ASYMMETRIC INFORMATION INFLUENCE ON EFFICIENCY OF CAPITAL MARKET

Jelena Minovic[15]

ABSTRACT

The paper research issues related to asymmetric information on capital markets. It is realistic to assume that all market participants do not have available all the information. The Serbian capital market is characterized by high informational asymmetry between investors. Therefore, it is necessary to consider asymmetric information on the capital market, and estimate its impact on the expected asset returns. Thus, in this paper we described issues related to asymmetric information on the Serbian capital market. Public reporting in Serbia doesn't have any serious rules, and insider information is widely used. It was happened that people respond on rumours with large investments. The paper presents the probability of informed trading (PIT measure), which would be a useful indicator of liquidity for emerging and frontier markets. Therefore, the main goal of this paper is to examine impact of asymmetric information on efficiency of capital markets. More precisely, it considers market equilibrium with investors who have asymmetrical information. For this reason, the paper presents empirical model in order to examine the impact of asymmetric information on the assets pricing. Generally, capital markets are not perfect. In particular, emerging and frontier markets are not perfect, specifically (for example, the Serbian capital market). However, there is information asymmetry through which borrowers (securities issuers) know more about the risks than the lenders to (securities purchasers). Thus, market participants may be reluctant to trade with these assets, whose characteristics and behaviour under varying economic conditions are not well known. The paper presents all advantages and disadvantages of studied models.

Key words: *Asymmetric Information, Probability Of Informed Trading, Efficiency Financial Market, Expected Eeturn*

JEL Classification: *G14, G12, G02*

[15] Institute of Economic Sciences, Belgrade, Serbia, jelena.minovic@ien.bg.ac.rs

INTRODUCTION

The mechanism of establishing the price balance does not function fully in practice on the financial markets. This is due to many market imperfections, which do not permit the establishment of complete market equilibrium according to traditional models. One of the reasons is certainly the heterogeneity of the investor expectations in terms of risk and return. Therefore, Andrikopoulos (2007) argues that the classical models of finance (the model of rational expectations and efficient markets model) should be seen only as a rough approximation of how the markets really behave, and certainly it is necessary to significantly revise and expand them. Models of behavioural finance include factors of investor attitudes, psychological factors, factors of agencies and institutions as well as the risk factors. Haugen (2002) and Andrikopoulos (2007) argue that these models represent a challenge to conventional models of finance in terms of explanatory and predictive power. In recent years more and more studies prove that the existing standard models, cannot effectively explain the expected returns of the modern capital markets (see Minović, 2012). So, there is a need for the introduction of new models in finance. However, traditional models of classic finance can never be out of date because they represent an ideal market. The development of behavioural finance and their application in practice should move a real market closer to the ideal of semi-strong market efficiency (Andrikopoulos, 2007). Creating and setting up new multifactor models are a necessity and a challenge, to get closer to the problem of describing the balance of underdeveloped markets (such as Serbian). These models provide a far better explanation of return than standard models. An example for this claim is works of the following authors: (Minović,Živković, 2014; Milunovich,Minović,2014;Minović, Živković, 2012; Minović,Živković,2010).

Akerlof (1970) believes that if the information is sufficiently asymmetric, the market can completely disappear. Specially, in the Serbian market, being a small frontier market, the information asymmetry is highly represented. Reporting to the public in Serbia has no serious rules, but it all comes down to the mass use of insider information. Šoškić, Živković (2007) consider that the state regulation is the basic form of the elimination of information asymmetry. State regulation, through the increase of information available to investors, reduces the risk of adverse selection which is necessary for the efficient functioning of the public securities market. Šoškić, Živković (2007) argue that the risk of information asymmetry cannot be completely eliminated. On the one hand, only the data is not of sufficient benefit to investors who are not able to interpret them completely. On the other hand, there will always be managers who will want to improve the image of their company by means of false or incomplete information (Minović, 2013). There is a huge gap between the real markets and models that describe them, both in terms of predictions and the assumptions. However, in recent times, emerged so-called based-agent model, grounded on the idea that the market can be described as complex systems comprising an interaction of rational and heterogeneous agents (Anufriev, 2005).

This paper examines the models in which agents may have different levels of information related to the prices of assets and the parameters that determine their dynamics. Fernando (2003), presented like wisely this issue, presenting a theoretical framework whereby investors have asymmetric trading motives. In fact, it is reasonable to assume that to all market participants are not available all the information or they are unsure about the value of some economic variables. Another problem is when there are a number of agents in the economy, often they will not agree on the value of the parameters and price. For example, one person may think that stock prices are overvalued, while the other person thinks they are fair prices. Alternatively, a person may consider that the economy is growing, while the other person might think that it is in the stage of decline. For this reason, we present some models that allow flexibility in the quantity and quality of information given by agent. Such models are called models with incomplete, imperfect, partial, or (in the case of several agents) asymmetric information (Cvitanić, Zapatero, 2004) .The main objective of this paper is to examine how asymmetric information affects the balance of the financial markets. For this purpose it will be presented theoretically the empirical model of Easley, Hvidkjaer,O'Hara (2002). However, it should be noted that this model cannot be empirically tested at the frontier market of Serbia due to lack of data. Easley et al. (2002) empirically examine the impact of asymmetric information on the valuation of assets. More specifically, this paper aims to consider the fundamental question: the existence of equilibrium in the market with investors who have asymmetric information.

The work consists of seven chapters, including the introduction and conclusion. The second chapter provides the literature review. The third chapter presents the traditional theory of market efficiency. The fourth implies the degree of information asymmetry between investors on the value of individual actions or probability of informed trading. The fifth describes the impact of asymmetric information on the expected returns through the different empirical experiences of individual authors. The sixth chapter relates to the advantages and disadvantages of those models. The seventh chapter gives a conclusion.

LITERATURE REVIEW

Opposite to the classical Fama (1970) theory of market efficiency, there is a theory of behavioural finance (Haugen, 2002). Hirshleifer (2001) argues that behavioural finance offer alternative explanations for the key issue of why prices diverge from their fundamental values. His key argument is based on the claim that human behaviour and perception are two essential elements of financial decision making. Andrikopoulos (2007) considers that this view led to the search for new models and ideas that can explain and predict market behaviour of various psychological prejudices. According to this theory, the market does not pay attention to fundamentals. In an extreme case, the market in the short term is in a state of complete and unpredictable chaos. Then the models based on rational economic behaviour become invalid, while models based on behaviour (the so-called behavioural models) are beginning to dominate. These models focus on the

bias in behaviour reaction to the real economic events. In an extreme interpretation of this theory, the market does not respond to the actual economic events, but only to their own changes. O'Hara (2003) is a model for the valuation of assets based on asymmetric information and claims that current theories of valuation of assets ignore the existence of information asymmetry in the market. It shows that assets which are valued on the basis of private information require greater equilibrium returns. In contrast, the assets being valued on the basis of publicly available information requires a lower equilibrium returns (O'Hara, 2003). Easley, Hvidkjaer, O'Hara (2002) prove that information affects the price of the asset.

Nevertheless, very extensive theoretical literature is devoted to price changes caused by the presence of informed and uninformed traders in the market (i.e. information asymmetry). Those sources describe models that examine the behaviour of market makers when some retailers are better informed than the other (Teodorović, 2008). Significant contribution in this part of the literature gave Glosten, Milgrom (1985) presenting the model of sequential trading, and Madhavan et al.,1997). Hasbrouck's (1991) approach is also based on the theory of asymmetric information. Wang (1994) examines investors who are heterogeneous in terms of their investment opportunities and access to information. The balance in competitive markets with agents who have asymmetric information analysed Trifunović (2008). Trifunović (2008) used the concept of rational expectations equilibrium to describe some of the additional role of equilibrium price unlike Walrasian equilibrium, whereby equilibrium price is only an indicator of relative deprivation.

A major contribution in the field of the analysis of the existence of equilibrium in the market with investors possessing heterogeneous expectations and asymmetric information gave the following authors: (Lintner,1969;Williams,1977; Wang,1994; Detemple, Murthy, 1994; Grossman, Zhou, 1996; DeMarzo, Skiadas, 1998; Basak, 2005; Garcia, Urošević, 2006) and many others. Otherwise, the literature on financial markets based agents can be divided into two groups, where the first group contains models that can be empirically tested and those are the so-called analytical models, while the second group includes numerical models designed for computer simulation. The great input to the literature with analytical models provided the following authors: (Easley,O'Hara,1987,1992; Easley et al. 2002; O'Hara,2003; Lux,1998; DeLong et al., 1990;) and others. Author's contributions of: (Levy et al, 2000; LeBaron et al., 1999) belong to the literature that deals with the numerical models. The microscopic simulations of different models presented in Samanidou et al.,(2006) clearly explain that the dynamics of financial markets is similar to the dynamics of any other system with many interacting agents. Samanidouet et al. (2006) agree that the financial markets should be viewed as a complex multi-agent system. Equilibrium models with heterogeneous agents possessing asymmetric information (models by Levy et al., 2000), resolved by the method of numerical simulation are described in Drašković et al., (2014).

Garcia, Urošević (2006) studied a class of equilibrium with rational expectations and noisy rational expectations in markets with a large number of agents. Specifically, Garcia, Urošević (2006) introduced a new concept of noisy

rational expectations (liquidity dealers, shocks), necessary and sufficient for returns in the major economies where prices are partially uncovered and information are perfectly aggregated, trading behaviour is competitive, or agents acting as price-takers. Their idea of noisy rational expectations has shown that it is necessary and sufficient to have a limited economy with perfectly competitive behaviour. These authors suggest that as long as the noise increases with the number of agents in the economy, competitive equilibrium is well defined and leads to non-trivial information acquisition, perfect aggregation of information and fragmentary revealing prices. In this equilibrium, risk sharing and price revelation play a different role in relation to the standard economy, in which the noisy rational expectations are not negligible. The key difference between the two types of balance lies in the role of informed agents, in particular in their capacity of sharing with a group of uninformed agents. In diversity of noisy rational expectations model the size of informed population is negligible, and uninformed investors are marginal in terms of sharing risk. On the other hand, informed agents are marginal in relation to the information they have on prices. In this way asymmetric information plays a nontrivial role in determining the equilibrium price (Garcia,Urošević, 2006).

EFFICIENT MARKET

In traditional theory of finance there is efficient market assumed by Fama (1970). On such market, there is no space for active investment strategy, because there are no overpriced or under-priced stocks. This theory state that models are based on rational behaviour of investors, which make a good estimation of market prices. In this case, all price volatilities are caused by past events (Minović, 2013). Fama (1970) formulated Efficient Market Hypothesis (EMH) as follows:

- Only prices and data from the past determine in total current market prices. Current prices are memory-free and they are independent and equally distributed among securities (weak form).
- All information available in public determine in total current market prices (semi-strong form).
- All information, including insider information, determines current market prices (strong form) (Hoguet, 2005).

According to Fama's (1970) theory, market is considered efficient according to given set of information if there is no ability to make abnormal profit with trading based on this information. Thus, it's impossible to make abnormal profit with trading based on publicly available information. Fama (1970) provides mathematical model as

$$E\left(p_{j,t+1}\middle|\Im_t\right)=0 \qquad (3.1)$$

where $p_{j,t+1}$ represents difference between real price of security j in moment t+1 and their expected price based on given information set $\Im_t$ (see formula (3.2)).

If expectation, given by formula (3.1), is equal to zero means that there is no chance for investor to beat up market, and that there is no under or overestimated securities in moment *t*. In this case, we can consider stochastic process $p_{j,t+1}$ as a fair game (Andrikopoulos, 2007).

Real abnormal profit is given as difference between real price of security *j* in moment *t*+1 and expected price for same security based on available information set, or

$$p_{j,t+1} = P_{j,t+1} - E\left(P_{j,t+1} \middle| \Im_t\right) \qquad (3.2)$$

where $P_{j,t+1}$ is price of security *j* in moment *t*+1, and *E* is expectation operator.

Fama's (1970) efficiency theory describe that information flows only influence on current prices and that market prices reflect best fundamental values of their basic assets. This theory implied existence of stochastic process with independent, equally distributed binomial randomised variables, known as random walk (Andrikopoulos, 2007).

In the world of classic finance, there is no prize for investors for holding anything but market portfolio. This is based on assumption that investors have rational expectations and that market efficiently aggregate information, where an equilibrium price involves all available information. Price is equal to value of security in the moment of trading, because all available information are discounted and involved in price (Hoguet, 2005). Some of these assumptions are very unrealistic, for example assumptions about total rationality of investors, symmetry of information, homogenous expectation, etc. There is phenomenon in reality which can easily invalidate assumptions given in models of classical finance. Beside, some empirical studies provide totally opposite projections according to analytical models, based on before mentioned assumptions (Martinez-Jaramillo, 2007). Amihud et al. (2005) state that classic theory of asset pricing without arbitrage stand on assumption of liquid markets. Literature dealing with liquidity implies that there is not such a thing as totally liquid market, but neither that nor all investors have same information nor they are all active on market all the time (Amihud et al., 2005).

Empirical testing of EMH theory is problematic. But, empirical evidences against market efficiency and theoretical linear relation between risk and expected return can be enough to eliminate assumptions needed for classical theories. Literature related to basic anomalies of market is one of major challenges in modern finance research and provide an opportunity of escalation of new research area, such as behavioural finance (Andrikopoulos, 2007).

PROBABILITY OF INFORMED TRADING

Behavioural finance supporters argue that investors tend to over-react to the recent information received. This would mean that the information that they thought as crucial had become of less important character in relation to the newly arrived

information. If the market reaction to the initial information is unbiased, one can expect that new relevant information has an equal chance to reverse the action price in the opposite direction from it reply to the initial information. However, if the initial information on the market is overweighed it will not happen (Haugen, 2002).

Here, we present measure of level of information asymmetry or probability of informed trading (PIT measure) and its characteristics. PIT measure is introduced by Easley,O'Hara (1987,1992) from the market microstructure model. PIT measure cannot be measured directly, but it is necessary to evaluate it by the numerical maximization of the credible function by specified theoretical model (Yan, Zhang, 2006). PIT is evaluation of the information fragments based on orders, meaning it is based on the imbalance between the purchase and sale of certain assets.

Considering a model that reflects trading as recurring daily play between risk-neutral competitive creators of markets and two kinds of traders: informed and uninformed. Market creators set the buying and selling prices on the basis of their assumptions on basic correct value of assets. In that way PIT measure plays an important role on the market makers assumptions because they can only observe the outcome (order) of the market trading having no possibilities to distinguish informed and uninformed traders. From the econometric point of view, for a given specific outcome (order) of trading, PIT can be calculated through the evaluation of the group of the structural parameters in the model (Li, 2008). Trading occurs over t = 1, ..., T of possible discrete trading days. Every working day (or day of trading), private information appear with probability α, in which case the probability of bad news is ι, and a good ones (1 - ι). Traders who have information about the bad news sell assets while those who have information about the good news buy them. All merchants come to the market following an independent Poisson process (Easley et al., 2002). Easley, O'Hara & Saar (2001) define information events as private if they affect trade, and the public ones if they do not affect it. Public information can cause price changes. A small number of trading or complete absences of trade is mainly generated from the events of public information (Easley al., 2001).

If the private information about the event appears, to informed traders it arrives according the η rate, to unenlightened customers arrive at a rate φ_b and to uninformed sellers arrive at the rate φ_s. If there is no information about an event, the received rates of uninformed buyers and sellers remain unchanged. The function of the credibility of the total number of purchases and sales on one trading day is (Easley et al., 2002):

$$L\left((B,S)\middle|\theta\right)=\alpha(1-\iota)e^{-(\eta+\varphi_b+\varphi_s)}\frac{(\eta+\varphi_b)^B(\varphi_s)^S}{B!S!}+ \\ +\alpha\iota e^{-(\eta+\varphi_b+\varphi_s)}\frac{(\eta+\varphi_s)^S(\varphi_b)^B}{B!S!}+(1-\alpha)e^{-(\varphi_b+\varphi_s)}\frac{(\varphi_b)^B(\varphi_s)^S}{B!S!} \tag{4.1}$$

where (B, S) represent the total number of purchases and sales for the day, and $\theta=(\eta,\varphi_b,\varphi_s,\alpha,\iota)$ is a vector of parameters. Introduced is the assumption that the

days are independent, and the credibility function for T day is simply the product of the above daily functions of credibility, consisting of independent identically distributed variables along all day in the model (Easley et al., 2002

$$L\left(\theta|M\right)=\prod_{t=1}^{T}L\left(\theta|\left(B_t,S_t\right)\right), \qquad (4.2)$$

where $M=\left(\left(B_1,S_1\right),...,\left(B_T,S_T\right)\right)$ represents a collection of data (Yan, Zhang, 2006). The measure probability of informed trading, or measure of information asymmetry is defined as: $PIT=\dfrac{\alpha\eta}{\alpha\eta+\varphi_S+\varphi_B}$ (4.3)

where $\alpha\eta+\varphi_S+\varphi_B$ is the incoming rate (speed) for all orders and $\alpha\eta$ incoming rates for orders based on information. The quotient represented by equation (4.3) is part of the order arising from informed traders, or the probability that the opening trade is based on information (Easley et al., 2002). In other words, this measure describes the percentage of trading based on private information of all observed trading. The higher value of these measures means a greater degree of information asymmetry, and consequently the lower liquidity (Li, 2008).

Maximizing credibility function represented by equation (4.2) according to the parameters θ obtained is the evaluation of the structural parameters. To achieve the solution the technique of numerical maximization (Yan, Zhang, 2006) is used. Easley et al. (2002) recommend numerical maximizing of the following likelihood function:

$$L\left(\left(B,S\right)_{t=1}^{T}\middle|\,\theta\right)=\sum_{t=1}^{T}\left[-\varphi_b-\varphi_s+M_t\left(\ln x_b-\ln x_s\right)+B_t\ln\left(\eta+\varphi_b\right)+S_t\ln\left(\eta+\varphi_s\right)\right]+ \\ +\sum_{t=1}^{T}\ln\left[\alpha\left(1-\iota\right)e^{-\eta}x_s^{S_t-M_t}x_b^{-M_t}+\alpha\delta e^{-\eta}x_b^{B_t-M_t}x_s^{-M_t}+\left(1-\alpha\right)x_s^{S_t-M_t}x_b^{B_t-M_t}\right] \qquad ,..(4.4)$$

where $M_t=\left(\min\left(B_t,S_t\right)+\max\left(B_t,S_t\right)\right)/2$, $x_s=\dfrac{\varphi_s}{\eta+\varphi_s}$ and $x_b=\dfrac{\varphi_b}{\eta+\varphi_b}$ (Yan, Zhang, 2006). The advantage of using this factorization is to increase efficiency and reduce truncation error. This is particularly important for actions that have a large number of buying and selling, because without factorization it would be necessary to take trading frequency parameters (that is jest η, φ_b, or φ_s) that are equal to the actual number of trading (that is B or S). This has usually caused problems of underflow over flow of numerous computers' software (Yan, Zhang, 2006).

Evaluation of PIT measures may be biased. To control potential bias in evaluation of PIT measures Easley et al. (2002) used the instrumental variable, while Vega (2006) used the so-called bootstrapping methods. Brown et al.(2004)

verify the robustness of their empirical findings by filtering PIT score. Yan, Zhang (2006) propose a method for overcoming the bias related to the evaluation of PIT rates. Bias occurs when the procedure of the numerical maximization generates solutions. Yan, Zhang (2006) have reported evidence that investors tend to sell losing assets at the end of the year due to tax incentives and buy winning ones at the beginning of next year. This behaviour leads to seasonal changes in trading based on information. Vega (2006) also used the PIT measure. He empirically measured the impact of private and public information. Vega (2006) concludes that all information have the same effect on the efficiency of markets. He argues that it is irrelevant whether the information is public or private. In his opinion, it is essential that the information is related to the incoming rate of the informed or uninformed traders (Vega, 2006).

IMPACT OF ASYMMETRIC INFORMATION ON THE EXPECTED RETURN

Easley et al. (2002) investigated the role of information on which trading is based and how they affect the return of assets. They believe in a dynamic market the prices of assets are continuously adapting to new information. These authors claim that the process in which asset prices become information effectives cannot be separated from the process of creating assets return. Easley et al. (2002) assessed PIT measure by using high-frequency data for the assets on the New York Stock Exchange (NYSE) for the period 1983-1998. The assessment result is the likelihood time series of trading based on the information for individual actions and for the large number of shares. They questioned whether this probability information affects the assets returns including the measure in the Fama-French's (1992) model for the valuation of assets. Their main result is that information affects prices of assets: stocks with higher PIT measures require higher rates of return. In fact, they found that the difference of 10 percentage points in the probability of trading based on information between the two actions leads to differences in their expected return of 2.5% per annum. These authors interpreted their results as a strong support for the hypothesis that information basically affects the prices of assets (Easley et al., 2002). Easley et al. (2002) found that across all of the securities, the probability of information-based trading, as a measure of liquidity, has a large positive and significant effect on securities return (Ammihud, 2002). They argue that the information risk can be evaluated. O'Hara (2003) analyses the impact of asymmetric information on the portfolio selection and evaluation of the assets in the context proposed by Grossman, Stiglitz (1980). O'Hara (2003) focuses on the differences in the election of the portfolio between informed and uninformed agents, as well as the effects of asymmetric information on the size of the risk-premium (O'Hara, 2003; Biais et al., 2004). Easley, O'Hara (2004) prove that information asymmetry affects the prices of assets in the balance. Wang (1993, 1994) also studied the effect of information asymmetry on the desired return in his dynamic model.

Li (2008) examined the independent and dominant effects of the levels of liquidity, information asymmetry and divergence in the attitudes of the assets returns in an emerging market, China's stock market. He used Ammihud's (2002), liquidity measure, termed as variable ILLIQ, considering the PIT variable represented by equation (4.3) as a proxy for information asymmetry. In addition, he took the variable OBS as an approximation for the divergence of views. Li (2008), using cross-regression examined how each variable ILLIQ, PIT, OBS[16], affects the return of assets (Li, 2008):

$$R_t^i = \kappa_{0,t} + \kappa_{1,t}\hat{\beta}_{p,M} + \kappa_{2,t}SMB_{i,t-1} + \kappa_{3,t}HML_{i,t-1} + \kappa_{4,t}ILLIQ_{i,t-1} + \varepsilon_{i,t}, \quad (5.1)$$

$$R_t^i = \kappa_{0,t} + \kappa_{1,t}\hat{\beta}_{\mathrm{p,M}} + \kappa_{2,\mathrm{t}}SMB_{i,t-1} + \kappa_{3,t}HML_{i,t-1} + \kappa_{4,t}PIT_{i,t-1} + \varepsilon_{i,t}, \quad (5.2)$$

$$R_t^i = \kappa_{0,t} + \kappa_{1,t}\hat{\beta}_{p,M} + \kappa_{2,t}SMB_{i,t-1} + \kappa_{3,t}HML_{i,t-1} + \kappa_{4,t}OBS_{i,t-1} + \varepsilon_{i,t}. \quad (5.3)$$

Then, he gathered all the variables in one regression equation, to see which variable has a dominant effect on returns (Li, 2008):

$$R_t^i = \kappa_{0,t} + \kappa_{1,t}\hat{\beta}_{\mathrm{p,M}} + \kappa_{2,\mathrm{t}}SMB_{i,t-1} + \kappa_{3,t}HML_{i,t-1} + \kappa_{4,t}ILLIQ_{i,t-1} + \kappa_{5,t}PIT_{i,t-1} + \\ + \kappa_{6,t}OBS_{i,t-1} + \varepsilon_{i,t}. \quad ...(5.4)$$

Li (2008) has shown that stocks with higher levels of liquidity, and lower information asymmetry, or lower levels of differences in attitudes, show significantly lower returns excess. What is more important, explanatory power of liquidity level in the asset return reflects only through information asymmetry or the disagreement of opinion. Moreover, the author finds that there is no evidence of dominating effect between information asymmetry and dissenting opinions when considering their impact on the return of assets. These findings confirmed the fact that information asymmetry and disagreement in attitudes both affect the level of liquidity. Li (2008) confirms that asymmetric information can only partly explain the dispersion positions along the investors in the Chinese stock market.

Biais et al. (2004) created theoretical and empirical analysis of the impact of heterogeneous information on the valuation of assets in the balance, and the selection of the portfolio. Their theoretical analysis is based on Admati (1985), which means that in addition to the total of partial information, portfolio separation theorem does not apply. Strategy buy-and-hold is not optimal, and investors should structure their portfolios using information contained in the prices. These authors applied the price-contingent portfolio allocation strategy, and show that this strategy economically and statistically outperforms passive or index buy-and-hold strategy. Thus, they show that prices reveal information, which is contrary to the homogeneity of information in the CAPM-in. This is in line with the balance of Noisy Rational Expectations Equilibrium (Biais et al., 2004).

[16] OBS measure presented and described in Minović (2013).

BENEFITS AND DISVANTAGES OF THESE MODELS

Eltonet et al. (2007) suggest two opposing problems related to explain the anomaly of assets evaluation by using behavioural models. The first problem is that there is no single, consistent model of the investor behaviour. Thus, while the classical theory such as CAPM has unequivocal empirical predictions, most behavioural models lack them. Investor overreaction is in accordance with one kind of heuristics, while the overconfidence is in accordance with the second. This problem can be interpreted as a sign that this field of behavioural finance has no developed, complete, internally consistent model of investor knowledge and action, which can be tested. Another problem is that most of the empirical research in the field of behavioural finance does not use data on investor behaviour (behavioural data). Elton et al. (2007) point out that investor psychology affects stock prices. However, testing whether the investor psychology can affect behaviour and whether this behaviour in turn can impact on the price, requires much more data and significant analysis.

Models that take account of asymmetric information and heterogeneity of investor expectations, and can be empirically tested have advantages because their dynamics can be studied using powerful tools of mathematical analysis (Anufriev, 2005). Empiric models have an advantage over the simulation models because they can help to present realistically the actual effects and trends in the markets if data are available. The main disadvantage of the empirical models is very restrictive assumptions needed to be introduced to ensure analytical solution. On the other hand, using models made for simulation on computers very realistic simulation of the capital market became available. Taking advantage of modern computer processes and simulation techniques, it is possible to confront the real market data with the real market with the results of "microscopically" realistic simulation market models. Traders on the stock markets behave in different manners in dependence of their individual preferences, attitudes towards risk, expectations, resources, memory and data processing capabilities. The so-called microscopic simulation is an alternative to a representative individual method (Solomon, 1999) .The main advantage of simulation modelling are that these models do not impose any assumptions and therefore have no limitations. Simulation models actually enable researchers to a high degree of flexibility (Levy et al., 2000; Anufriev, 2005).

General view is that models of traditional financial theories have very low explanatory power, and more importantly have a very low predictive power (Haugen, 2002). Haugen (2002); Andrikopoulos (2007) suggest that investors are very interested in the predictive power of the model; therefore the model of behavioural finance will have superiority over the traditional theory.

CONCLUSION

The paper presents an empirical model of Easley et al. (2002) as well as a measure of the degree of information asymmetry so called probability of

information trading (PIT measure). Easley et al. (2002) have empirically demonstrated the impact of asymmetric information on the assets valuation. It turns out that the heterogeneous information caused by levels of market liquidity has a great significance on the expected returns. Liquidity depends definitely on the information. The "perfect" and complete markets, with extensive and available information of all market participants, and a complete set of securities, present poor liquidity problem. The assets can be traded at its "basic" values, the solvent institutions will always be properly funded and risks can always be assessed and distributed to agents affected by risks. However, markets are not perfect. In particular, those are not emerging and frontier financial markets such as Serbia. Presented is an information asymmetry which means that borrowers (issuers of securities) know more about the risks than lenders (or purchasers of securities). Consequently, market participants may be reluctant to trade the assets whose characteristics and behaviour under varying economic conditions are not well known. Uncertainty in the market can affect the liquidity in two ways: the impact on the information and the impact on the market dynamics. In times of crises, when uncertainty increases, all the trading can become impossible, and market liquidity disappears (Banque de France, 2008). Akerlof (1970) showed that the market liquidity is inversely related to the degree of information asymmetry common among economic agents. He believe that the market can completely disappear (which is the most extreme form of illiquidity), if the information is sufficiently asymmetric (Akerlof, 1970). With this attitude goes along the attitude of Šoškić, Živković (2007) which stated that the risk of adverse selection, caused by information asymmetry, can ultimately stop a financial activity completely.

Specially, in the Serbian market, being a small frontier market the information asymmetry is represented significantly. Reporting to the public in Serbia has no serious rules, but it all comes down to the mass use of insider information. The problem with this issue is that it is quite impossible to decide whether one is dealing with pure manipulation or reliable information. In circumstances when it is not possible to consistently estimate which information is correct and which is not, it is better not to have any, but have false information. Šoškić, Živković (2007) suggest that the state regulation is a basic form of the elimination of information asymmetry. State regulation by increasing the information available to investors reduces the risk of adverse selection necessary for the efficient functioning of the public securities market (Šoškić, Živković, 2007). To analyse the impact of illiquidity on the expected returns it would be useful to determine the PIT measure for frontier markets (e.g. the Balkans) and use regression equations to examine the impact. This PIT measure (the probability of trading based on the information) would be a useful indicator of illiquidity of frontier and emerging markets due to the extreme informational asymmetry in these markets. However, PIT measure is empirically impossible to locate due to lack of data at frontier markets. Therefore, the empirical assessment of these measures is impossible for frontier markets. It turns out that it is impossible in these markets to examine empirically the impact of asymmetric information on the expected returns.

However, the future research could contain numerical simulation of some frontier segmented market with agents who have asymmetrical information and heterogeneous beliefs. In particular, it should to make the simulation of the Serbian market, which realistically reflects real behaviour of frontier market. For implementation of numerical simulation it is necessary to know the number of actual investors and their portfolios as well as the capital that they have invested in the Serbian market.

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