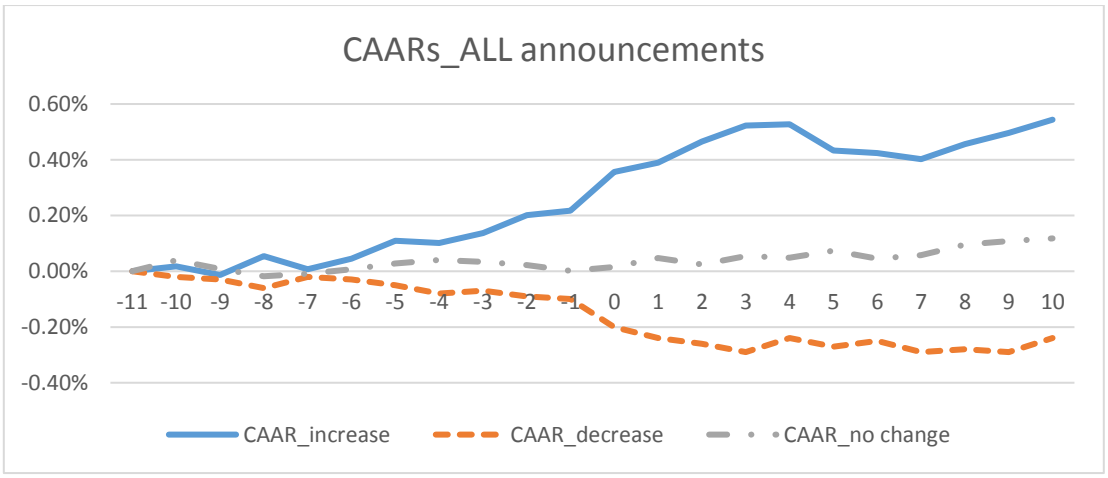

Figure 6. Dynamics of CAARs for all announcements

Note: Summation of AARs starting 10 days prior to the event.

Estimation of the dividend announcement impact on stock prices using Gordon Growth Model.

As it is described in the 6th step of the Methodology subsection, I use the Gordon Growth Model to approximately estimate the impact of dividend announcements on stock prices. Because the period under consideration is quite large, the Gordon Growth Model can be considered as a guide to long-run average estimation of the relationship between the variables.

I express linear relationship as follows:

$$\frac{\Delta \mathrm{P_t}}{P_{t-1}} = \alpha + \beta \frac{\Delta \mathrm{D_t}}{P_{t-1}} + \epsilon,$$

where ϵ has zero mean and variance σ.

The obtained regression results for dividend increase and decrease announcements are presented in Table 8.

Table 8. The results of regression based on the Gordon Growth Model

	Coeff	Stnd. Error	t-stat	p-value	R^2	N
Dividend Increase Announcements						
deflated_delta_div	0.1415**	0.0428	3.3	0.001	4%	284
const	0.1112	0.0008	13.95	0		
Dividend Decrease Announcements						
deflated_delta_div	0.5058**	0.1625	3.11	0.003	14%	60
const	-0.0174	0.0048	-3.63	0		

Note: H0 is rejected if p<0.05. Significant results are represented in bold,
(***) 1%, (**) 5% significance levels.

The results of OLS regression shows that there is positive relationship between dividend change announcements and stock prices, as expected. Moreover, the sensitivity of stock prices is

much higher (0.5058) in the case of dividend decreases compared to dividend increases (0.1415). This result is also in line with the majority of research.

Obviously, the result of this OLS regression gives the coefficient which shows how stock prices react to dividend changes. On the one hand this is not the best estimate due to the simplicity of the model. This regression could be more precise with control variables such as bank's size, retained earnings, tax rates, inflation, cash flows and other indicators. On the other hand, the main methodology to check the reaction of stock prices on dividend announcements in this paper is the event study and the purpose of this regression is to confirm the achieved results. This regression provides an intuition about the general relationship between dividend changes and price changes and confirms the results from the event study.

5 Conclusion

Empirical research in finance has shown that there is a significant reaction of stock prices to dividend announcements. In this paper a standard event study methodology was used to investigate the effect of dividend announcements made by the US banks and other financial institutions listed on the NYSE on stock prices. The period under consideration was mostly 18 years from 2000 to 2018 (some banks had shorter time interval for consideration) and the analysis was made based on daily data.

The analysis showed that semi-strong market efficiency hypothesis works for the banking sector in the US. This is an expected result based on the previous literature. Particularly, both positive and negative dividend announcements had significant and large impacts on stock prices. The most significant trends were noticed during the event itself – from day -1 to day 0 – which means that the effect was instantaneous. There was a small positive (negative) trend before the dividend increase (decrease) announcements which means that there might have been information leakage and insider trading before the event. Another possible explanation can be the expectations of the market. There was also some drift after the event.

AARs during dividend increase (decrease) were the largest (smallest) within the considered event window. Overall, when dividend increases are announced, on the last day of event window, stocks gained 0.54% positive cumulative abnormal returns on average. In the case of dividend cuts cumulative abnormal returns were negative and equal to -0.25% on average on the 10^{th} day after the announcement date. For neutral announcements there were no significant average abnormal returns.

Thus, the findings of this paper reject the null hypothesis (at the 1% significance level) which states that there is no impact of dividend announcements on stock prices. It can be concluded that information content of dividend announcements is strong, and investors can achieve abnormal returns in the period of incoming news.

There are some limitations in this paper. First, and as Aharony and Swary (1980) stated, the major difficulty in assessing dividend information is the interconnection between dividend and earnings announcements. That is why it is very hard to precisely isolate the impact of dividend announcements on prices from those of earning announcements. Second, if banks were involved in M&A or other deals at the same time as dividend announcements, it could influence the results significantly. Particularly it is hard to determine if these abnormal returns were attributable to dividend announcements or other news. It is possible to consider other information which became publicly available around dividend announcements dates and consider them together. Another shortcoming is the precision of normal return calculation. For instance, the estimation window can be changed, and it may influence the results as the dynamics of the market and stock prices is volatile especially during a crisis. A company's stock prices could change due to factors which have nothing to do with the market movements. It would be useful to consider a larger event window from -30 to 30 days, for instance. Thus, in order to achieve more precise results more detailed research and modelling should be implemented.

Overall it can be concluded that the dividend announcements of financial institutions have a great impact on the US stock market and market participants. This confirms the idea that there is an information gap between the institutions and investors. Through dividend announcements institutions are able to influence the stock prices, and although the abnormal returns for the banking sector are much lower than for the non-banking sector, they are still noticeable and significant.

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