Национальный исследовательский университет –
«Высшая школа экономики»

Международный Институт Экономики и Финансов

ВЫПУСКНАЯ КВАЛИФИКАЦИОННАЯ РАБОТА

на тему:
«Анализ информационной составляющей объявлений о выплате дивидендов»
«Analysis of informational content of dividend announcements»

Студент 4 курса, 1 группы
Демидкин Максим Олегович

Научный руководитель
Пирогов Никита Константинович

Москва 2013

Introduction

Dividend payout policy is one of the main concerns in corporate finance. Manager has to decide about the amount of payout, its timing and the form of delivery. There is a great amount of financial literature dedicated to studying this problem. Miller and Modigliani (1961) in their work showed that under perfect capital markets conditions financial policy of the firm is irrelevant in altering firm's value. In particular, dividend policy as such is also irrelevant in this case. Thus, managers can choose to pay either with cash dividends or capital gains to shareholders. Assumptions used in Miller and Modigliani (1961) paper are rather strong and are not close to reality. One implicit assumption, as pointed out by Ross (1977), is that outside market participants are fully aware and know for sure all future cash flows of the firm, meaning that there is no asymmetry of information on the markets. Thus, by revealing this information to the market, managers won't contribute to the value of their firm. Under assumption of asymmetric information, on the other hand, managers obtain inside information about firm's future prospects and in particular about expected future cash flows of the firm, while shareholders can only perceive them. Such inside information can potentially signal firm's prospects, and will be immediately reflected in prices when revealed to the market.

It has been shown and developed in theoretical models of Bhattacharya (1979), Miller and Rock (1985) and John and Williams (1985) that dividends can be used as a signal of firm's value to the market. This is true because of dissipative costs, which are associated with dividend payment. The latter work of John and Williams (1985) showed that it is the tax burden which makes dividend payments relatively costly when compared to share repurchase. John and Williams (1985) got this result because in developed countries and at least in case of individuals dividends are taxed higher than capital gains. This makes dividends a costly signal, which is available only to managers of high quality firms. This result is known as tax-based signaling theory of dividends in finance. It predicts that unexpected positive changes in dividends must be accompanied by increase in value of the company, while negative unexpected change will decrease the value of the company. Under tax-based signaling hypothesis managers increase dividends only if they expect their future earnings to rise as coincides with empirical findings of Lintner (1956).

An alternative to classical signaling hypothesis is the more recently developed "maturity" or "life-cycle" hypothesis, first pointed out by Grullon, et al. (2002) and then further developed by DeAngelo, et al. (2006). The theory takes into account the fact that the investment opportunity set of a firm changes in time. Specifically, as the firm "matures", its possible investment set diminishes which means that both its profitability and systematic risk diminishes. As a result, there is more free cash flow available to spend on dividends. Under maturity hypothesis dividend increase is associated with lower profitability and systematic risk. As suggested by Grullon et al. (2002) the overall impact should be positive, that is market treats decrease in risk as more valuable feature of the firm then decrease in profitability.

Currently Russian firms are subject to a different tax scheme as compared to US firms in above studies. Without the loss of generality, in Russia tax rates on capital gains can be taken as 13% for individual taxpayers and tax rate on dividends as 9% (Russian Federation Tax Code). This means that according to signaling hypothesis dividends can't be used to signal firm's prospects. However, the recent work of Amihud and Murgia (1997) has shown on a sample of German firms that even in case of absence of tax disadvantage of dividends, they can still used as a reliable signal.

This paper considers the ability of dividends to reflect changes in current and future profitability, systematic risk and investment opportunities, as well as the significance of dividends and those variables in explaining market reaction around the announcement dates. The purpose of this paper is to investigate what kind of information contained in dividends determines the observed market reaction as reflected by changes in stock prices around dividend announcements under the current Russian tax scheme with respect to two theories of dividends: signaling and maturity hypotheses.

In order to achieve this goal it is planned to do the following:

1. Review the existing literature on dividend payout policy under the presence asymmetric information in the market in order to find a solid basis for research hypotheses.

2. Conduct an event study to measure the significance of impact of dividend announcements on stock prices by calculating abnormal returns on stocks around announcement dates.
3. Test the relationship between dividend changes and changes in current and future earnings, current risk, investment opportunities and a set of control variables.
4. Regress the obtained abnormal returns on those variables to determine what type of information influences the market reaction around the announcement dates.

The object of this paper is a sample of 176 dividend announcements made by 34 Russian firms for the time period 2002 – 2012. All the relevant information and variables are collected from Bloomberg terminal. The main criteria of choice were the availability of information about announcement dates and annual regularity of dividend payments. The subject of research is the informational content of dividends, which is assumed to be represented by firm's current and expected future cash flows, its systematic risk risk and investment opportunities, as postulated by signaling and maturity hypotheses.

The paper is structured in the following way. First, the review of relevant dividend theories is presented with description of papers of major importance. Second, review and analysis of empirical papers on the subject of signaling and maturity hypothesis is presented. Next, a brief description of the sample used in the study is presented as well as the selection criteria for the firms. Then comes the empirical part, which is divided in three sections. Each part begins with description of statistical tools used for analysis and formulation of hypotheses based on the observed literature. First part contains an event study, which is conducted to reveal the effect of dividend announcements on stock prices. Then, the possible determinants of managers' dividend policy decision are tested for significance. Afterwards, obtained abnormal returns are used in analyzing the reaction of the market with respect to control variables. Finally, the results are summarized and conclusion is made concerning the information content of dividends.

1. Overview of theoretical models and empirical findings

1.1. Overview of signaling and maturity theories of dividends

Dividend irrelevance proposition, one of the earliest theories of dividends, was formulated by Miller and Modigliani (1961). They used a set of assumptions, under which dividend policy is irrelevant and does not alter the value of the firm. Assumptions they used were: frictionless markets without taxes and transaction costs; symmetric information and homogenous expectations; investors care only about their wealth; the choice of financing decisions does not affect investment outcomes. In this case not only the dividends policy but in fact the whole financing policy becomes irrelevant. What matters are the investment decisions, that create the value of the firm. The assumptions of Miller and Modigliani (1961) work are rather inconsistent with reality and their violation leads to the breakdown of irrelevance proposition. For example, the works of Jensen and Meckling (1976), Myers (1977) and Jensen (1986) show that agency costs may lead to capital structure being significant in determining firm's value.

Assuming asymmetric information also leads to the fact that dividend can use its financing and payout policy to signal inside information to the market. It is generally true that managers obtain information about firm's future projects and expected future cash flows, while outside investors don't. By revealing this type of information to the market and signaling good news about firm's future prospects in times of undervaluation by the market, managers can improve the value of their firm. Of course, there are different instruments, which managers can use to signal firm's quality. For example, Ross (1977) in his work showed how debt financing could signal good quality of the firm, the firm's cost of signaling being bankruptcy costs of not paying its liabilities. Due to this costs only good quality firms have incentives to use debt as a signal, and thus separating equilibrium exists.

Another possible tool is the dividend policy. It has been pointed out in the work of Lintner (1956) that managers do take into account payout policy as important tool in valuation of the firm. Particularly, Lintner (1956) argues that when choosing a payout policy, managers base their decision on expected long run earnings. Thus by changing dividend policy managers signal their expectations of future prospects to the market.

As Lintner (1956) suggests, only when firm's expected future earnings rise, they increase their dividend payout rate. Thus, dividends act as a signal of firm's future prospects to the market. An important question, which arises, is: why firms use dividends, a rather costly signal, rather than share repurchase or other less expensive tools, to signal their prospects? (Easterbrook, 1984)

The use of dividends of a signal was modeled in the works of Bhattacharya (1979), Miller and Rock (1985) and John and Williams (1985). These are the main models that form the signaling hypothesis of dividends. They suggest that managers can convey information about firms' future earnings, which is not known by outsiders, by choosing dividend policy. As suggested by Al-Malkawi et al (2010), all these works are based on the same set of assumptions:

1. Asymmetric information exists between managers and outside shareholders
2. Dividends may convey information about firm's cash flows, both current and future
3. Dividends are a credible signal only due to associated dissipative costs

Still, in all three works managers act in way to maximize shareholders' wealth as assumed by Miller and Modigliani (1961). The three works are modeled differently and the main difference is the way dissipative costs are modeled in them. Basically, only in the work of John and Williams (1985) the model was able to explain why dividends are used as a signal.

In paper of Bhattacharya (1979) firms can be divided according to the set of projects which each of them obtains in the beginning. Firms of high quality obtain projects, which in future will generate high cash flows and vice versa for low quality firms. Good quality firms have incentives to separate themselves from low quality firms by revealing their type to the market. To do this they must use a signal, which is too expensive to be used by low quality firms. Bhattacharya (1979) in his model assumes that firms commit themselves to a dividend payout level in the future. The dissipative cost related to this type of commitment is the cost of outside financing, which the firms have to use in case the cash flows generated by their projects is not enough to cover the level of committed dividend payout. Thus good quality firms can set dividends to high enough level that cannot be covered by the cash flows of projects of low quality firms without resorting to outside financing. In this case separating equilibrium exists.

The paper of Miller and Rock (1985) provides an alternative model to explain the use of payout policy as a signaling tool. In their model firms first make an investment decision, which is the optimal solution to their problem of profit maximizing. An important assumption is that neither the future profitability nor the cost of initial investment is unobservable to shareholders. When firms receive cash flows from their projects, they choose the level of dividends and new level of investment, which is again unobservable by shareholders. Two important assumption made by the authors here are that there is a number of shareholders willing to sell their shares after the firm pays dividend, and that firms earnings are positively correlated through time. By paying high dividends firms signal that their current earnings is relatively high, and the higher price asked by the sellers of shares after dividend payout means that the firm is expected to earn high profits in the future as well. Thus, if a low quality firm wishes to pay high dividends it has to cut the level of its new investment, since its actual earnings from initial investment are low. The dissipative cost that Miller and Rock (1985) modeled in their paper is the cost of deviation from optimal investment decision. By paying large enough dividends, authors suggest that good quality firms can separate themselves from low quality firms.

The work of John and Williams (1985) was able to overcome the main criticism of the two papers discussed above. Unlike Bhattacharya (1979) and Miller and Rock (1985), John and Williams (1985) assumes that dividends and share repurchase are no substitutes at all. They introduce personal taxes into their model, with tax rate on dividend higher than that on capital gains. Thus the relative tax disadvantage of dividends is the associated dissipative costs in the model of John and Williams (1985). In their model inside shareholders must sell some part of their shares to meat their liquidity needs in each period. In order to maximize their wealth, as assumed above, managers have to raise the price of those shares by communicating positive information to the market. By paying out dividends that are tax disadvantaged relative to capital gains firms can signal good quality to the market. The cost of such transaction is the tax burden paid by inside shareholders. The benefits, on the other hand, are higher prices on the market, which means that inside shareholders will sell a lower proportion of their shares to outsiders to meat their liquidity needs and thus retain a higher share in firm's equity. John and Williams (1985) suggest that only good quality firms are able to use such signal, with costs of paying dividends being higher than benefits for inside shareholders of low quality firms.

These three theoretical models are able to explain why it is often observed that market positively reacts to unexpected increases in dividends, interpreting it as "good news", and negatively reacts to unexpected decreases in dividends, regarding them as "bad news". In terms of returns that shareholders get it means that in general when managers announce dividend increase, shareholders get positive abnormal returns, while when dividends are decreased, the abnormal returns are negative. The market reaction to dividend changes has been studied in the works of Healy and Palepu (1988), Michaely et al. (1995) and other papers discussed in detail in the next section. Another implication from the models of Bhattacharya (1979), Miller and Rock (1985) and John and Williams (1985) is that the news, which shareholders get from dividend changes, is related to expected future cash flows of the firm, in hand with Lintner's (1956) findings. Particularly, in case of increase of dividends, signaling models predict that managers perceive their future earnings to increase, which causes positive abnormal returns on the market. In case of decrease of dividends, signaling hypothesis suggests that earnings are expected to decrease. The works of Watts (1973), De Angelo et al. (1996), Benartzi et al. (1997) and other works described in more detail in the next chapter tested the power of dividend changes to predict future profitability. In general, all the works with different model specifications failed to provide support that there exists a significant positive relationship between these two variables. The results were either weakly significant or predicted reversed relationship as in the work of De Angelo et al. (1996).

These results lead to the formulation of maturity hypothesis mainly summarized in the works of Grullon et al. (2002) and De Angelo et al. (2006). As pointed out by De Angelo et al. (2006) dividends are usually paid by firms with low growth rates, reflecting their maturity. The theory takes into account the fact that the opportunity set of the firm changes over time. Also, as noted in Grullon et al. (2002), news that the market gets can be generalized in two types: news about expected future cash flows or about its discount rate, or systematic risk. Particularly, when firm matures and begins to grow at a lower rate, its investment opportunity set diminishes, which brings down both profitability of the firm and its systematic risk. The former is the bad news for potential shareholder, while the latter is considered as good news. Since we expect growth opportunities to decline, by engaging in a less number of risky projects, firm's cost of capital decreases. As capital expenditures of the firm on new projects decreases, firm is able to spend more of its free cash flow to shareholders. Thus, maturity hypothesis predicts that as firms mature, their dividend payouts increase. As supported by empirical evidence in the work of Grullon et al. (2002), researchers conclude that dividend changes positively affect market prices. The explanation of this phenomenon is, on the other hand, entirely different from signaling hypothesis. Market positively reacts to increases in dividends, since they signal that the firm has entered into the mature phase of development. This means that due to lower investment opportunities firm's systematic risk has decreased and it will soon experience a decline in profitability. It is important to mention that decline in risk compensates for decline in future profitability, which means that the overall market reaction should be positive (Grullon et al., 2002).

To summarize the above, in hand with empirical observations of Lintner (1956), signaling hypothesis is able to provide an explanation why dividend payout policy should be relevant for the managers of the firm in case of asymmetric information. As mentioned by Allen and Michaely (2003), the main strength of Bhattacharya (1979) and Miller and Rock (1985) papers is that they were able to describe why payout policy can be used as a signal of firm's quality and thus describe the observed market reactions to dividend announcements. However, these models take dividends and share repurchase as perfect substitutes, which doesn't explain why managers prefer to pay dividends. On the other hand, the model of John and Williams (1985) is better in this sense, since was able to explain both why firms choose to conduct a payout policy and why they choose dividends. Empirical evidence, which will be in detail discussed in the next section, gives support to implicit result of signaling theory that markets should positively react to unexpected dividend increases and negatively to unexpected dividend decreases. But there found little support on implication of signaling hypothesis concerning firm's future profitability. Maturity hypothesis shows, on the other hand, that by taking into account systematic risk and investment opportunities of the firm it is possible to obtain an alternative explanation to the informational content of dividends, as opposed to the signaling theory.

1.1. Overview of empirical research on informational content of dividends

Empirical literature on dividend signaling is mostly concentrated on studying market reaction to dividend announcements and analyzing informational content of these announcements. First papers aim to study how the market reacts to announcements. This is usually done by conducting an event study. The second ones try to identify what information investors can get from such announcements. For example, signaling theory tells us that it is information of expected future cash flows, while maturity hypothesis emphasizes on the news about firms investment opportunities and risk. This section aims to discuss some relevant for signaling and maturity hypotheses researches conducted in different time periods, analyze the applied models and approaches and compare the results.

One of the earliest empirical works on dividend policy was conducted by Lintner (1956). The paper provided the results of a field survey of a group of managers regarding factors, which they considered to be important in determining dividend payout policy. The results showed that managers were more concerned with the change in dividend rate rather than the level of dividend itself. Almost no decisions were undertaken without considering the firm's existing dividend rate and the target payout rate. Each firm according to its history, objectives and expected perspectives determines the target rate individually. Current and expected future earnings are also taken into account and the perceived changes are smoothly reflected in corresponding changes in payout ratios. This is done in order "minimize adverse stockholders reactions" (Lintner 1956, p. 100). Moreover, managers (at least of large firms, as commented by Pettit (1972)) strongly dislike situations when they are forced to decrease dividends, which were not perceived by shareholders. That is they are more likely to increase dividend rate only in case of being sure that they will be able to sustain it in the future. Lintner's (1956) paper is important from the point of view of signaling theory of dividends and provides support that dividend policy is not irrelevant.

Pettit (1972) was one of the first researchers who conducted an event study of market reaction around dividend announcements dates. The prime purpose of his work was to test the market's efficiency with respect to dividend announcements. He divided the sample into seven subsamples according to the size of change in dividend rates, the extreme groups being dividend initiations and omissions. The results show that market reacts according to the signaling theory, i.e. positively to dividend increases and negatively to decreases, and the effect increases with the magnitude of the dividend change. Also, Pettit (1972) was able to show that dividend changes provide information to the market in addition to that provided by unexpected earnings change, with the earnings effect being small and insignificant. This provides support for the ability of dividends to reveal information beyond that contained in earnings announcements. When studying market reaction by plotting cumulative abnormal average returns around the announcement date, Pettit (1972) also notices that there is some "anticipation effect" in prices, in the sense that abnormal returns adjust gradually before the announcement date. Pettit (1972) explains this behavior either by the fact that announcements are correlated (made on a regular basis) or there is a leakage of private information to some participants of the market. The study of initiations and omissions performed by Michaely et al. (1995) has generated the same results as suggested by Pettit (1972). Moreover, they showed that market reaction when measured by average abnormal returns is asymmetric to these two types of events. Michaely et al. (1995) claim that market reaction is more sensitive to changes in dividends in times of dividend decreases than in times of increases.

Asquith and Mullins (1983) conducted an event study, which focused on dividend initiations or dividend announcements made for the first time in a 10-year period. These results are then compared with subsequent announcements for the same firms. Asquith and Mullins (1983) emphasized the importance of correctly modeling dividend expectations. Before their work, researchers primarily used naïve model of dividend expectations, where the future dividend is considered to follow a random walk pattern. Thus the expected change in dividends was always zero. Authors argue, that such model for expectations is more appropriate for initial dividend announcement, when the whole change is unexpected. Once the dividend payments are initiated and continued, they enter into the information set of investors and influence their expectations about future dividends. Asquith and Mullins (1983) argue that these expectations are already incorporated in stock prices at the time of announcements. The results of their study fully support signaling hypothesis in predictions concerning price reactions, showing that both initiations and subsequent changes bring new information to the market. Asquith and Mullins (1983) found that initiations generate larger positive abnormal returns than the following subsequent increases. But also initiations are associated with larger in magnitude dividend changes. Asquith and Mullins (1983) argue that larger market reactions during initiations are associated with the larger magnitude of dividend changes, and not with superior informational content of initiations. To test the relationship between market reaction and magnitude of unexpected change in dividends they regress abnormal returns against changes in dividend yield. Both results for initiations and subsequent increases show positive slope, providing evidence that market positively reacts to the positive changes in dividend yield. The slope coefficient for subsequent dividend changes, however, being twice as big as that for initiations, Asquith and Mullins (1983) conclude that market reaction is even more sensitive to changes in subsequent dividends. Initiations are shown to be brining no superior information over subsequent dividend changes with higher reaction being captured by the magnitude of change. The results they obtained also held for changes in dividends being measured by changes in payout ratios.

The work of Amihud and Murgia (1997) is also relevant to my research in the sense that they studied informational content of annual dividend announcements in Germany during the time period from 1988 to 1992 when the dividends were not tax disadvantaged relative to capital gains. According to the signaling theory, dividends in this case are not informative and cannot be used as a signal. The abnormal returns generated around the dates of announcements, if any, should be generated by other factors, like change in earnings. However, the results of event study are the same both in magnitude and direction as in the work of Pettit (1972). In addition, the regression of cumulative average abnormal returns on changes in dividends and earnings per share show that dividends convey information beyond that contained in earnings announcements. By showing evidence against signaling hypothesis Amihud and Murgia (1997) suggest that there are factors other than tax disadvantage of dividends, which make them informative. They mention the works of Miller and Rock (1985) and their idea of dissipative costs of underinvestment and of Kalay (1982), who proposed in his work that dividends reveal the information about the ability of firms to service their debt liabilities.

Another well-studied implication of signaling model is the ability of dividends to predict future earnings. Watts (1973) studied this phenomenon and found little support for the signaling theory. He used the model for dividend changes specified by Lintner (1956) and augmented by Fama and Babiak (1968) with the unexpected component of the dividend policy being specified as the error term in the model. Watts (1973) used this unexpected change in dividends to predict change in future earnings. The results are positive but weakly significant for naïve model for earnings. By subtracting the trend term from earnings Watts (1973) was able to get the unexpected component of change in earnings. The overall results turned out to be trivial and generally insignificant. As Watts (1973) himself concluded: "in general the potential information in current dividends regarding future earnings is small" (Watts 1973, p. 198).

Since Watts (1973) many researchers tried different specifications and the results were somewhat ambiguous. The work of Healy and Palepu (1988) concentrated on dividend initiations and omission, i.e. times when new information is of potential importance to shareholders in modeling their expectations concerning firm's future profitability. Authors studied the ability of dividend change to predict future earnings growth rate. The results for dividend initiations show support for signaling hypothesis, meaning that earnings indeed increased in future for dividend initiating firms. For dividend omissions Healy and Palepu (1988) show that earnings fall in the year of omission, but later on increase significantly, which is contradictory with signaling theory. The results of the work of De Angelo et al. (1996) were also inconsistent with separating equilibrium proposed by signaling theory. They focused on firms, which exhibited earnings decline after several years of sustained growth. For such firms information about future prospects of the firms is of particular interest. If decline is temporary, as perceived by managers, managers would not decrease dividends. If earnings are expected to decline permanently, on the other hand, signaling theory predicts that managers will decrease dividends. De Angelo et al. (1996) show that for firms which increase dividends experience either a decline in earnings in the future or non-positive earnings, a result, which seriously undermines the credibility of signaling hypothesis. One possible explanation, suggested by authors is that managers behave optimistically and overestimate the possible future earnings.

The results of Benartzi et al. (1997) showed that earnings growth, when scaled by market value of firms' equity, does not subsequently increase after the dividend increase. On the other hand, earnings of firms that decrease dividends significantly decline in 2 years after the announcement date. Results for decreases, though, appeared to be significant only after inclusion of additional 27 control variables, which help explaining the change in earnings, as suggested by Ou and Penman (1989).

The way Benartzi et al. (1997) captured unexpected earnings changes is also criticized in the work of Nissim and Ziv (2001). The later authors claim that the previous results appeared to bring only partial support to signaling theory due to incorrect specification of the model and choice of wrong variables. Specifically, Nissim and Ziv (2001) argued that in order for scaled change in earnings to be an appropriate proxy for unexpected change, it has to be scaled by book value of equity. Otherwise, they claimed, there will be a measurement error in the dependent variable, which makes dividend change less significant in predicting earnings. Thus, by deflating delta earnings by book value of equity at the beginning of the year prior to the announcement researchers ruled out this problem. By doing this to control for measurement errors in dependent variable and adding additional explanatory variable to control for omitted variables Nissim and Ziv (2001) found significant and positive relationship between changes in dividends and future earnings.

Nissim and Ziv (2001) were in turn criticized for several other reasons. The use of return on equity as a measure of profitability was criticized by Benartzi et al. (2005), since it sensitive to changes in capital structure and is affected by special items before taxes. (Benartzi et al. (2005)). Return on assets was argued to be the better proxy of abnormal profitability than any other earnings scaled variable, as suggested by Barber and Lyon (1996). The work of Benartzi at al. (2005) took into account for nonlinear of earnings through time and included additional dummy variables to control for mean reversion in earnings. Their results showed that under this specification dividends tend not to have power in predicting future earnings.

It is perhaps the ambiguous results of preceding studies that lead to development of another theory, called maturity hypothesis. First formulated by Grullon et al. (2002) it was latter on developed by De Angelo et al. (2006). The prime idea was that in addition to news about future cash flows, dividends convey information about firm's systematic risk. Also, the investment opportunities of the firm were analyzed as well. Brought together by Grullon et al. (2002), the main result of this hypothesis was that increase in dividends signal about decreases in firm's investment opportunity set, risk and future profitability, the later prediction clearly being opposite to classical signaling theory. Maturity hypothesis does not identify why exactly dividends can be used as a signal, although it does not deny that it could be due to tax disadvantage, as suggested by John and Williams (1985). The paper of Grullon et al. (2002) confirms that there is indeed the predicted negative relationship between dividend changes and risk as measured by firm's equity risk premium and future profitability as measured by return on assets. The relationship between dividend change and current profitability, on the other hand, is positive, indicating that dividends mimic current position of the firm. The results are reported to be the same when controlling for unexpected change in profitability and risk and also. Further, to investigate market reaction to changes in these parameters, Grullon et al. (2002) regresses cumulative abnormal returns on the same set of parameters. The signs of coefficients appeared to be of the same sign and highly significant, both for expected and unexpected changes in profitability and risk, as suggested by maturity hypothesis. Thus, Grullon et al. (2002) showed that market on average positively reacted to decreases in expected future profitability and systematic risk as reflected by decreases in dividend payouts. The paper also shows that for firms in their sample for dividend increasing firms both capital expenditures and cash balance significantly declines in the three years after the announcement date. This is in hand with maturity hypothesis, predicting that managers of overinvesting firms usually increase dividends to due to lack of investment opportunities and availability of extra funds.

Empirical evidence against the influence of investment opportunity set on stock prices was provided by Yoon and Starks (1995). The purpose of their study was to analyse the informational content of dividends from the point of view of dividend signaling and Lang and Litzenberger (1989) version free cash flow theories. The theory divides firms according to their investment opportunities on over and underinvesting. According to the Lang and Litzenberger (1989) interpretation of free cash flow hypothesis that for firms, which are overinvesting there should be significant market reaction and the market expects managers of such firms to increase their dividends to reduce the amount of free cash flow available for risky investments. Such firms are characterized by low Q-Tobin ratio ($Q < 1$), which is market value of the firm divided by its total assets. By analogy, underinvesting firms, i.e. firms with large investment opportunities set but low funds available, have $Q > 1$. Note that such classification is also appropriate for analysis of maturity hypothesis, by classifying overinvesting firms as mature ones with low growth opportunities and underinvesting firms as young firms with high growth opportunities. As Yoon and Starks (1995) points out, firms with $Q > 1$ exhibit lower dividend yield than firms with $Q < 1$, indicating that overinvesting firms on average pay larger dividends than underinvesting firms. Results of their study, on the other hand provides strong support for signaling hypothesis. Particularly, Yoon and Starks (1995) show that for dividend increasing firm's capital expenditures increase in the following years of the date of announcement, an observation certainly not consistent with maturity hypothesis. Also, they have found that current dividend changes are significant in determining the expectations of current profitability, meaning dividend convey new information to the market, not conveyed in earnings announcement.

To summarize, I empirical evidence on informational content of dividends generally shows that dividend changes do convey new information to the market beyond that contained in earnings announcements, as supported by market reaction around announcement dates. Specifically, dividend changes positively affect abnormal returns. Which particular information dividend changes convey to market participants is not clear. Signaling theory predicts that it is managers' expectations of long run earnings, which determine the dividend policy of the firms, thus market can reveal this information from dividend changes, and higher dividends should lead to higher future earnings. Existing evidence shows that in most cases this is not true and dividend are either completely uninformative about future earnings or predict the reversed relationship to that predicted by signaling theory. The maturity hypothesis thus claims that dividends are negatively related to future earnings and risk and should signal the investment and growth opportunities of the firm. It predicts that market reaction to increases in dividends should be positive for overinvesting firms and negative for underinvesting firms.

2. Event study

2.1 What do we expect to observe?

The paper of MacKinlay (1997) was taken as a basis for conducting an event study. The purpose of conducting it is to observe and measure the effect, which an event has on stock prices. In my case announcement of dividend change was taken as an event. I assume that markets are semi strong efficient, which means that prices must quickly and correctly react to new public information as soon as it becomes known to the market participants (Fama, 1991). This is done in order not to get caught by "joint hypothesis" problem, since it is not the purpose of my study to measure the efficiency of Russian emerging market. In case of asymmetric information in the light of observed theories above dividends serve as signal that managers of firms can use to reveal the quality of their firms to the market in case of undervaluation. Both theories (signaling and maturity hypothesis) describe unexpected dividend increases as good news while dividend decreases as bad news to the market. Under the tax based signaling hypothesis dividend announcement in Russia will not bring any new information to the market, since dividends are not tax disadvantaged under current tax scheme, and thus will not influence the stock prices. Thus the null hypothesis for signaling theory can be described as:

H1: Stock prices are not influenced by dividend announcements in Russia

Alternative hypothesis is that dividends contain some unique information previously unknown to the market and thus their announcements will have an impact on stock prices. Specifically, in this case market must react positively to unexpected dividend increases and negatively to unexpected dividend decreases.

H1a: Market reacts positively (negatively) to unexpected dividend increases (decreases), which should be revealed by significant positive (negative) abnormal returns around the announcement dates.

Moreover, dividend initiation and omissions, being the extreme versions of dividend increases and decreases, characterized by larger changes in dividends in magnitude, are expected to produce more significant market reactions, revealed by larger market price increases for dividend initiations and larger decreases for omissions. This leads us to another null hypothesis about market reaction to dividend changes.

H2: Effect of dividend initiation (omissions) in more pronounced which should be reflected by larger positive (negative) abnormal returns during at those dates

If the market will show such response to dividend changes than we can conclude that dividends are indeed an informative signal, but not because of being tax disadvantaged as prescribed by John and William (1985). Maturity hypothesis described in the works of Grullon et al. (2002) and De Angelo et al. (2006) predicts the same market reaction to dividend changes; however, it doesn't specify why exactly dividends can be used as a signal. If the market reaction is positive for unexpected dividend increases and vice versa for decreases we can conclude that results also support maturity hypothesis.

2.2 Description of a sample

The sample of firms and all the relevant information was downloaded from Bloomberg HSE database. A sample of 34 Russian publicly traded firms, which are classified into 7 industries according to Industry Classification Benchmark (ICB) criteria, was selected. Those industries are Oil and Gas, Basic materials, Industrials, Consumer goods and services, Telecommunications, Utilities and Financials. The distribution of firms among industries is presented in Table 1 below.

Industry Name	**№ of firms**
Oil & Gas	3
Basic Materials	4
Industrials	4
Consumer Goods and Services	3
Telecommunications	4
Utilities	8
Financials	8
Total	**34**

Table 1. Distribution of 34 firms among 7 industries.

It is important to mention here that the sample is not random, since it was selected basing on several criteria. The main criterion of firm selection was the availability of data. Since the data about Russian firms stored in Bloomberg is typically dated no earlier than 2002, the period of my study was chosen to be from 2002 to 2012. Among those firms traded on that period only those were selected which announced dividend payments on a yearly basis. Those firms, which paid dividend more than once a year (on a semiannual basis, for example), were excluded form the sample. This was done in order to get more accurate estimates of abnormal returns, discussed in detail the next subsection. My study also includes analysis of effect of initiation of dividend payments as compared to subsequent dividend changes. Thus, those firms, which made their first payment on the chosen time interval, had a priority over those, which did not, given the same amount of other types of data available for those firms.

As a result, a total of 34 Russian firms with 176 cash dividend announcement dates for a period from 2002 to 2012 were taken for the analysis in my research. Dates of cash dividend announcements were collected from Bloomberg terminal news calendar and double-checked with time series of daily figures of dividends per share for each of the firms. From analysis of Bloomberg output it follows that dividends can be announced either to be increased, decreased or kept constant; initiated; omitted or discontinued (the latter being the continual form of omission)[1].

To sum up, the final sample consisting of 176 dividend announcement events contains 32 initiations and 19 omissions. These types of events will be later on analyzed in more detail.

2.3 Description of methodology of event study

Investors are believed to react positively to dividend increases and negatively to decreases and omissions announcements. This should be reflected by changes in market prices, since dividends announcements are said to convey new information to the market. To measure the effect of a dividend announcement on stock price, we must construct a time series of abnormal returns estimated around the announcement

[1] Dividends were discontinued when the firm became no longer traded during the observation period. There were three firms, which discontinued their dividends. To simplify the analysis, without the loss of generalization, I defined omitted and discontinued dividend announcement events as “omission” in my study.

date. To do this, I followed the procedure described in the paper of MacKinlay (1997).

After defining the type of event studied and forming a sample I need to chose estimation and event windows. The first one is used to estimate a model for expected returns. The second one is centered on the event itself and is used to plot the abnormal returns pattern. MacKinlay (1997) emphasizes the importance of these two windows not to overlap. In case this happens, author claims that the estimated expected returns will be affected by the information contained in the event, and thus abnormal returns will be biased.

The chosen event window is a time period of 21 days, i.e. +/- 10 days around the announcement date. There is always a probability that other events like earnings announcements, news about mergers and acquisitions, stock splits etc. will be included in the window, thus affecting abnormal returns and leading to biased results about the significance of influence of dividends. Such event window also was used in the works of Asquith and Mullins (1983) and Pettit (1972) to study the daily returns. Results of their studies show that such size properly measures the market reaction for dividend announcements.

The estimation window used for estimating model for expected returns was taken 200 days before the event window. This was done in order to include as many observations into the estimation process without intersecting current estimation period with the previous event window.

Next step is to describe the model for expected returns. In my work I used market model to estimate expected returns.[2] When choosing explanatory factors for stock returns I considered return on market portfolio measured by return on RTS index, market to book value to control for growth opportunities of the firm and current market capitalization (taken in logarithms) to control for market size. The daily data on prices and the two explanatory variables were downloaded from Bloomberg

---

[2] CAPM is also a rather popular choice for this purpose. However, CAPM is inappropriate to emerging markets like Russia due to high market segmentation and presence of inside trading, as stated by Bekaert and Harvey (2002). In general, MacKinlay (1997) summarizes that CAPM has to many restrictions, which make results obtained from using it questionable.

terminal for the time span from 2002 to 2012 for each firm. Returns for each date were calculated as the logarithm of current market price divided by previous day market price. If the previous day was non-trading day, the price of the last trading day available was used.

$R_t = \ln\left(\frac{P_t}{P_{t-1}}\right),$ (1)

The two-factor specification using market returns and market to book value provided the best fit for the data, so the results of this specification is provided in this paper. The estimation of abnormal returns as well as individual variances of returns for each event was conducted using Mathlab software.

Model specification can be written as follows.

$R_{it} = \alpha_i + \beta_{1t} Rm_t + \beta_{2t} MBV_{it} + e_{it},$ (2)

Where R – return of i-th stock at time t, Rm – return on RTS index at time t, MBV – market to book value of i-th firm at time t, and *e* is the error term with zero mean.

The estimated coefficients were used to calculate expected returns according to the formula. Abnormal returns were calculated as the difference between the actual and estimated expected returns.

$AR_t = R_t - E_{t-1}(R_t),$ (3)

The estimated abnormal returns (AR) were then aggregated across firms and years in Cumulative Average Abnormal Reruns (CAARs) for each day of the event window (from -10 to +10 around the announcement date t = 0). That is for each day *s* and *m* from -10 to 10 the CAR was calculated as:

$CAR(s,m) = \sum_{i=s}^{m} AR_i \, , for\ s < m$ (4)

The term "average" is used since for each day in event window average of all relevant abnormal returns is calculated. The cumulated average returns are then plotted for each day of event window to analyze the reaction of the market. From now on I use CAAR as a notation for cumulative average abnormal returns.

It is also important to correctly classify each event as either "good" or "bad" news for the market. In this paper I use two approaches to model unexpected dividend change for this procedure. The first one is naïve expectations approach, which assumes that dividend payout policy of a firm follows a random walk. Thus, any change in dividends is fully unanticipated by the market. This model, however, does not take into account the rationality of market agents, who, according to Asquith and Mullins (1983) use historical data on dividend policy of the firm to form their expectations about firm's future payout policy. Authors claim that only dividend initiations can be modeled using naïve expectations, since it is plausible to assume that those changes are unexpected. Once the dividend policy is initiated, however, it is important to include it into agents' expectations. The second approach for event classifications requires a model for expected dividend change.

I used the version of Lintner's (1956) model for dividend change augmented by Fama and Babiak (1968). Watts (1973), who also compared these specifications in predicting future profitability of the firm, also mentioned that the augmented version tends to provide better results. In this model dividend change is regressed on past dividends, and current and past earnings. Lintner (1956) and Watts (1973) used earnings per share to measure firm's profitability. In my work I used earnings scaled by book value of equity.

$$\Delta DPS = f\big(E, E(-1), DPS(-1)\big), \quad (5)$$

Where E – EBITDA deflated by Total book value of equity[3], DPS – dividend per share, terms with -1 in parenthesis are one period lagged variables.

In the next subsection I present the results of event study.

2.4 Description of results of event study

First, I used naïve expectations to classify the results. The table with statistics is provided in Table 2 below, while the graph for cumulative abnormal returns is presented in Figure 1 in Figures section in the end of the paper. To check the significance of market reaction we test whether CAAR at different time intervals is

[3] Total book value of equity value is computed as the sum of common equity, minority interest and preferred equity as defined in the Bloomberg HSE terminal.

statistically different from zero. Test-statistics for two sub groups are tested using one tail z-test, in order to test for the direction of the sign as well. Results for aggregate news are tested by two-tailed test, since there is no prediction for their sign. The critical values of one and two tail z-statistic for 2.5%, 5% and 10% are also presented in the table.

H3: CAAR of good (bad) news is not significantly greater (less) than zero

The total number of analyzed events is 166. This is due to loss of observations when they the data for dividends for one year in a subsequent series of years are missing. In this case I don't know whether the data is actually missing or there was zero payout. In order not get biased results, these events and those happening the next year were excluded from the sample. As a result, 10 observations were dropped out.

	# of events
Good	101
Bad	65
Aggregate	166

	Good	**Bad**	**Aggregate**
CAAR (-10, 10)	1.01	0.46	1.06
CAAR (-5, 5)	1.31*	-0.19	0.84
CAAR (-1, 1)	1.74**[4]	-0.44	0.98

	Significance level		
	2.5%	**5%**	**10%**
Critical values Z (two tails)	2.24	1.96	1.64
Critical values Z (one tail)	1.96	1.64	1.28

Table 2

Statistics for naïve expectations classification

Positive signs of statistics for good news show that market reaction for dividend changes is positive, as predicted by maturity hypothesis. Test - statistic for CAAR (-

[4] By *, **, *** I mark test statistics significant at 10%, 5% and 2.5% significance levels respectively.

10, 10) is 1.01, which is less than1.28, critical value of 10% significance level. Thus, we can conclude that abnormal returns are not significant for 10-day interval around the announcement date. Statistics for CAAR (-5, 5) and CAAR (-1, 1) are 1.31 and 1.74 respectively, which makes them higher than critical values for 10% and 5% significance level. Note that abnormal returns are more significant for a small 1-day around event interval, which captures the immediate market reaction to news.

The signs of bad news statistics are somewhat ambiguous. There seems to be positive reaction captured by positive abnormal returns for 10-day time interval around event. This means that it is strongly insignificant. Result clearly contradicts the theory, and could have happened due to improper classification of events using naïve expectations. As shown below, modeled expectations successfully solve this problem. Statistics for CAAR (-5, 5) and CAAR (-1, 1) are -0.19 and -0.44 respectively and are both of negative sign, as expected. Both statistics are insignificantly different from zero at any chosen one-tail significance level. Thus, we can conclude that there are insignificant negative abnormal returns around bad news announcements.

Results for aggregate news are insignificantly different from zero for all lengths of chosen intervals, which was also expected.

Second, I modeled dividend expectations using method described in the previous section. The plot of CAARs using new classification is presented below in Figure 2.

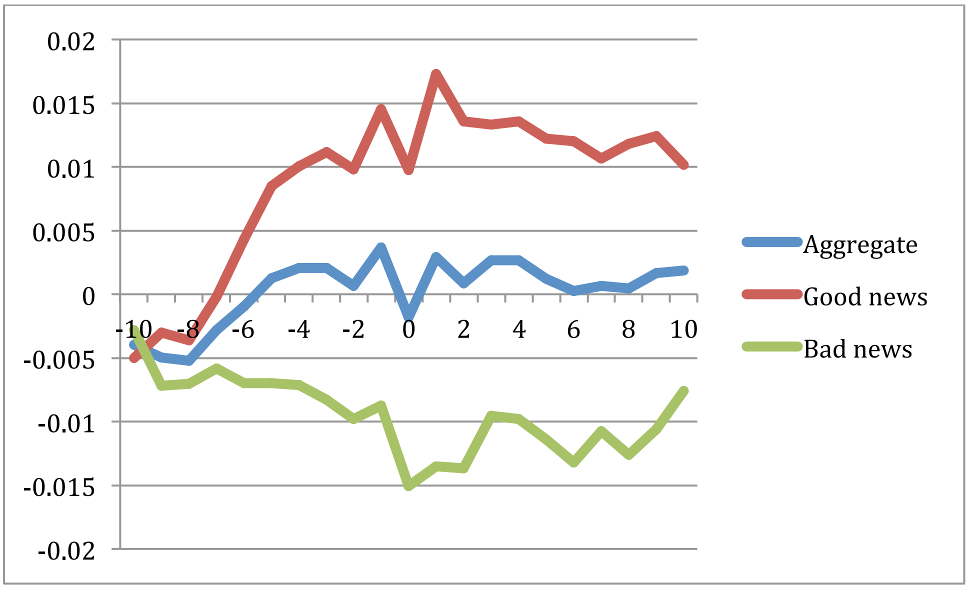

Figure 2

CAARs plot for modeled expectations

The new classification shows positive market reaction to unexpected dividend increases and negative reaction to unexpected decreases. There is a clearly seen increasing trend for good news and a decreasing trend for bad news, which is evidence in favor of dividends being a signal. The CAAR for bad news approximately -1.5% and CAAR for good news is approximately equal to 1% at the announcement date t = 0. This is in hand with empirical evidence of asymmetric reaction of the market to good and bad news (Michaely et al. (1995)). The graph for good news also shows evidence of private information leakage to the market from day -7 prior to announcement. Market adjusts during days -7 to -2 prior to announcement and abnormal returns cumulate by approximately 1.5% so that CAAR for -2 is 1%. Further, there are some fluctuations of returns, and the peak of positive trend is CAAR of 1.7% for 1 day after announcement. For negative news, there is almost no evidence of such leakage. To investigate the significance of observed trends, the analysis of statistics using new classification of events is produced. Results are presented in Table 3.

	# of events
Good	79
Bad	69
Aggregate	148

	Good	**Bad**	**Aggregate**
CAAR (10, 10)	0.71	-0.54	0.19
CAAR (-5 5)	0.77	-0.43	0.30
CAAR (-1, 1)	1.38*	-0.69	0.60

	Significance level		
	2.50%	**5%**	**10%**
Critical values Z (two tails)	2.24	1.96	1.64
Critical values Z (one tail)	1.96	1.64	1.28

Table 3.

Statistics for modeled expectations classification

Regression specified in equation (5) in the previous section was estimated for each of 34 firms. The total of 148 observations were obtained. The loss of events is explained by lack of data for explanatory variables for some of the firms. Statistics for good and bad news are of expected signs. For good news only CAAR (-1, 1) is significant at 10% significance level, since z-statistic 1.38 is greater than the critical value 1.28 for one tail test. CAAR (-10, 10) and CAAR (-5, 5) are 0. 71 and 0.77 respectively, which means that they are not significant at any chosen significance level.
Results of statistics of bad news are all insignificant. CAAR (-10, 10), CAAR (-5, 5) and CAAR (-1, 1) are -0.54, -0.43 and -0.69 respectively, which makes them insignificant at any chosen level. That is, although market perceives dividend decreases as negative news, the abnormal returns generated are still insignificant.
Results for aggregate statistics are positive and statistically indistinguishable from zero.

The results, although showing clear trends, are in general weakly significant. I find support only for significant abnormal returns for good news at 1 day around event interval. Results for bad news are fully insignificant.

To investigate whether market reaction is different for extreme cases, that is for dividend initiations and omissions, I provide brief description of results which show that there are significant positive (negative) abnormal returns for dividend initiations (omissions).

2.4.1 Analyzing dividend initiations

Test statistics dividend initiations are provided in Table 4 and the CAARs are plotted in Figure 3.

	Z stat
CAR (-10, 10)	1.18
CAR (-5, 5)	1.45*
CAR (-1, 1)	2.04***

Number of events	32

Table 4

Statistics for dividend initiations

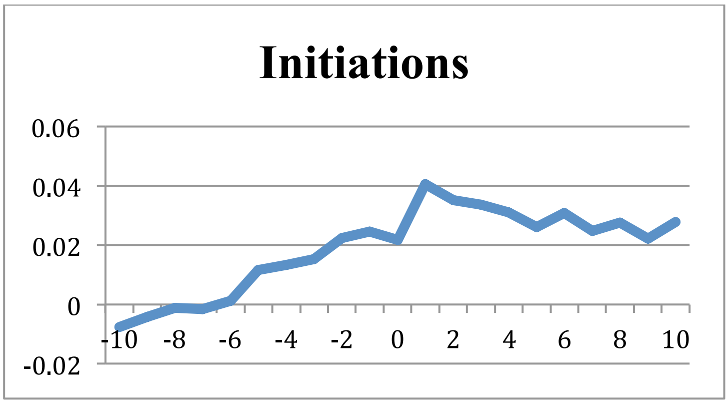

Figure 3

CAARs plot for dividend initiations

Market reaction seems to be more pronounced for dividend initiations, which are characterized by larger in magnitude changes in dividends. There is a significant 2% increase in abnormal returns reaction at day 1 after the announcement with CAAR being equal to 4%. Statistics also indicate that CAAR (-5, 5) and CAAR (-1, 1) are 1.45 and 2.04 respectively, which makes them significant at 10% and 2.5% respectively according to one tail test. Statistics for CAAR (-10, 10) is not significant at 10% but is still greater than 1, which in general makes it marginally significant. The effect of increase in abnormal returns is somewhat prolonged, which reflects that market slowly adjusts to positive news before the announcement date, like CAARs plot for good news in Figure 2, which could be the result of information leakage. To sum up, I have found support for significant and more strong positive market reaction for dividend initiations than for subsequent dividend increases.

2.4.2 Analyzing dividend omissions

Test statistics for dividend omissions are provided in Table 5 and the CAARs are plotted in Figure 4.

	Z-stat
CAR (-10, 10)	-0.56
CAR (-5, 5)	-0.89
CAR (-1, 1)	-0.57
CAR (0, 5)	-1.48*

Number of events	19

Table 5

Statistics for dividend omissions

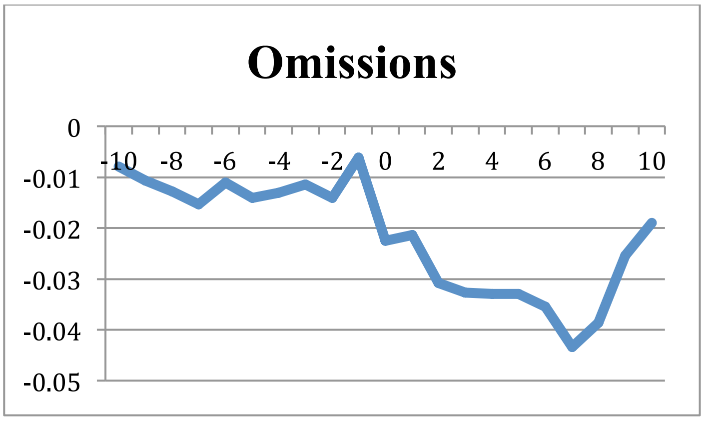

Figure 4

CAARs plot for dividend omissions

Dividend omissions show larger negative abnormal returns than dividend decreases. CAAR is -2.3% at time t = 0 and is -4.3% at time t = 7. The plot shows quick market reaction at the announcement date, which means that information is absorbed quickly by the market, as opposed to dividend initiations and subsequent increases. Statistics dividend omissions are larger than those for decreases in Tables 2 - 3, however CAAR are insignificant for three windows of 1, 5 and 10 days width. Statistics for CAAR (0, 5) of -1.48 is also given in this case to demonstrate that abnormal returns cumulated form the day of announcement are significant at 10% significance level, since 1.48 > 1.28. Overall, I find that results for omissions are more strong and larger in absolute value than those for dividend decreases, but still are not significant. The only significant cumulative abnormal return less than zero was found for time period from t = 0 to t = 5.

2.5 Summary of results for event study

Taking into account that dividends are not tax disadvantaged in Russia, signaling theory as formulated by John and Williams (1985) predicts that dividends cannot be used as a credible signal. Therefore, market should not response to unexpected dividend changes. I used two methods of classification events between "good" and "bad" news. Furthermore, I produced a separate analysis of extreme forms of dividend changes: initiations and omissions.

When Fama and Babiak's (1968) model was used to predict unexpected dividend change for event classification, the CAARs plot shows clear upward trend of abnormal returns for dividend increases and downward trend for decreases around the date of announcement. However, the significance of the trend is low in general. Particularly, dividend decreases showed negative abnormal returns (in most of the cases), which were never classified as significant in my analysis, using both naïve and modeled expectation approaches. Results for dividend increases are somewhat more significant. Using naïve expectations abnormal returns were significant at 10% and 5% significance levels for one tail z-test for 5 and 1 days time period around announcement date respectively. Under modeled expectations only abnormal returns for 1-day time period around announcement date were significant at 10% level. Note that the closer time interval centered at announcement date we take, the higher is the corresponding statistics and thus significance, in general. This means that most of the market reaction takes place at close intervals around the announcement. Larger intervals may include influence of other events on abnormal returns, which is, unfortunately, hard to control for. Results for initiations and omissions show more significant results, especially for dividend initiations. Test statistics for initiations are significant for 1 and 5 days intervals at 2.5% and 10% respectively. Abnormal returns for 10 days interval is marginally significant with test statistic being greater than 1. Abnormal returns for negative to and more than two times greater in magnitude than for other dividend decreases, but are still not significant. Result is only significant at 10% level for CAAR (0, 5), which captures the immediate response after the announcement.

To sum up, the results show that dividend announcements contain information to the market. CAARs plots indicate that there is some market reaction due to dividends announcements, although this reaction is not significant in most cases. Out of 19 test statistics provided in the Tables 2 – 5 only 6 are statistically significant and reject the null hypothesis that abnormal returns are equal to 0. However, there is evidence of presence of significant market reaction for dividend initiations, omissions and increases at some time intervals. Thus, we cannot state that dividends are completely uninformative even when they are not tax disadvantaged.

3. The analysis of informational content of dividend announcements

The informational content of dividends is going to be tested the following way. First, I present a model which is designed to describe the manager's choice of dividend policy as described by the change in dividend per share as a function of individual characteristics of a firm. These will include changes in current and expected future profitability, current systematic risk of a firm, investment opportunity set and a set of control variables for firm's capital structure and liquidity position. The model will be analyzed from the point of view of signaling and maturity hypotheses. If market participant are assumed to realize these relationships between dividends and those factors, this should be reflected in corresponding market reaction around the announcement dates. Thus, my next step is to apply those factors in a model that explains the market reaction as captured by abnormal returns. I expect that market reaction will be explained, at least in general, by the factors which affect management's policy choice.

In this section I specify the variables used in these two models, provide a brief description of them, formulate hypotheses according to the empirical literature studied and present the results of regression analysis.

3.1 Overview of variables

3.1.1 Dividends

In this paper, I primarily focus on the dividend change, rather than its level, since the dividend policy of a firm is more concerned with the first, as stated by Lintner (1956). To measure dividend change I use change in dividend yield, calculated as difference between current dividend per share deflated by current price and one period lagged dividend per share deflated by past price. For each announcement date, change in yield was calculated as follows:

$$dDPSpp = \left(\frac{DPS_0}{P_0} - \frac{DPS_{-1}}{P_{-1}}\right), \quad (1)$$

Where P_0 – previous month end stock price in current period

P_{-1} – previous month end stock price in the previous year

Previous month end price for deflation was used in the work Amihud and Murgia (1997). Such prices do not incorporate market reaction to dividend changes.

Following the results of my event study, I expect changes in dividends to positively affect abnormal returns around the announcement dates.

3.1.2 Profitability

It is important to correctly measure profitability of the firm, in order to get the right relationship. After analysis of empirical papers on my subject I decided to use EBITDA. As argued by Barber and Lyon (1996), operating income is a better measure of profitability since it is not sensitive to changes in capital structure and not affected by special items before taxes. Next, book value of equity was used to deflate earnings, to control for measurement errors resulting from deflating by market value, when modeling future unexpected changes under assumption that earnings at time t are unrelated to earnings at (t-1), as argued by Nissim and Ziv (2001).

Current and one period ahead earnings changes are calculated as:

$dEbitdaTeq_t = \frac{Ebitda_t - Ebitda_{t-1}}{Teq_{t-1}}$, (2), for t = 0, 1. Where Teq is the book value of equity, calculated as sum of common, preferred equity and minority interest.

I also tried alternative measure of abnormal future change in profitability as specified in the work of Grullon et al. (2002)[5] to account for long run earnings prospects of the firm:

$dEbitda22 = \frac{dEBITDATeq_2 + dEBITDATeq_1}{2} - \frac{(dEBITDATeq_{-2} + dEBITDATeq_{-1})}{2}$, (3), where the terms of the formula reflect the average of one and two period ahead changes in profitability less the average of one and two period lagged changes in profitability.

According to the observed empirical literature, I expect changes in current profitability to positively affect manager's decision of dividend policy, like it was shown in the paper of Benartzi et al. (1997), and thus I expect it to have positive effect on market prices. The same work of Benartzi et al. (1997) and the work of Grullon et al. (2002) show the negative relationship between future earnings growth and current dividend changes. Thus, I expect increases in future earnings to negatively affect dividend policy and thus have a negative impact on abnormal returns.

[5] Grullon et al. (2002) in his work used ROA instead to measure profitability and used three period averages instead of two. In this paper I use two-period lagged averages to save observations, since the overall span of time period studied in my work is smaller.

3.1.3 Systematic risk

As pointed out in maturity hypothesis literature dividends bring information not only of future cash flows of the firm but also of its systematic risk. Two measures of systematic risk were used in this paper:

1) Change in current risk premium, which is computed as the product of firms beta coefficient and current market risk premium. Risk premium for individual firm was calculated based on CAPM:

   $$Rprem = \beta * (Rm - Rf)$$

   Where beta is the applied beta coefficient of a stock, Rm – market return of the MICEX index and Rf – return on 10 year Russian Government bond[6]. Such measure of risk was used in the work of Grullon et al. (2002).
2) Change in beta coefficient, where beta is defined as percentage change in the price of an equity given a one percent change in market portfolio and is taken from the formula above. As mentioned in the work of Rozeff (1982), beta coefficient is also an appropriate measure of individual stock systematic risk.

Based on empirical papers on maturity hypothesis, I expect increase in dividends to signal reduction in firm's systematic risk, thus there is a negative relationship. So a reduction in firm's systematic risk as reflected by dividend increase at the time of announcement will have a positive effect on abnormal returns.

3.1.4 Investment opportunities

1) As discussed in the paper of Yoon and Starks (1995), Q-Tobin ratio can capture market valuation of firm's growth opportunities. Firms with high Q-Tobin ratio are engaged in firm's value maximizing investment projects, at their times of high growth. Thus shareholders would expect dividends to be lower for those firms. Alternatively, if firm's Q ratio is low, it is overinvesting and invests in projects of poor quality. Shareholders of such firms expect

[6] Data was downloaded from Bloomberg HSE terminal. Description of it was obtained from Bloomberg Customer Help Service. Applied beta is defined as percentage change in the price of an equity given a one percent change in market portfolio. Return on MICEX index is calculated as a market cap-weighted average of the member stocks' Internal Rate of Returns (IRRs). The formula for IRR for each individual stock is given at the end of this paper in Appendix section.

dividends to decrease, to avoid wastage of retained earnings. Formula for Q-Tobin is:

$$Q = \frac{(Market\ Cap + Liabilities + Preferred\ equity + Minority\ interest)}{Total\ assets}$$

Dummy for firms, which are underinvesting (Q > 1), is used in CAARs analysis. According to maturity hypothesis shareholders will positively react to dividend increases for firms with Q < 1. Alternatively, for firms with high rates of growth it is optimal to cut dividends, so only in this case reaction will be positive.

2) An alternative measure of firm's change growth opportunities used in this work is price to book ratio, which is equal to:

$$dMBV = \frac{Market\ capitalization_0}{Total\ book\ value\ of\ Equity_0} - \frac{Market\ capitalization_{-1}}{Total\ book\ value\ of\ Equity_{-1}}$$

Price to ratio also reflects market's appraisal of firm's future prospects and applies the same intuition in separating firms according to their investment opportunities as Q ratio. Its change will be used in modeling dividend policy of the firm, since it is highly correlated with Q ratio and has advantage of being deflated by total book value of equity. The last is important, since for proper specification of the model gross variables have to be scaled by the same value in general.

3) If we assume that firms spend retained earnings either on dividend payments or capital expenditures, than dividend policy can tell about firm's spending on purchasing new assets and upgrading the existing ones. When dividends increase, CAPEX of the firm decreases. In the light of maturity hypothesis, market will react positively only when overinvesting firms decrease their capital expenditures or when underinvesting firms increase them. Change in CAPEX as a percent of total book value of equity is used for this purpose.

$$dCAPEXTeq = \frac{CAPEX_0}{Teq_0} - \frac{CAPEX_{-1}}{Teq_{-1}}$$

Where *Teq* is the book value of equity.

3.1.5 Control variables

By accounting for variables responsible for other parameters than described above I will be able to get better results in modeling dividend policy of a firm. First of all, I capture the effect of capital structure in my analysis. To do this I choose firms total liabilities to total book value of equity as a proxy for firm's capital structure.

$$TlTeq = \frac{Tl}{Teq}$$

As Rozeff (1982) suggests, high amount of debt makes firm's transaction costs high, thus it will cut dividends to avoid further external financing. Thus, the relation ship between the changes in firm's leverage ratio is negatively related to dividends.

It was stated by Kalay (1982) that dividend changes might convey information to the market about firm's ability to cover its debt liabilities. However, it is out of scope of my work to study this relationship in more detail, so leverage ratio is only used as a control variable in my work.

Also, to capture firm's liquidity position I use quick ratio, which is defined as firm's current assets less inventory deflated by firm's current liabilities.

$$QR = \frac{CA - Stock}{CL}$$

The higher liquidity position of a firm is characterized with higher quick ratio. It reflects how well firm's most liquid assets cover current liabilities. It is important in analyzing short-term debt position of a firm. Therefore, I expect a positive relationship between dividends and changes in firm's liquidity position.

3.2 Model for change in dividends

The following set of hypotheses for dividend change model is listed:

H1: Current profitability positively affects dividends, as suggested by the work Miller and Rock (1985).
H2: Future earnings negatively affect current dividend decision, as shown in the work of Benatrzi et al. (1997).
H3: Firm's risk is negatively related to dividends, as postulated in empirical paper on maturity hypothesis by De Angelo et al. (2006).
H4: Change in dividend yield negatively depends on firm's investment opportunities, as it was shown in the work of Grullon et al. (2002).

For two control variables the following hypothesis are formulated:
H5: Leverage of the firm negatively affects dividends of a firm, as suggested in the work of Rozeff (1982).
H6: Better liquidity position of the firm positively affects its dividend payouts.

The above relationships are being tested using the following model specification.

$$dDPSpp = f(dEbitdaTeq, dEebitda22, dBeta, dTlTeq, dQR, dMBV)$$

Change in beta was chosen to represent change in current systematic risk, and market to book ratio to control for investment opportunities.

First, I perform standard tests for panel data structure[7]. I begin with estimating FE model for this specification. Wald F-statistic is 93.48 with p-value being zero, which shows that FE model outperforms pooled OLS regression. The next step is to check Lagrange multiplier test by estimating RE model. Lagrange multiplier test shows that pooled OLS regression outperforms RE model, since the chi square statistic is 0.05 with corresponding p-value 82.65%. The last check is Huasman test to compare FE with RE model. The chi square statistic being equal to 1.97 and corresponding p-value being equal to 85.35%, I conclude that RE model is preferred over FE model. Results of the tests are ambiguous, since one model always outperforms the other. This could have resulted from violation of conditions for one the tests, and it is impossible to detect for which test particular. I make my decision on Huasman test, in order to account for panel structure of my data. Thus I use RE model to explain the significance of relationship between variables in this specification.

[7] From hereafter FE – fixed effects model, RE – random effect model.

Results are presented in the Table 6. Coefficient of changes in dividends to changes in current profitability is positive, as expected, with p-value 4% and thus significant at 5% significance level. Coefficient of unexpected future changes in profitability is negative with p-value of 2.7%, being also significant at that level. Coefficient of changes in dividends to changes in systematic risk, as measure by beta, is negative and highly significant with p-value of 0. Taken together, the last two results provide support for maturity hypothesis. The coefficient of price to book ratio is negative, as expected, although not significant, since its p-value is 13.3%. Thus there is only weak significance that firms with low growth opportunities tend to payout more dividends, as suggested by maturity hypothesis. The coefficient of control variable for firms change in current liquidity is positive, as it was expected, with p-value of 3.8% and thus significant at 5% level. Control variable for change in firm's capital structure on the other hand turned out to be insignificant under this specification.

```
. xtreg ddpspp dbeta debitdateq debitda22 dtlteq dqr dmbv, re

Random-effects GLS regression                   Number of obs      =        27
Group variable: tiker1                          Number of groups   =         9

R-sq:  within  = 0.6379                         Obs per group: min =         1
       between = 0.1033                                        avg =       3.0
       overall = 0.0176                                        max =         6

Random effects u_i ~ Gaussian                   Wald chi2(6)       =     24.86
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0004
```

ddpspp	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
dbeta	-.0309988	.008684	-3.57	0.000	-.0480192	-.0139784
debitdateq	1.205831	.5882516	2.05	0.040	.0528787	2.358783
debitda22	-1.783762	.8047959	-2.22	0.027	-3.361133	-.2063909
dtlteq	.0001294	.0000951	1.36	0.173	-.0000569	.0003157
dqr	.0022983	.0011063	2.08	0.038	.0001299	.0044667
dmbv	-.0058919	.0039179	-1.50	0.133	-.0135709	.001787
_cons	-.0301787	.0425222	-0.71	0.478	-.1135206	.0531633
sigma_u	.13449821					
sigma_e	.00810902					
rho	.99637817	(fraction of variance due to u_i)				

Table 6

Result of estimating dividend change model using random effects

To sum up, the above model for change in dividends shows strong support for maturity hypothesis. A 1% increase in current earnings leads to 1.2% increase in dividend yield. Decreases in systematic risk and future earnings by 1% leads to 0.3% and 1.7% decreases in dividend yield, respectively. Thus, when firms experience decline in risk accompanied with decrease in future earnings, they tend to increase dividend yields to signal this news to the market. Coefficient of proxy for investment opportunities has negative sign as expected but is insignificant. If market rationally understands this relationship, it should act accordingly at the times of dividend announcements. This hypothesis is going to be tested in the next section in more detail.

3.3 Analysis of market reaction to dividend changes

The following set of hypotheses for analysis of abnormal returns is listed, accounting for the discovered relationships in the dividend change model:

H1: Changes in dividends positively affect CAARs, as shown in the works of Amihud and Murgia (1997) and Pettit (1972).

H2: Current profitability positively affects CAARs, as suggested by the work of Miller and Rock (1985).

H3: Future earnings negatively affect CAARs, as shown in the work of Benartzi et al. (1997).

H4: Firm's risk is negatively affects CAARs, consistent with empirical findings of Grullon et al. (2002).

H5: Market should react positively for dividend increases of firms with low Q ratio and dividend decreases for firms with high Q ratio, basing on classification of firms suggested by Lang and Litzenberger (1989) and applying the empirical finding on maturity hypothesis.

H6: Market should react positively for decreases in CAPEX for firms with low Q ratio and increases in CAPEX for firms with high Q ratio, assuming that firm's decision of dividends is directly related to it's choice of amount of investment in the current period.

H7: CAARs' sensitivity to dividend yield changes for dividend initiations and omissions is the same as for other dividend announcements, as suggested by Asquith and Mullins (1983).

This time I also include the change in dividend yield as additional factor, since it may convey information beyond that captured by changes in earnings, risk and investment opportunities, as noted by Pettit (1972) for earnings changes. For this analysis I also use one period ahead change in earnings to account for different measures of changes in future profitability. To test for different market reaction for changes in dividends for over and underinvesting firms, a slope dummy variable *dDPSppDQ,* which is the product of change in yield and dummy for high Q-Tobin firms, was introduced. Thus, I expect to get positive elasticity of abnormal returns to dividend yield, negative with respect to systematic risk and future profitability. Overinvesting firms are expected to decrease their dividends yields to signal good news to the market.

Analysis shows that market reaction as captured by CAARs on a 10-day interval around the announcement is significantly explained by changes in current and future profitability, changes in risk and changes in dividends. Wald test with F-statistic 0.36 and p-value of 92.8% and Lagrange multiplier tests with chi square statistic of 0.57 and p-value of 44.98% both show that simple OLS is preferred both FE and RE model so the relationship was tested using pooled OLS regression. Despite using panel data set, there could be a problem of lack of observations, due to limited data set. Thus, in some cases, tests show that simple pooled OLS regression performs better. After conducting the Breusch-Pagan test for heteroscedasticity I get the chi square statistic of 11.03 with p-value of 0, which means that I reject the null hypothesis of constant variance for this specification. Thus, I use robust standard errors to estimate relationship. The estimated output is presented in Table 7 below.

From the output observed we see that the most significant variables are changes in dividend yield with p-value of 0 and changes in systematic risk premium with p-value of 1%, being significant at 2.5% level. They have positive and negative coefficients respectively. Note that the significant positive slope coefficient of change in yield represents the sensitivity of market reaction for overinvesting firms, with Q-Tobin ratio lower than 1. This shows that market indeed reacts positively to dividend increases made by such firms, as predicted by maturity hypothesis. Thus, the relationship is identical to what was expected.

```
. reg car10 ddpspp debitdateq debitdaf1teq drprem ddpsppdq, robust

Linear regression                                      Number of obs =      36
                                                       F(  5,    30) =   28.58
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.1426
                                                       Root MSE      =  .24997
```

car10	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
ddpspp	1.374335	.1699188	8.09	0.000	1.027315	1.721356
debitdateq	1.444291	1.065489	1.36	0.185	-.7317275	3.620309
debitdaf1teq	-1.100086	1.902126	-0.58	0.567	-4.984745	2.784574
drprem	-2.179532	.7978085	-2.73	0.010	-3.808874	-.5501897
ddpsppdq	-.4176178	1.176416	-0.35	0.725	-2.820179	1.984944
_cons	.0496497	.0404702	1.23	0.229	-.0330014	.1323008

Table 7

Result of estimating model for CAAR (-10, 10) using pooled OLS regression with robust standard errors

Changes in profitability have expected signs, but are both insignificant. The sign of slope dummy variable for investment opportunities is negative, as expected, reflecting the possible higher sensitivity of abnormal returns to decreases in dividend yield by underinvesting firms, but the coefficient is insignificant, meaning that for underinvesting firms the sensitivity of abnormal returns to changes in dividend yield is the same as for overinvesting firms. This means that market on average reacts identically to changes in dividend yield for both types of firms. This contradicts maturity hypothesis, as the market fails to distinguish the importance of different changes in dividends by the two types of firms.

Next, I change this specification a bit and drop the most insignificant variable form the analysis, the slope dummy variable, and running the regression for the whole sample of firms. Result is presented in Table 8 below.

```
. reg car10 ddpspp debitdateq debitdaf1teq drprem, robust

Linear regression                                      Number of obs =      44
                                                       F(  4,    39) =   17.65
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.1186
                                                       Root MSE      =  .22938
```

car10	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
ddpspp	1.253407	.3651862	3.43	0.001	.5147481	1.992066
debitdateq	1.316388	.5158585	2.55	0.015	.2729659	2.359811
debitdaf1teq	-1.384477	.7989253	-1.73	0.091	-3.000455	.2315023
drprem	-1.311932	.8022194	-1.64	0.110	-2.934574	.3107098
_cons	.036889	.0368288	1.00	0.323	-.0376043	.1113823

Table 8

Result of estimating model for CAAR (-10, 10) using pooled OLS regression with robust standard errors (after dropping insignificant variables)

The improved specification shows positive relationship of abnormal returns to changes in current dividend yield, meaning that market reaction is positive, for two types of firms. The significance of current changes in risk premium has decreased a bit. Now with p-value of 11% it is significant only at 15% level, however with t-statistic of -1.64 the relationship is marginally significant. The changes in current and one period ahead future profitability are both significant at 2.5% and 10% level with p-values of 1.5% and 9.1% respectively. Thus market reaction to these variables is now highly significant and accompanied with reaction for decreases in systematic risk shows strong support for maturity hypothesis.

To enrich my analysis I add slope dummy variables for dividend changes in time of initiations, *dDPSppInit,* and slope dummy variable for omissions, *dDPSppOmis,* which are the product of change in dividend yield with corresponding dummy variable being equal to 1 in case the dividend announcement is initiation/omission. Results show significant lower coefficient for changes in yield for times of initiations and are presented below, while results for omissions are insignificant and are presented in Stata output section.

As suggested by Asquith and Mullins (1983), higher market reaction observed in empirical findings due to larger in magnitude of changes in dividends, captured entirely by change in dividend yield. They show that sensitivity of market to such announcements is the same if not lower for dividend initiation. Thus I expect the coefficient to be insignificant or negatively significant.

```
. reg car10 ddpspp debitdateq debitdaf1teq drprem ddpsppinit, robust

Linear regression                                      Number of obs =      44
                                                       F(  4,    38) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.1212
                                                       Root MSE      =  .23202
```

car10	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
ddpspp	1.26465	.373174	3.39	0.002	.5091987	2.020101
debitdateq	1.309818	.5243458	2.50	0.017	.2483348	2.3713
debitdaf1teq	-1.413299	.7905307	-1.79	0.082	-3.013644	.1870471
drprem	-1.360525	.8331098	-1.63	0.111	-3.047068	.3260173
ddpsppinit	-.1256246	.0697171	-1.80	0.079	-.2667595	.0155103
_cons	.0392423	.0385354	1.02	0.315	-.0387687	.1172532

Table 9

Result of estimating model for CAAR (-10, 10) using pooled OLS regression controlling for announcement of initiations with robust standard errors

The second is true, as shown in Table 9. The p-value of slope dummy variable for initiations has p-value of 7.9% being significant at 10% level. The coefficient is negative, reflecting that a 1% increase in dividend yield leads to on average to -0.13% lower abnormal returns for initiations than for subsequent dividend changes. Thus, the abnormal returns of 4% for initiations above 2% for other dividend increases observed in Event Study section are explained by larger magnitude of change in dividends and not superior informational content of dividend initiations.

An alternative specification to measure firm's level of investments is also provided. Assuming that agents can distinguish between under and overinvesting firms, we add change in capital expenditures on new investment as measure by CAPEX deflated by firm's total book value of equity. *dCAPEXteqDQ* is the slope dummy variable for firms with high Q-Tobin ratio. I expect negative market reaction for firms which are overinvesting and which increase their capital expenditures even further. Vice versa, for firms with high Q-Tobin ratio, capital expenditures increases must bring positive market reaction. By including these variables plus control for abnormal change in future profitability and current change in beta coefficient I can distinguish market reaction for two types of firms. Thus, I run the specification presented in Table 10 below.

I was unable to produce tests for panel data structure due to insufficient observations, as shown in the Stata output section. Thus I run pooled OLS regression and check for the presence of heteroscedasticity.

```
. reg car10 dcapexteq dcapexteqdq debitda22 dbeta

      Source |       SS       df       MS              Number of obs =       9
-------------+------------------------------           F(  4,     4) =  149.07
       Model |  1.70458893     4  .426147231           Prob > F      =  0.0001
    Residual |    .0114345     4  .002858625           R-squared     =  0.9933
-------------+------------------------------           Adj R-squared =  0.9867
       Total |  1.71602343     8  .214502928           Root MSE      =  .05347

------------------------------------------------------------------------------
       car10 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   dcapexteq |  -2.255281   .1008398   -22.36   0.000    -2.535257   -1.975304
 dcapexteqdq |   2.140073    .135005    15.85   0.000     1.765239    2.514907
   debitda22 |  -4.037878   .7929882    -5.09   0.007    -6.239566    -1.83619
       dbeta |  -.3113466   .1013481    -3.07   0.037     -.592734   -.0299592
       _cons |   .0386812   .0247327     1.56   0.193    -.0299878    .1073502
------------------------------------------------------------------------------
```

Table 10

Result of estimating model of alternative model for CAAR (-10, 10) using pooled OLS regression

No heteroscedasticity was detected due to large p-value of the test being equal to 72.13%. Thus I use standard errors to estimate pooled OLS regression. If the estimates of regression are correct under this specification, we observe highly significant coefficients for all variables at 5% significance level. Changes in future profitability and current risk have negative signs as expected and described above. A 1% increase in capital expenditures by overinvesting firms leads to -2.25% decrease in abnormal returns, while the corresponding decrease for underinvesting firms is -0.09%. Results suggest that market reaction for firms, which overinvest and further increase their capital expenditures on buying new assets, is strong and negative. On the other hand, market reaction for underinvesting firms, which increase their capital expenditures, is almost around zero, being significantly negative, though.

The same time of analysis was performed for abnormal returns at 5 and 1-day interval around the announcement dates. Results of the tests and outputs are presented in the Stata Output section, while here I merely discuss the results.

Simple OLS model was chosen for 5-day interval abnormal returns. F-statistic of Wald test is 0.7 with p-value of 68.54% indicating that OLS performs better than FE model. Chi square statistic for Lagrange multiplier test is 1.06 with p-value of 30.28% indicating that OLS is preferred over RE model. The robustness check for heteroscedasticity yields p-value of 4%, which represents the presence of heteroscedasticity at 5% significance level. Results for 5-day window are presented in Table 11 below.

```
. reg car5 ddpspp debitdateq debitdaf1teq drprem ddpsppdq ddpsppomis ddpsppinit, robust

Linear regression                                      Number of obs =      36
                                                       F(  6,    28) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.2672
                                                       Root MSE      =  .07508
```

car5	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
ddpspp	.7376891	.064493	11.44	0.000	.6055813	.8697969
debitdateq	.6304596	.1803914	3.49	0.002	.2609447	.9999745
debitdaf1teq	.0324472	.353895	0.09	0.928	-.6924739	.7573683
drprem	-.8321426	.6984724	-1.19	0.244	-2.262898	.5986132
ddpsppdq	-.1341605	.8510101	-0.16	0.876	-1.877376	1.609055
ddpsppomis	.065496	.9575105	0.07	0.946	-1.895875	2.026867
ddpsppinit	-.085668	.0328641	-2.61	0.014	-.1529871	-.0183489
_cons	.0088547	.0155758	0.57	0.574	-.023051	.0407604

Table 11

Result of estimating model for CAAR (-5, 5) using pooled OLS regression (controlling for initiations and omissions) with robust standard errors

Only coefficients of changes in current profitability and current dividend yield have positive as expected signs and are highly significant. Neither risk nor future profitability seems to affect abnormal returns in 5 day around the event time interval. Slope dummy variable for underinvesting firms is also highly insignificant, meaning that market symmetrically react to changes in dividend yield by two types of firms. Among the two slope dummy variables for initiations and omissions, again, only the first one is significant with negative sign, reflecting lower elasticity of abnormal returns to changes in dividends in case of dividend initiations.

Analysis of alternative model using changes in CAPEX as presented in Table 12 shows the same results as for abnormal returns on a 10-day interval around the announcement dates. Coefficients are of expected sign for all variables included, with only coefficient of changes in risk being insignificant. Other coefficients are significant either at 5% or 10% level, as reflected by corresponding p-values. Slope coefficient for overinvesting firms is negative as expected, like in model for CAARs at 10-day interval. Slope coefficient for underinvesting firms is around -0.02, which is higher than for overinvesting firms. Again, we can conclude that market reaction is strong and persistent for changes in capital expenditures by overinvesting firms, while there is almost no reaction for corresponding changes by underinvesting firms.

```
. reg car5 dbeta debitda22 dcapexteqdq dcapexteq

      Source |       SS       df       MS              Number of obs =       9
-------------+------------------------------           F(  4,      4) =    5.40
       Model |  .088283826     4  .022070956           Prob > F      =  0.0657
    Residual |   .01635985     4  .004089962           R-squared     =  0.8437
-------------+------------------------------           Adj R-squared =  0.6873
       Total |  .104643676     8  .013080459           Root MSE      =  .06395

------------------------------------------------------------------------------
        car5 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       dbeta |  -.2050846   .1212262    -1.69   0.166    -.5416626    .1314934
   debitda22 |  -2.425365   .9485228    -2.56   0.063    -5.058886    .2081564
 dcapexteqdq |   .4275314   .1614845     2.65   0.057    -.0208215    .8758843
   dcapexteq |  -.4474752   .1206183    -3.71   0.021    -.7823652   -.1125852
       _cons |   .0333465   .0295837     1.13   0.323     -.048791     .115484
------------------------------------------------------------------------------
```

Table 12

Result of estimating of alternative model for CAAR (-5, 5) using pooled OLS regression

Results for CAARs around 1-day interval around the date of announcement are the least significant. With p-values for Wald and Lagrange multiplier tests being 35.96% and 22.58% respectively, I estimate the standard specification with OLS regression. With p-value of 53% for constant variance check I conduct that heteroscedasticity does not present in for this specification. The only variable, which is significant at 5% significance level, is one period ahead future change in profitability. Neither of slope dummy variables appears to be significant and any reasonable level. After trying various specifications for the model I conclude that the market reaction for dividend announcements for 1-day window is explained solely by changes in one period ahead profitability. All other variables appear to be highly insignificant, even the change in dividend yield itself. This means that dividends do not contribute information beyond that already contained in one period ahead earnings announcement. An alternative model for changes in CAPEX showed a negative and significant coefficient for unexpected change of future long run earnings with p-value 6.7% being significant at 10% level. Both the change in CAPEX itself and corresponding dummy variable was insignificant.

3.4 Summary of analysis of informational content of dividends

To sum up the results for analysis of market reaction around the dates of announcements, I find strong support that dividends convey new information to the market at 10-day interval around the dates of announcements, less significant support for 5-day interval and almost no support at 1-day interval.

At 10-day interval market positively reacts to changes in current profitability and negatively to changes in systematic risk and future profitability, which were shown in the previous section to be reflected through changes in dividend policy. The current changes in dividends itself are also highly significant, positively affecting abnormal returns. This suggests that dividends convey information beyond that contained in news about firms profitability and risk. Slope coefficient for initiations is lower for 10 and 5-day intervals, indicating lower sensitivity of abnormal return to changes in dividend yields around the dates of initiation. Market reaction for increases in dividends and decreases in CAPEX is strong and negative for overinvesting firms for both 10 and 5-day intervals. For underinvesting firms one specification provides no support for a different market reaction, while the other shows that changes in CAPEX almost do not change abnormal returns. The first could explanation is that market fails to distinguish which firms experience rapid growth and which do not and act and act as if all firms are underinvesting. The second is that market highly monitors the actions of big firms with low investment opportunities, while the dividend policy of young and fast growing firms is indifferent to them. Analysis of CAARS for 5-day interval showed strong market reaction to current changes in earnings and dividend yields. This result also shows that dividends convey information to the market beyond that contained in current earnings, consistent with findings of Healy and Palepu (1988) and Amihud and Murgia (1997). Other parameters like changes in risk and future profitability are not reflected in abnormal returns. Analysis of CAARs for 1-day interval shows that market reaction is explained solely by changes in future earnings. Dividend change in yield is itself insignificant, meanings that it brings no other news to the market than those about future profitability, as reflected by dividend model.

Conclusion

The review of existing literature on dividend payout policy under asymmetric information showed that since dividends are not tax disadvantaged relative to capital gains under current Russian tax scheme, signaling theory of John and Williams (1985) predicts that dividend changes are uninformative to the market. The recent work of Amihud and Murgia (1997), however, shows that market positively reacts to dividend increases in Germany, where dividends are also not tax disadvantaged. Furthermore, dividend-signaling models predict that dividend increases reflect increase in future earnings as expected by managers, thus revealing its high quality. Empirical findings on this subject presented in the works of Healy and Palepu (1988) and De Angelo et al. (1996) show reverse relationship to that suggested by signaling hypothesis, suggesting that dividend signaling theory is largely inconsistent with reality. Maturity hypothesis, on the other hand, formulated by Grullon et al. (2002) and De Angelo et al. (2006), provides more support for empirical findings, but does not specify why exactly dividends can be used as a signal.

For event study analysis it was expected to get no significant reaction for dividend changes. However, analysis under modeled dividend expectations by the market used for event classification shows that there is a clearly observed increase in abnormal returns around the dates of dividend increases and decrease in returns for dates of dividend decreases. Dividend increases generate significant at 10% level abnormal returns calculated for a 1-day window around the event. Results for dividend initiations and omissions also show clear patterns of market adjustment to news around event. Cumulative abnormal returns for initiations are significant at 10% for 5-day time interval and at 2.5% for 1-day interval around the event. Omissions also show significant at 10% negative cumulative abnormal returns. Significant results for dividend increases, initiation and omissions contradict signaling hypothesis, and coincides with market reaction for such events in developed countries with different to Russia tax scheme as shown in the works of Michaely et al. (1995) and Pettit (1972).

Further, from the analysis of the determinants of dividend policy in Russia, it follows that managers take into account information about firm's current and future profitability, risk and liquidity position. Managers' decision positively depends on changes in current earnings, consistent with Miller and Rock (1985) model, and negatively on changes in expected long run earnings and current risk consistent with the works of Benartzi et al. (1997) and Grullon et al. (2002). Influence of changes in current liquidity position of a firm, as a control variable, is also positive. Proxy for investment opportunities of the firm has negative as expected sign but is weakly significant, meaning that low support for influence of investment opportunities on dividend policy was found.

Abnormal returns around dividend announcements were analyzed using two different specifications. Returns tend to be fully explained by determinants of dividend policy on a 10-day interval around the date of announcement. Market reaction is positive to changes in current earnings and negative to changes in future earnings and risk, as it was expected from the results for dividend change model. One specification shows that markets fails to distinguish between under and overinvesting firms and reacts positively to change in dividends by both types of firms, clearly inconsistent with maturity hypothesis. Change in dividend has positive and significant sign, representing that it yields more information to the market than that represented by changes in earnings prospects, risk and investment opportunities. Another specification, which analyses market reactions with respect to changes in capital expenditures by the two types of firms, shows that market reacts negatively to increases in investments by overinvesting firms, but almost does not react to changes in capital expenditures by underinvesting firms. Such empirical findings are more consistent with free cash flow hypothesis of Lang and Litzenberger (1982) than with predictions of maturity hypothesis. Test of informational content of dividend initiations and omissions shows that non of these events provides superior information over common dividend change announcements, and sensitivity of market reaction to dividend initiations is even lower than to subsequent changes, which coincides with results of Asquith and Mullins (1983). The same type of analysis was provided for 5 and 1-day around the event time intervals. Results for 5-day window show strong positive relationship between abnormal returns and changes in current profitability and dividends and the same result for dividend initiation events as for 10-day window. Risk was found to be uninformative at this time interval. For investment opportunities both specifications provided the same results as for 10-day window.

Results for 1-day window were the most insignificant, indicating that only news about future profitability affect abnormal returns for this window. Current profitability, risk, investment opportunities and the dividend change itself were insignificant under these specifications.

To sum up, the results suggest of event study that dividend announcement by Russian firms generate significant abnormal returns, at least for 1 and 5-day event windows around announcement date for dividend increases, initiations and omissions, with cumulative abnormal returns for 10-day window being insignificant. Dividend change model in turn shows that dividends are directly related to firm’s risk, current and future profitability and investment opportunities, as suggested the maturity hypothesis. Further analysis however showed that the dividend change is only able to explain insignificant abnormal returns for 10-day time interval. This means that, if my results are not biased by improper specification of applied models, then there should be factors other than those specified by maturity hypothesis, which generate significant abnormal returns around the dividend announcement. This could be information about firm’s ability to cover its debt, as mentioned by Kalay (1982). However, a separate study is required to test whether dividends bring such news to the market. Results can also be improved by constructing a more balanced panel with a larger number of observations included. Also, one could choose different estimation window and model for event classification and compare the results with those that are presented in this paper.

Bibliography

1. Al – Malkawi H.-A. N., Rafferty M., Pillai R. (2010), "Dividend Policy: A Review of Theories and Empirical Evidence", *International Bulletin of Business Administration*, Issue 9, 171 – 200
2. Allen F., Michaely R. (2003), "Payout policy", in: Handbook of the Economics of Finance, Edited by G. M. Constantinides, M. Harris and R. Stulz, (Ch. 7), Elsevier
3. Amihud, Yakov, and Maurizio Murgia, (1997): Dividends, Taxes, and Signaling: Evidence from Germany, *Journal of Finance,* 52, 397-408.
4. Asquith P., and D. W. Mullins Jr (1983): The impact of initiating dividend payments on shareholders' wealth, *Journal of Business,* 56 (1): 77-96.
5. Barber, B. M., and Lyon, J. D. (1996), "Detecting abnormal operating performance: The empirical power and specification of test statistics", *Journal of Financial Economics*, 41 (July): 359–99.
6. Bekaert G. and Harvey R. (2002), "Research in emerging markets finance: looking to the future", *Emerging markets review,* 3 (2002), 429 – 448.
7. Benartzi S., R. Michaely and R. Thaler (1997): "Do changes in dividends signal the future or the past?", *Journal of Finance* 52 (3): 1007-1043.
8. Benartzi S., Michaely R., Thaler R. (2005), "Dividend Changes Do Not Signal Changes in Future Profitability", *The Journal of Business*, Vol. 78, No. 5 (September 2005), pp. 1659-1682
9. Bhattacharya, S. (1979), "Imperfect information, dividend policy, and 'the bird in the hand' fallacy", *Bell Journal of Economics,* 10 (1): 259-270.
10. De Angelo H., L. De Angelo and D. Skinner (1996), "Reversal of fortune, dividend signaling and the disappearance of sustained earnings growth", *Journal of Financial Economics,* 40: 341-371.
11. De Angelo H., L. De Angelo and R. M. Stulz (2006), "Dividend policy and the earned/contributed capital mix: a test of life cycle theory", *Journal of Financial Economics*, 81 (2006), 227 – 254.
12. Easterbrook, E. H. (1984), "Two agency-cost explanations of dividends", *American Economic Review,* 74 (4): 650-659.

13. Eugene F. Fama and Harvey Babiak (1968), "Dividend Policy: An Empirical Analysis," *Journal of the American Statistical Association,* 63 (December 1968): 1132-61.
14. Fama E., (1991), "Efficient capital markets: II", *Journal of Financa* 46 (5), pp. 1575 – 617.
15. Grullon, G., R Michaely and B. Swaminathan (2002), "Are dividend changes a sign of firm maturity?", *The Journal of Business,* 75:387-424.
16. Healy, P. M., and K. G. Palepu (1988), "Earnings information conveyed by dividend initiations and omissions", *Journal of Financial Economics,* 21 (2): 149-176.
17. Jensen, M. C. (1986), "Agency costs of free cash flow, corporate finance, and takeovers", *American Economic Review,* 76 (2): 323-329.
18. Jensen, M. C., and W. H. Meckling (1976), "Theory of the firm: managerial behavior, agency costs and ownership structure", *Journal of Financial Economics,* 3 (4): 305-360.
19. John, K., and J. Williams (1985), "Dividends, dilution, and taxes: a signaling equilibrium", *Journal of Finance,* 40 (4): 1053-1070.
20. Kalay, A. (1982), "Stockholder-bondholder conflict and dividend constraint", *Journal of Financial Economics,* 14: 423-449.
21. Lang, L. H. P., and R. H. Litzenberger (1989), "Dividend announcements: cash flow signaling vs free cash flow hypothesis", *Journal of Financial Economics,* 24 (1): 181-192.
22. Lintner, J. (1956), "Distribution of incomes of corporations among dividends, retained earnings, and taxes", *American Economic Review* 46 (2): 97-113.
23. MacKinlay A. (1997), "Event studies in economics and finance", *Journal of Economics Literature,* vol. 35, Issue 1 (Mar., 1997), 13-39.
24. Michaely, R., R. H. Thaler and K. Womack (1995), "Price reactions to dividend initiations and omissions: overreaction or drift?", *Journal of Finance,* 50 (2):573-608.
25. Miller, M., and E. Modigliani (1961), "Dividend policy, growth and the valuation of shares", *Journal of Business,* 34:411-433.
26. Miller, M., and K. Rock (1985), "Dividend policy under asymmetric information", *Journal of Finance,* 40 (4): 1031-1051.

27. Myers, S. C. (1977), "Determinants of corporate borrowing", *Journal of Financial Economics*, 5 (2): 147-175.
28. Nissim, D., and A. Ziv (2001), "Dividend changes and future profitability", *Journal of Finance,* 61 (6): 2111-2134.
29. Ou A. and Penman H. (1989), "Financial statement analysis and the prediction of stock returns", *Journal of Accounting and Economics,* 11 (1989), 295-329.
30. Pettit, R. Richardson (1972), "Dividend Announcements, Security Performance, and Capital Market Efficiency", *Journal of Finance,* 27, 993-1007.
31. Ross, S. A. (1977), "The determination of financial structure: the incentive signalling approach", *Bell Journal of Economics*, pp 13-40.
32. Rozeff, M., "Growth, Beta and Agency Costs as Determinants of Dividend payout Ratios", *The Journal of Financial Research*, 5, pp. 249-259, 1982.
33. Watts, R. (1973), "The information content of dividends", *Journal of Business* 46 (2): 191-211.
34. Yoon, P. S., and L Starks (1995), "Signaling, investment opportunities, and dividend announcements", *Review of Financial Studies,* 8 (4): 995-1018.

Appendix

Formula for IRR of individual member stocks of MICEX index and the description provided was obtained by contacting Bloomberg Customer Help Service. Return on MICEX is defined as a market cap-weighted average of IRRs of individual member stocks, where individual IRR is calculated as follows:

Current Price = D1/(1+IRR) + D2/[(1+IRR)^2] + ... + DK/[(1+IRR)^K]

- D1 is the dividend in year one, DK is the dividend in year K
- IRR is the internal rate of return

Figures

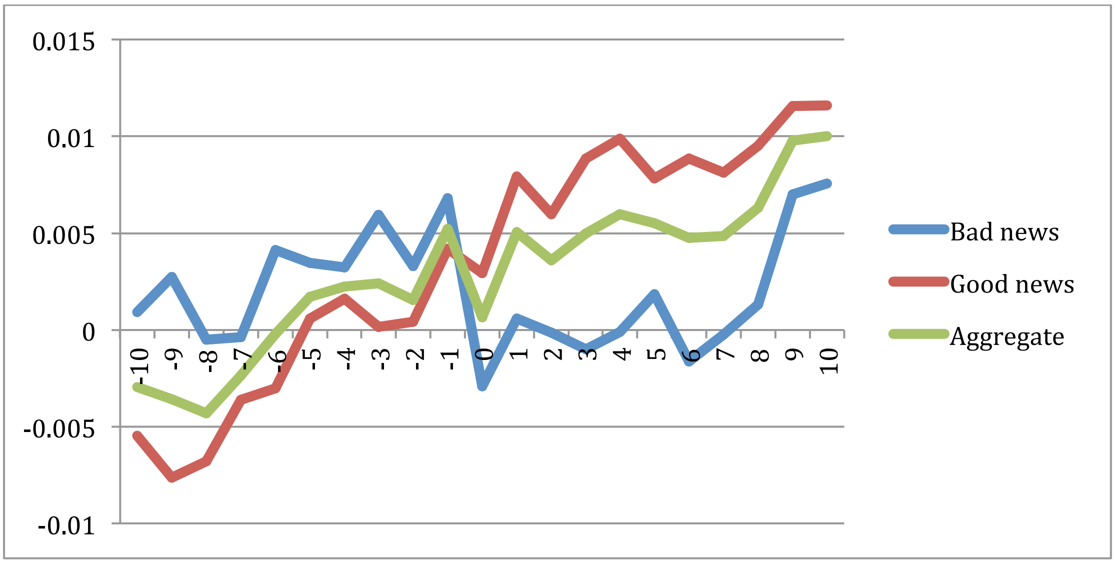

Figure 1
CAAR plot for naïve classification

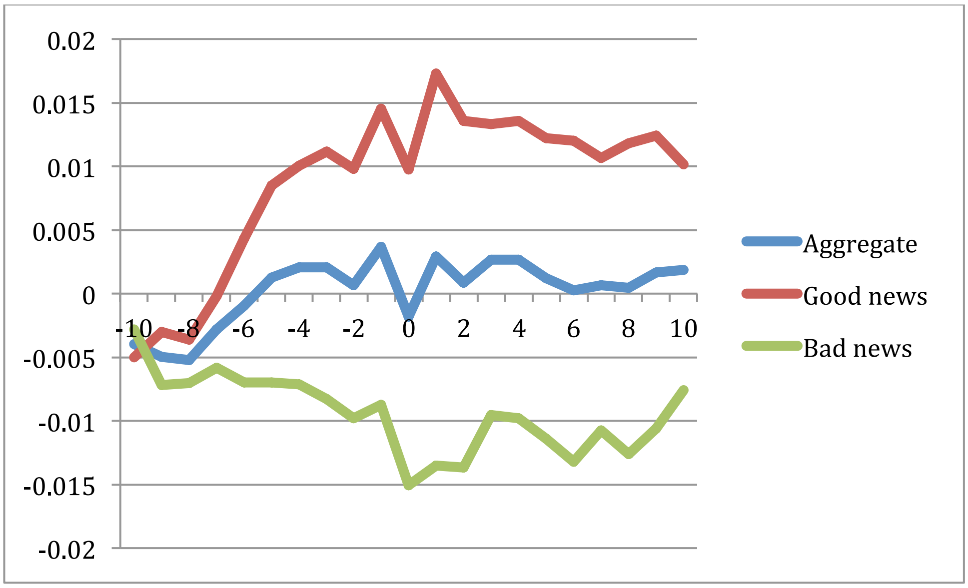

Figure 2
CAAR plot for modeled expectations

Stata output
Model for dividend change

```
. xtreg ddpspp dbeta debitdateq debitda22 dtlteq dqr dmbv, fe

Fixed-effects (within) regression               Number of obs      =        27
Group variable: tiker1                          Number of groups   =         9

R-sq:  within  = 0.6615                         Obs per group: min =         1
       between = 0.1303                                        avg =       3.0
       overall = 0.0637                                        max =         6

                                                F(6,12)            =      3.91
corr(u_i, Xb)  = -0.7245                        Prob > F           =    0.0213

------------------------------------------------------------------------------
      ddpspp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       dbeta |  -.0329114   .0095009    -3.46   0.005     -.053612   -.0122107
  debitdateq |   1.846754   .7503435     2.46   0.030     .2118956    3.481611
   debitda22 |  -1.761382   .8868419    -1.99   0.070    -3.693644    .1708807
      dtlteq |   .0002173   .0001186     1.83   0.092    -.0000411    .0004757
         dqr |   .0021446   .0012013     1.79   0.100    -.0004729    .0047621
        dmbv |  -.0055226   .0042887    -1.29   0.222    -.0148668    .0038217
       _cons |  -.0124067   .0069726    -1.78   0.100    -.0275987    .0027853
-------------+----------------------------------------------------------------
     sigma_u |  .12092511
     sigma_e |  .00810902
         rho |  .99552333   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(8, 12) =     93.48              Prob > F = 0.0000
```

```
. xtreg ddpspp dbeta debitdateq debitda22 dtlteq dqr dmbv, re

Random-effects GLS regression                   Number of obs      =        27
Group variable: tiker1                          Number of groups   =         9

R-sq:  within  = 0.6379                         Obs per group: min =         1
       between = 0.1033                                        avg =       3.0
       overall = 0.0176                                        max =         6

Random effects u_i ~ Gaussian                   Wald chi2(6)       =     24.86
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0004

------------------------------------------------------------------------------
      ddpspp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       dbeta |  -.0309988    .008684    -3.57   0.000    -.0480192   -.0139784
  debitdateq |   1.205831   .5882516     2.05   0.040     .0528787    2.358783
   debitda22 |  -1.783762   .8047959    -2.22   0.027    -3.361133   -.2063909
      dtlteq |   .0001294   .0000951     1.36   0.173    -.0000569    .0003157
         dqr |   .0022983   .0011063     2.08   0.038     .0001299    .0044667
        dmbv |  -.0058919   .0039179    -1.50   0.133    -.0135709     .001787
       _cons |  -.0301787   .0425222    -0.71   0.478    -.1135206    .0531633
-------------+----------------------------------------------------------------
     sigma_u |  .13449821
     sigma_e |  .00810902
         rho |  .99637817   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        ddpspp[tiker1,t] = Xb + u[tiker1] + e[tiker1,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                  ddpspp |   .0024744        .049743
                       e |   .0000658        .008109
                       u |   .0180898       .1344982

        Test:   Var(u) = 0
                             chi2(1) =     0.05
                         Prob > chi2 =     0.8265
```

```
. hausman fix ran

Note: the rank of the differenced variance matrix (5) does not equal the number of
        coefficients being tested (6); be sure this is what you expect, or there may be
        problems computing the test.  Examine the output of your estimators for anything
        unexpected and possibly consider scaling your variables so that the coefficients
        are on a similar scale.
```

	(b) fix	(B) ran	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
dbeta	-.0329114	-.0309988	-.0019126	.0038541
debitdateq	1.846754	1.205831	.6409228	.4658061
debitda22	-1.761382	-1.783762	.0223801	.3725481
dtlteq	.0002173	.0001294	.0000879	.0000709
dqr	.0021446	.0022983	-.0001537	.0004682
dmbv	-.0055226	-.0058919	.0003694	.0017444

```
                          b = consistent under Ho and Ha; obtained from xtreg
           B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        1.97
                Prob>chi2 =      0.8535
```

Analysis of market reaction

1) Analysis of CAARs for 10-day interval around the announcement date.

```
. xtreg car10 ddpspp debitdateq debitdaf1teq drprem ddpsppdq, fe

Fixed-effects (within) regression               Number of obs      =        36
Group variable: tiker1                          Number of groups   =         9

R-sq:  within  = 0.1339                         Obs per group: min =         1
       between = 0.1855                                        avg =       4.0
       overall = 0.1332                                        max =         8

                                                F(5,22)            =      0.68
corr(u_i, Xb)  = 0.0019                         Prob > F           =    0.6430
```

car10	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ddpspp	1.063269	1.677868	0.63	0.533	-2.416417	4.542954
debitdateq	1.945773	2.742572	0.71	0.485	-3.741973	7.633519
debitdaf1teq	.0323837	5.312015	0.01	0.995	-10.98406	11.04883
drprem	-2.205568	2.037671	-1.08	0.291	-6.43144	2.020303
ddpsppdq	1.225894	5.287246	0.23	0.819	-9.739183	12.19097
_cons	.044186	.0516851	0.85	0.402	-.0630023	.1513743
sigma_u	.08727307					
sigma_e	.27427327					
rho	.0919407	(fraction of variance due to u_i)				

```
F test that all u_i=0:     F(8, 22) =      0.36              Prob > F = 0.9280
```

```
. xtreg car10 ddpspp debitdateq debitdaf1teq drprem ddpsppdq, re

Random-effects GLS regression                   Number of obs      =        36
Group variable: tiker1                          Number of groups   =         9

R-sq:  within  = 0.1291                         Obs per group: min =         1
       between = 0.3417                                        avg =       4.0
       overall = 0.1426                                        max =         8

Random effects u_i ~ Gaussian                   Wald chi2(5)       =      4.99
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.4170

------------------------------------------------------------------------------
       car10 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ddpspp |   1.374335   1.091012     1.26   0.208    -.7640088    3.512679
  debitdateq |   1.444291    1.59831     0.90   0.366    -1.688338     4.57692
debitdaf1teq |  -1.100086   2.566403    -0.43   0.668    -6.130143    3.929971
      drprem |  -2.179532   1.754372    -1.24   0.214    -5.618038    1.258974
    ddpsppdq |  -.4176178   4.282683    -0.10   0.922    -8.811521    7.976286
       _cons |   .0496497   .0439054     1.13   0.258    -.0364034    .1357027
-------------+----------------------------------------------------------------
     sigma_u |          0
     sigma_e |  .27427327
         rho |          0   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        car10[tiker1,t] = Xb + u[tiker1] + e[tiker1,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                   car10 |   .0624702       .2499403
                       e |   .0752258       .2742733
                       u |          0              0

        Test:   Var(u) = 0
                             chi2(1) =     0.57
                         Prob > chi2 =     0.4498
```

```
. reg car10 ddpspp debitdateq debitdaf1teq drprem ddpsppdq

      Source |       SS       df       MS              Number of obs =      36
-------------+------------------------------           F(  5,    30) =    1.00
       Model |  .311877042     5  .062375408           Prob > F      =  0.4356
    Residual |  1.87457856    30  .062485952           R-squared     =  0.1426
-------------+------------------------------           Adj R-squared = -0.0003
       Total |  2.18645561    35   .06247016           Root MSE      =  .24997

------------------------------------------------------------------------------
       car10 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ddpspp |   1.374335   1.091012     1.26   0.217    -.8538084    3.602478
  debitdateq |   1.444291    1.59831     0.90   0.373    -1.819893    4.708475
debitdaf1teq |  -1.100086   2.566403    -0.43   0.671    -6.341379    4.141208
      drprem |  -2.179532   1.754372    -1.24   0.224    -5.762437    1.403373
    ddpsppdq |  -.4176178   4.282683    -0.10   0.923    -9.164023    8.328787
       _cons |   .0496497   .0439054     1.13   0.267    -.0400172    .1393165
------------------------------------------------------------------------------

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of car10

         chi2(1)      =    11.03
         Prob > chi2  =   0.0009

. reg car10 ddpspp debitdateq debitdaf1teq drprem ddpsppdq, robust

Linear regression                                      Number of obs =      36
                                                       F(  5,    30) =   28.58
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.1426
                                                       Root MSE      =  .24997

------------------------------------------------------------------------------
             |               Robust
       car10 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ddpspp |   1.374335   .1699188     8.09   0.000     1.027315    1.721356
  debitdateq |   1.444291   1.065489     1.36   0.185    -.7317275    3.620309
debitdaf1teq |  -1.100086   1.902126    -0.58   0.567    -4.984745    2.784574
      drprem |  -2.179532   .7978085    -2.73   0.010    -3.808874   -.5501897
    ddpsppdq |  -.4176178   1.176416    -0.35   0.725    -2.820179    1.984944
       _cons |   .0496497   .0404702     1.23   0.229    -.0330014    .1323008
------------------------------------------------------------------------------
```

```
. reg car10 ddpspp debitdateq debitdaf1teq drprem, robust

Linear regression                                      Number of obs =      44
                                                       F(  4,    39) =   17.65
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.1186
                                                       Root MSE      =  .22938

------------------------------------------------------------------------------
             |               Robust
       car10 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ddpspp |   1.253407   .3651862     3.43   0.001     .5147481    1.992066
  debitdateq |   1.316388   .5158585     2.55   0.015     .2729659    2.359811
debitdaf1teq |  -1.384477   .7989253    -1.73   0.091    -3.000455    .2315023
      drprem |  -1.311932   .8022194    -1.64   0.110    -2.934574    .3107098
       _cons |    .036889   .0368288     1.00   0.323    -.0376043    .1113823
------------------------------------------------------------------------------
```

Model using changes in CAPEX

```
. reg car10 dcapexteq dcapexteqdq debitda22 dbeta

      Source |       SS       df       MS              Number of obs =       9
-------------+------------------------------           F(  4,     4) =  149.07
       Model |  1.70458893     4  .426147231           Prob > F      =  0.0001
    Residual |   .0114345     4  .002858625            R-squared     =  0.9933
-------------+------------------------------           Adj R-squared =  0.9867
       Total |  1.71602343     8  .214502928           Root MSE      =  .05347

------------------------------------------------------------------------------
       car10 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   dcapexteq |  -2.255281   .1008398   -22.36   0.000    -2.535257   -1.975304
 dcapexteqdq |   2.140073    .135005    15.85   0.000     1.765239    2.514907
   debitda22 |  -4.037878   .7929882    -5.09   0.007    -6.239566    -1.83619
       dbeta |  -.3113466   .1013481    -3.07   0.037     -.592734   -.0299592
       _cons |   .0386812   .0247327     1.56   0.193    -.0299878    .1073502
------------------------------------------------------------------------------

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of car10

         chi2(1)      =     0.13
         Prob > chi2  =   0.7213


. xtreg car10 dcapexteq dcapexteqdq debitda22 dbeta, fe
insufficient observations
r(2001);

. xtreg car10 dcapexteq dcapexteqdq debitda22 dbeta, re
insufficient observations
r(2001);
```

2) Analysis of CAARs for 5 day interval measured around the announcement date

```
. xtreg car5 ddpspp debitdateq debitdaf1teq drprem ddpsppdq ddpsppomis ddpsppinit, fe

Fixed-effects (within) regression               Number of obs      =        36
Group variable: tiker1                          Number of groups   =         9

R-sq:  within  = 0.2383                         Obs per group: min =         1
       between = 0.3925                                        avg =       4.0
       overall = 0.2519                                        max =         8

                                                F(6,21)            =      1.09
corr(u_i, Xb)  = 0.0157                         Prob > F           =    0.3978

------------------------------------------------------------------------------
        car5 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ddpspp |   .6821865   .4710203     1.45   0.162    -.2973538    1.661727
  debitdateq |   .7264135   .8649851     0.84   0.410    -1.072421    2.525249
debitdaf1teq |   .2529563   1.649447     0.15   0.880    -3.177257    3.683169
      drprem |  -.7857688   .5731516    -1.37   0.185    -1.977703    .4061653
    ddpsppdq |  -.0484691   1.948281    -0.02   0.980    -4.100141    4.003203
  ddpsppomis |   .0835332   3.345738     0.02   0.980    -6.874309    7.041376
  ddpsppinit |  (dropped)
       _cons |   .0060073     .01451     0.41   0.683    -.0241678    .0361824
-------------+----------------------------------------------------------------
     sigma_u |  .03245808
     sigma_e |  .07698947
         rho |  .15091554   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(8, 21) =     0.70               Prob > F = 0.6854
```

```
. xtreg car5 ddpspp debitdateq debitdaf1teq drprem ddpsppdq ddpsppomis ddpsppinit, re

Random-effects GLS regression                   Number of obs      =        36
Group variable: tiker1                          Number of groups   =         9

R-sq:  within  = 0.2372                         Obs per group: min =         1
       between = 0.6046                                        avg =       4.0
       overall = 0.2672                                        max =         8

Random effects u_i ~ Gaussian                   Wald chi2(7)       =     10.21
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.1769

------------------------------------------------------------------------------
        car5 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ddpspp |   .7376891   .3282819     2.25   0.025     .0942684     1.38111
  debitdateq |   .6304596    .485031     1.30   0.194    -.3201836    1.581103
debitdaf1teq |   .0324472   .8102932     0.04   0.968    -1.555698    1.620593
      drprem |  -.8321426   .5424501    -1.53   0.125    -1.895325      .23104
    ddpsppdq |  -.1341605    1.77633    -0.08   0.940    -3.615704    3.347383
  ddpsppomis |    .065496   2.333785     0.03   0.978    -4.508639    4.639631
  ddpsppinit |   -.085668   .1200452    -0.71   0.475    -.3209522    .1496163
       _cons |   .0088547   .0138355     0.64   0.522    -.0182624    .0359718
-------------+----------------------------------------------------------------
     sigma_u |          0
     sigma_e |  .07698947
         rho |          0   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        car5[tiker1,t] = Xb + u[tiker1] + e[tiker1,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                    car5 |   .0061541       .0784483
                       e |   .0059274       .0769895
                       u |          0              0

        Test:   Var(u) = 0
                             chi2(1) =     1.06
                         Prob > chi2 =     0.3028
```

```
. reg car5 ddpspp debitdateq debitdaf1teq drprem ddpsppdq ddpsppomis ddpsppinit

      Source |       SS       df       MS              Number of obs =      36
-------------+------------------------------           F(  7,    28) =    1.46
       Model |  .05756366      7  .00822338            Prob > F      =  0.2223
    Residual | .157830873     28  .005636817           R-squared     =  0.2672
-------------+------------------------------           Adj R-squared =  0.0841
       Total | .215394533     35  .00615413            Root MSE      =  .07508

------------------------------------------------------------------------------
        car5 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ddpspp |   .7376891   .3282819     2.25   0.033     .0652341    1.410144
  debitdateq |   .6304596    .485031     1.30   0.204    -.3630813       1.624
debitdaf1teq |   .0324472   .8102932     0.04   0.968    -1.627363    1.692258
      drprem |  -.8321426   .5424501    -1.53   0.136    -1.943301     .279016
    ddpsppdq |  -.1341605    1.77633    -0.08   0.940    -3.772808    3.504487
  ddpsppomis |    .065496   2.333785     0.03   0.978    -4.715046    4.846038
  ddpsppinit |   -.085668   .1200452    -0.71   0.481    -.3315694    .1602335
       _cons |   .0088547   .0138355     0.64   0.527    -.0194861    .0371955
------------------------------------------------------------------------------

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of car5

         chi2(1)      =     4.22
         Prob > chi2  =   0.0399


. reg car5 ddpspp debitdateq debitdaf1teq drprem ddpsppdq ddpsppomis ddpsppinit, robust

Linear regression                                      Number of obs =      36
                                                       F(  6,    28) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.2672
                                                       Root MSE      =  .07508

------------------------------------------------------------------------------
             |               Robust
        car5 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ddpspp |   .7376891    .064493    11.44   0.000     .6055813    .8697969
  debitdateq |   .6304596   .1803914     3.49   0.002     .2609447    .9999745
debitdaf1teq |   .0324472    .353895     0.09   0.928    -.6924739    .7573683
      drprem |  -.8321426   .6984724    -1.19   0.244    -2.262898    .5986132
    ddpsppdq |  -.1341605   .8510101    -0.16   0.876    -1.877376    1.609055
  ddpsppomis |    .065496   .9575105     0.07   0.946    -1.895875    2.026867
  ddpsppinit |   -.085668   .0328641    -2.61   0.014    -.1529871   -.0183489
       _cons |   .0088547   .0155758     0.57   0.574     -.023051    .0407604
------------------------------------------------------------------------------
```

Model using changes in CAPEX

```
. reg car5 dbeta debitda22 dcapexteqdq dcapexteq

      Source |       SS       df       MS              Number of obs =       9
-------------+------------------------------           F(  4,      4) =    5.40
       Model |  .088283826     4  .022070956           Prob > F      =  0.0657
    Residual |  .01635985      4  .004089962           R-squared     =  0.8437
-------------+------------------------------           Adj R-squared =  0.6873
       Total |  .104643676     8  .013080459           Root MSE      =  .06395

------------------------------------------------------------------------------
        car5 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       dbeta |  -.2050846   .1212262    -1.69   0.166    -.5416626    .1314934
   debitda22 |  -2.425365   .9485228    -2.56   0.063    -5.058886    .2081564
 dcapexteqdq |   .4275314   .1614845     2.65   0.057    -.0208215    .8758843
   dcapexteq |  -.4474752   .1206183    -3.71   0.021    -.7823652   -.1125852
       _cons |   .0333465   .0295837     1.13   0.323     -.048791     .115484
------------------------------------------------------------------------------

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of car5

         chi2(1)      =     0.14
         Prob > chi2  =   0.7059

. xtreg car5 dbeta debitda22 dcapexteqdq dcapexteq , fe
insufficient observations
r(2001);

. xtreg car5 dbeta debitda22 dcapexteqdq dcapexteq , re
insufficient observations
r(2001);
```

3) Analysis of CAARs for 1 day interval measured around the announcement date

```
. xtreg car1 ddpspp debitdateq debitdaf1teq drprem ddpsppdq ddpsppomis ddpsppinit, fe

Fixed-effects (within) regression               Number of obs      =        36
Group variable: tiker1                          Number of groups   =         9

R-sq:  within  = 0.0853                         Obs per group: min =         1
       between = 0.0000                                        avg =       4.0
       overall = 0.0506                                        max =         8

                                                F(6,21)            =      0.33
corr(u_i, Xb)  = -0.0419                        Prob > F           =    0.9156

------------------------------------------------------------------------------
        car1 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ddpspp |   .1577147   .2337464     0.67   0.507    -.3283875    .6438169
  debitdateq |   .2333499   .4292536     0.54   0.592    -.6593317    1.126032
debitdaf1teq |  -.0679394   .8185471    -0.08   0.935    -1.770201    1.634323
      drprem |  -.0280345   .2844296    -0.10   0.922    -.6195383    .5634693
    ddpsppdq |   .1371554   .9668449     0.14   0.889    -1.873509     2.14782
  ddpsppomis |  -.2758336   1.660341    -0.17   0.870    -3.728701    3.177034
  ddpsppinit |  (dropped)
       _cons |  -.0034001   .0072006    -0.47   0.642    -.0183747    .0115745
-------------+----------------------------------------------------------------
     sigma_u |  .03165941
     sigma_e |  .03820644
         rho |  .40710707   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(8, 21) =     1.17               Prob > F = 0.3596
```

```
. xtreg car1 ddpspp debitdateq debitdaf1teq drprem ddpsppdq ddpsppomis ddpsppinit, re

Random-effects GLS regression                   Number of obs      =        36
Group variable: tiker1                          Number of groups   =         9

R-sq:  within  = 0.0505                         Obs per group: min =         1
       between = 0.7182                                        avg =       4.0
       overall = 0.2117                                        max =         8

Random effects u_i ~ Gaussian                   Wald chi2(7)       =      7.52
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.3768
```

car1	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ddpspp	.1456591	.1740461	0.84	0.403	-.1954651	.4867832
debitdateq	-.1742483	.2571502	-0.68	0.498	-.6782534	.3297569
debitdaf1teq	-.9221523	.4295954	-2.15	0.032	-1.764144	-.0801608
drprem	-.1472996	.2875923	-0.51	0.609	-.7109701	.4163708
ddpsppdq	-.0986005	.941762	-0.10	0.917	-1.94442	1.747219
ddpsppomis	-.7176546	1.237309	-0.58	0.562	-3.142736	1.707427
ddpsppinit	-.0131379	.0636447	-0.21	0.836	-.1378792	.1116034
_cons	-.0002146	.0073352	-0.03	0.977	-.0145913	.0141622
sigma_u	0					
sigma_e	.03820644					
rho	0	(fraction of variance due to u_i)				

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        car1[tiker1,t] = Xb + u[tiker1] + e[tiker1,t]

        Estimated results:
```

	Var	sd = sqrt(Var)
car1	.001608	.0400995
e	.0014597	.0382064
u	0	0

```
        Test:   Var(u) = 0
                             chi2(1) =     1.47
                         Prob > chi2 =     0.2258
```

```
. reg car1 ddpspp debitdateq debitdaf1teq drprem ddpsppdq ddpsppinit ddpsppomis

      Source |       SS       df       MS              Number of obs =      36
-------------+------------------------------           F(  7,    28) =    1.07
       Model |  .011915239     7  .001702177           Prob > F      =  0.4054
    Residual |  .044363603    28  .001584414           R-squared     =  0.2117
-------------+------------------------------           Adj R-squared =  0.0146
       Total |  .056278843    35  .001607967           Root MSE      =   .0398

------------------------------------------------------------------------------
        car1 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ddpspp |   .1456591   .1740461     0.84   0.410    -.2108583    .5021764
  debitdateq |  -.1742483   .2571502    -0.68   0.504    -.7009966    .3525001
debitdaf1teq |  -.9221523   .4295954    -2.15   0.041    -1.802139   -.042166
      drprem |  -.1472996   .2875923    -0.51   0.613    -.7364057    .4418064
    ddpsppdq |  -.0986005    .941762    -0.10   0.917    -2.027713    1.830512
  ddpsppinit |  -.0131379   .0636447    -0.21   0.838    -.1435081    .1172324
  ddpsppomis |  -.7176546   1.237309    -0.58   0.567    -3.252168    1.816859
       _cons |  -.0002146   .0073352    -0.03   0.977    -.0152401     .014811
------------------------------------------------------------------------------

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of car1

         chi2(1)      =     0.39
         Prob > chi2  =   0.5299
```

Model using changes in CAPEX

```
. reg car1 dbeta  debitda22 dcapexteq dcapexteqdq

      Source |       SS       df       MS              Number of obs =       9
-------------+------------------------------           F(  4,     4) =    2.00
       Model |  .007068732     4  .001767183           Prob > F      =  0.2585
    Residual |  .003525879     4   .00088147           R-squared     =  0.6672
-------------+------------------------------           Adj R-squared =  0.3344
       Total |   .01059461     8  .001324326           Root MSE      =  .02969

------------------------------------------------------------------------------
        car1 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       dbeta |  -.0555389   .0562783    -0.99   0.380    -.2117924    .1007146
   debitda22 |  -1.098788   .4403437    -2.50   0.067    -2.321378    .1238025
   dcapexteq |  -.0477673    .055996    -0.85   0.442    -.2032372    .1077025
 dcapexteqdq |   .0801985   .0749678     1.07   0.345    -.1279456    .2883425
       _cons |   .0218841    .013734     1.59   0.186    -.0162476    .0600157
------------------------------------------------------------------------------

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of car1

         chi2(1)      =     0.37
         Prob > chi2  =   0.5446
```