The significance of non-financial information flows in risk management

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***Abstract*—risk management in this paper is focused on the concept of information efficiency. Information efficiency means that prices fully reflect all relevant information at every instant and therefore prices can not be predicted, i.e. prices are evolving randomly. When stock markets are not efficient, there are possibilities for speculation. Although neither the direction nor the magnitude of the price change can be specified without knowing the expectations model of investors, therefore Capital Asset Pricing Model (CAPM) will be used for removing the market wide effects, i.e. unspecified factors. By removing the effects from unspecified factors, unexpected price changes can be estimated, in period around the announcement day, due to the incoming information. The aim of this paper is to provide evidence of information which can affect investor's strategies, and to compare the influence of bad news and good news to the price changes. Moreover, empirical analysis will show that there is significant correlation between information content of the incoming news and price volatility (unexpected price changes) based on data set of daily closing prices for 6 most traded stocks, all obtained form Zagreb Stock Exchange. It is expected that bad news have greater influence on price movements than the good news.**

Keywords-risk management, non-financial information, unexpected price movements, Capital Asset Pricing Model

I. INTRODUCTION

Information efficiency is central to many studies of financial markets. Namely, by risk control manager makes free supplementary capital for new investments. Modern financial analysis requires forecasting unexpected price movements according to the new information flows. Forecasting is necessary, apart from other reasons, because financial volatilities move together over time across assets and markets. Since it is difficult to monitor non-financial information that can often have a decisive influence on the financial markets movements and therefore this paper puts this issue to the center of interest.

Portfolio managers, option traders and market makers are all interested in volatility forecasting in order to get higher profits or less risky positions. According to these requirements the significance of non-financial information flows in risk management is evident. This appears from the practical need for options pricing, portfolio selection, hedging and risk estimation. Furthermore, a fundamental characteristic of modern capital markets leads to application of various asset pricing models.

Among these models one of the most appropriate models that best reflects investor expectations is the Capital Asset Pricing Model (CAPM). CAPM model is used, among other applications, especially when it is necessary to take into consideration two basic research assumptions: to remove the impact of wide market effects and to properly estimate investor's expectations [7]. When evaluating the price of assets it is necessary to comprehensively examine impacts of volatility on stock markets. Whatsoever, volatility is one of the most relevant entry in risk management research. The importance of volatility can be summarized in following facts:

- the volatility of one market leads to volatility of other markets,
- the volatility of an stock transmits to another stock,
- the correlation between stock returns change over time,
- the correlation between stock returns increases in the long run because of the globalization of financial markets.

The relevance of non-financial information is important because they simultaneously affect the all stocks in the market. In contrast, financial information which is related to the announcement and publication of business results of individual companies, and therefore affect only the stock trading of these companies.

Empirical analysis in this paper will show that there is significant correlation between information content of the incoming news and price volatility (unexpected price changes). Data set consist of daily closing prices for 6 most traded stocks, all obtained form Zagreb Stock Exchange (ZSE). The empirical results indicate that bad news have greater influence on price movements than the good news.

The structure of the paper is organized as follows. In the second section price movements in trends are described from the point of view of technical analysis. In the third section the significance of non-financial information flows in risk management is presented, while the fourth section summarizes the estimation results of the research. Last section provides conclusion of the empirical findings.

II. PRICE MOVEMENTS IN TRENDS

Technical analysis studies supply and demand in a market in an attempt to determine what direction, or trend, will continue in the future. Technical analysis is a method of evaluating stocks by analyzing the statistics of the past prices movements and volume. Therefore, it uses charts and other tools such as indicators and oscillators to identify patterns that can suggest future movements. Technical analysis relays on three basic assumptions:

- at any given time, a stock's price reflects everything that has or could affect the company - including fundamental factors,
- the repetitive nature of price movements is attributed to market psychology, i.e. market participants tend to provide a consistent reaction to similar market situations. It means that history tends to repeat itself,
- price movements are believed to follow trends.

In technical analysis it has been shown that after a trend of price movements has been established, the future price movement is more likely to be in the same direction [9]. Most technical trading strategies are based on this assumption.

Empirical researches discover two types of trend distinguishing according to:

- time structure and
- general direction.

According to time structure there are long-term trends, intermediate trends or short-term trends. These are connected with investment strategies. Namely, there is a significant difference between an investor and a trader. It means that an investor expects profit only in long-term period, while traders prefer to profit in short-term period. So, it can be defined that long-term investment strategy is associated within time frame of 50 trading days; intermediate strategy is adapted with 20 trading days, while short-term investment strategy is associated within 10 trading days.

According to general direction prices could trend up, trend down, or trend sideways [4]. In financial literature synonym for uptrend market is bull market. A bull market tends to be associated with increasing investor confidence, motivating investors to buy in anticipation of further capital earnings. Technical term for downtrend market is bear market. A bear market tends to be accompanied by widespread pessimism. Investors anticipating further losses are motivated to sell.

III. INFLUENCE OF NON-FINANCIAL INFORMATION

The relevance of non-financial information is important because they simultaneously affect the all stocks in the market. In contrast, financial information which is related to the announcement and publication of business results of individual companies, and therefore affect only the stock trading of these companies.

As it is already pointed out that neither the direction nor the magnitude of the price change can be specified without knowing the expectations model of investors, therefore Capital Asset Pricing Model (CAPM) will be used for removing the market wide effects, i.e. unspecified factors. By removing the effects from unspecified factors, unexpected price changes can be estimated, in period around the announcement day, due to the incoming information. It is expected that the variability of price changes is likely to be greater when good or bad news are announced than at other times during the year [11].

According to the Capital Asset Pricing Model

$$r_{i,t} = \alpha_i + \beta_i \cdot m_t + \varepsilon_{i,t} \tag{1}$$

$r_{i,t}$ is observed rate of return on a stock i in the moment t and m_t is observed market stock return (presented by the CROBEX index). After parameters estimation $\hat{\alpha}_i$ and $\hat{\beta}_i$ for each stock the unexpected rate of return, for period around announcement day of incoming information can be calculated as

$$\begin{aligned} &\hat{\varepsilon}_{i,j} = r_{i,j} - \hat{\alpha}_i - \hat{\beta}_i \cdot m_{t,j} \\ &i = 1,2,..,6 \quad j = -7,-6,...,0,...,+6,+7 \end{aligned} \tag{2}$$

The estimated residuals was then squared and divided by the variance of the residuals for the nonreported (control) period. Analysis performed in this research paper is similar to the empirical examination the extent to which the common stock investors perceive earnings to possess information value, according to Beaver (1986) [2]. Thus, the contribution of this paper is to analyze the impact of non-financial information on price movements and therefore the dates of released information does not overlap with dates for financial reporting.

IV. EMPIRICAL RESULTS

Empirical research will be provided through the sample of ten mostly traded companies, listed on the Zagreb Stock Exchange. We expect that the results of our research will reveal which types of information have positive or negative influences on the stock prices, as well as measuring volatility and the intensity of market reaction to new information arrival. The data set analyzed in this paper consists of daily closing prices for 6 most traded stocks (Dalekovod, IGH, Podravka, Atlanska Plovidba, INA and Ericsson). Two sample periods were taken. First sample period covers year 2007, while the second sample period covers year 2009. In each year 250 trading days are observed. Influence of various

information on price changes are compared in pre-crisis year to the period of crisis.

TABLE I. ABNORMAL PRICE CHANGES TO THE INCOMING INFORMATION FOR GOOD NEWS

Period around the announcement day	Abnormal price changes in %[a]	
	Year 2007	*Year 2009*
-7	-0,36	-0,37
-6	-0,82	-1,00
-5	-0,93	-0,93
-4	-0,98*	-0,81
-3	-0,08	-0,93
-2	-0,98*	-0,99*
-1	0,94*	-0,81
0	1,44**	2,33**
1	0,87	0,24
2	0,23	1,01*
3	0,73	-0,57
4	0,52	-0,89
5	-0,95*	0,23
6	-0,74	-0,96*
7	-0,75	-0,27

a. If the null hypothesis is accepted, the average abnormal return of n stocks during the interval around the announcement day follows a Student's distribution with (n-1) degree of freedom. The significance at 10% level is marked by (*), 5% level by (**) and 1% level by (***).

TABLE II. ABNORNMAL PRICE CHANGES TO THE INCOMING INFORMATION FOR BAD NEWS

Period around the announcement day	Abnormal price changes in %[a]	
	Year 2007	*Year 2009*
-7	0,01	0,74
-6	0,16	0,86
-5	0,34	0,72
-4	0,57	0,97*
-3	0,64	0,90
-2	-0,79	-0,49
-1	-0,13	0,97*
0	-2,42**	-4,74***
1	-0,73	-1,79**
2	-0,06	-1,35**
3	0,06	-1,02*
4	0,44	0,13
5	0,62	0,64
6	0,33	1,00*
7	-0,93	0,88

a. If the null hypothesis is accepted, the average abnormal return of n stocks during the interval around the announcement day follows a Student's distribution with (n-1) degree of freedom. The significance at 10% level is marked by (*), 5% level by (**) and 1% level by (***).

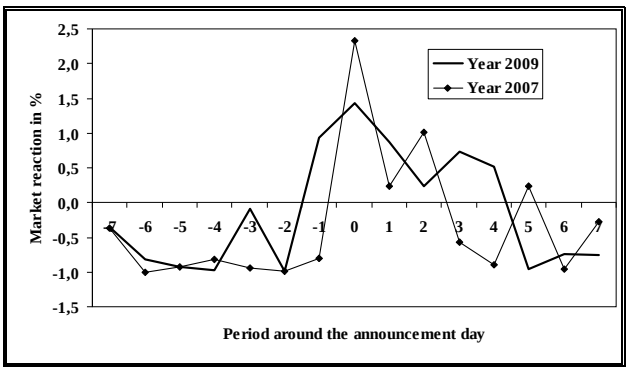

Figure 1. Abnormal price changes to the incoming information for good news in pre-crisis and crisis year.

From Figure 1 it can be seen that the magnitude of the price changes at day 0 is much larger (2,33% higher in 2007 and 1,44% higher in 2009) than the average during the nonreported period. The above normal price activity is what would be expected if changes in equilibrium prices are more likely to occur when information were released.

Above normal activity is also present for two days after the announcement day in year 2007, while in 2009 positive price changes are present for 4 days after the announcement day. It means that the market moves to the equilibrium position quickly in 2007 (pre-crisis year) when good information are released than in crisis period.

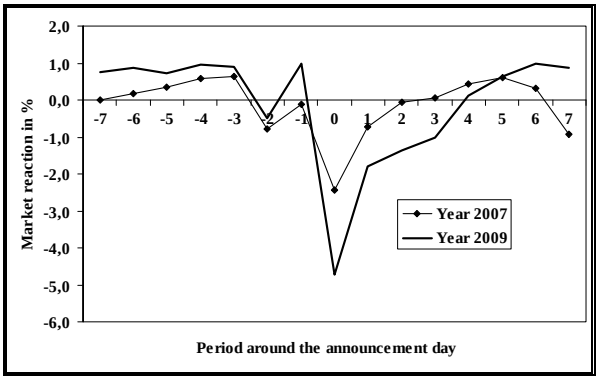

Figure 2. Abnormal price changes to the incoming information for bad news in pre-crisis and crisis year.

From Figure 2 it can be seen that the magnitude of the negative price changes at day 0 is much larger than the average during the nonreported period, when bad news is released. The below normal price activity is also present for two days after the announcement day in year 2007, while in 2009 negative price changes are present for almost 4 days after the announcement day. It means that the market moves to the equilibrium position slowly in crisis period.

From comparison of two Figures it can be concluded that the bad news have greater influence on price movements than the good news. However, negative information influence on price changes is more persistent in crisis period, while positive information influence on price changes is more persistent in pre-crisis period.

V. CONCLUSION REMARKS

Financial theory assumes that developed and liquid capital markets react intensively to new information. This paper reveals that Croatian capital market reacts to a smaller extent, which is the characteristic of less developed capital markets such as those in emerging markets. According to the market random walk hypothesis the returns are serially uncorrelated with a zero mean and hence unpredictable

random variables. But when the market is not efficient it is possible to predict changes in stock prices.

Our findings are based on a sample of six most traded stocks on ZSE, and they show much larger magnitude of the price changes at day 0, when we have good news (2,33% higher in 2007 and 1,44% higher in 2009) than the average during the nonreported period. The above normal price activity is what would be expected if changes in equilibrium prices are more likely to occur when information were released. Above normal activity is also present for two days after the announcement day in year 2007, while in 2009 positive price changes are present for 4 days after the announcement day. It means that the market moved to the equilibrium position quickly in 2007 (pre-crisis year) when good information are released than in crisis period.

When we have bad new magnitude of the negative price changed at day 0 is much larger than the average during the nonreported period, when bad news is released. The below normal price activity is also presented for two days after the announcement day in year 2007, while in 2009 negative price changed are present for almost 4 days after the announcement day. It means that the market moved to the equilibrium position slowly in crisis period. Generally it can be concluded that the bad news have greater influence on price movements than the good news.

Summarizing the findings of this paper it is evident that nonfinancial information, positive or negative had impact on prices volatility. However, negative nonfinancial information was influenced on price changes is more persistent in crisis period, while positive nonfinancial information was influenced on price changes is more persistent in pre-crisis period. Future research should aim to explore in more details the source of information and impact on volatility of stock market.

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