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Theoretical Framework for Stock Pricing Process based on Micro-Economic Decision Model

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ABSTRACT

The most common model for asset pricing (CAPM) is problematic and does not match the reality. In this article, I introduce a theoretical framework for a new model which aims at avoiding the problems of CAPM and keeping its advantages, therefore allowing universality of asset pricing. The model is built on the economic principles, using a budget constraint and a Risk Appetite (RA) function. It is based on the micro-economic decision model, involving an expected value and dividing a stock price to objective and subjective prices. As a result, rational based individuals, just like individuals with non-rational factors, may use the model to calculate a future price stock in exactly the same way.

Keywords: Asset Pricing, CAPM, Risk Appetite, Economic Decision Model.

1. Introduction

For six decades CAPM has been a preferred model for asset pricing both by the academia and industry. It gives and shows a simple explanation of expected returns, which is based on the connection between risk and expected rates of return as compensation for the risk. However, it is far from being perfect due to its mismatches of the reality. Because of strong and non-realistic assumptions, the model has created econometric anomalies, which support the wrongness of the model.

Generally, there are two main approaches to asset pricing which bring solutions to the puzzles or anomalies associated with asset pricing. A traditional economic approach sees the solution to any problem only in the economic factors, such as a utility function and consumption or an income, based on the underlying assumption that the economic agents are rational. On the other hand, there is a behavioural economic approach that sees a human as a complicated organism whose decisions are influenced by psychological and sociological factors rather than by economic factors. The reason for such a view is the fact that human nature may be non-rational in the sense of homo economicus, as the traditional approach suggests.

Both approaches have strong evidence of their rightness, but so far both have failed to find a final and efficient solution for asset pricing. Rational behaviour, as non-rational, is observed on the markets, and the theory or models should count all the agents in order to match the reality as much as possible. Combining two main approaches has the potential to create a better explanation for the financial phenomena.

One of the main advantages of CAPM is the ability of a graphical presentation of the model. The visual explanation is easy and understandable even to a naive investor, but due to the model's failure to explain the reality, it is preferred to keep this advantage through finding a better alternative. Another advantage of CAPM is its simplicity and ease of use [Fama, French, 2004]. On the other hand, there are some problems and criticism of the model. The

most problematic is a market portfolio, which theoretically should contain all possible assets that in some part are immeasurable and beta coefficient, which is supposed to be a measure of systematic risk, but in fact fails to do it. Those problems create a distorted explanation of the reality on one hand, and challenge to find a better solution on the other hand.

The model suggested in this paper tries to tackle with the challenge. This is a theoretical framework for the asset pricing process in which I attempt to integrate normative and descriptive approaches into one pricing platform. This article is theoretical rather than empirical. The applied methodology is literature study with a combination of the findings and my own analyses.

Looking at the price nature from a different angle, the model introduces the price as an objective price with its dissonance and assumes a budget constraint. The price is adjusted to something that I call a Risk Appetite (RA). The higher the Risk Appetite, the higher the expected price of an asset. The proposed model should keep the advantages of CAPM and eliminate its disadvantages. The model is stepping forward to the universality relatively to an agent's nature. Both, the rational-based agents and agents using non-rational factors are able to accept it.

The second part of this paper discusses the limitations, advantages and criticism of CAPM. It shows why CAPM fails in general, but is still the most popular and preferred model for asset pricing. In the third section two main approaches to asset pricing and resolving the anomalies with the puzzles are introduced and discussed. In the fourth part I propose a new approach. I show the goals of a new model and explain how it is possible to eliminate the limitations of CAPM through keeping its advantages. Also, I show how the model may gain suitability with rational-based agents and agents using non-rational factors. Next, I show how the suggested model should work and what it contains. At the end of the paper I make necessary conclusions.

2. Theoretical framework

The failure of CAPM does not mean that it does not have any rational points, but it means that the model should be improved through keeping its advantages and eliminating its disadvantages. Consequently, I suggest the theoretical framework that has three main goals - directions:
1) Keeping the advantages of CAPM:
- Simplicity
- Ease of use
- Ability of the graphical explanation

2) Eliminating the disadvantages of CAPM:
- Problematic market portfolio
- Beta coefficient critics
- Better and closer explanation of the reality
3) Possibility for rational based agents and agents using non-rational factors to accept the model:
- Independent of classical economic rationality
- Possibly universal

2.1. Keeping the advantages of CAPM

A simple model means it is intuitively understandable and it looks similar from the past knowledge. Even before knowing or using the model, the agents may recognize its parts due to the analogy with other approaches. The proposed model imitates the microeconomic-decision model of an individual's choice between two different products due to the existing utility function. Hence, in the suggested model, the utility function is replaced with the so-called Risk Appetite, which originally comes from risk management.

When the model is familiar, it is acceptable by the agents as they may easily use it. Moreover, when the model contains fewer simple components, it will be more understandable and easy. Another important ease point is the ability of the model to create a very understandable product with a simple accessible input.

Additional advantage that CAPM has is an ability of graphical explanation. Due to imitating some known models, the proposed model has the same principles and can be represented by similar and familiar graphs. The visual explanation adds a lot to the mathematical explanation.

2.2. Eliminating the disadvantages of CAPM

CAPM has limitations through a clear point: risk and ROR have a very strong connection and only when an individual is ready to take a higher risk may he or she obtain a higher ROR. Those limitations are too problematic. It is possible to get rid of them by improving the CAPM, but it may make the CAPM more complicated and uncomfortable. It is also possible to avoid the limitations by creating a new model. This model is built on a different basis. It has no market portfolio or beta coefficient. It is based on the economic approach: the individual's choice is made by the integration of their Risk Appetite with their desirable ROR.

2.3. Universality

Two approaches, EMH and behavioral finance, which are based on rationality and on possible non-rationality respectively, try to deal with the issue of the econometric anomalies, but no

one gives an efficient solution to it. The issue of rationality is on top of economic sciences. The proposed model uses the so-called Risk Appetite instead of the utility function and universalizes the expectations of all individuals. Whatever the factors that an individual uses to make his or her decision are, it will not affect the proposed model. The fact that the model avoids the utility function makes it suitable with every possible individual.

3. The fundaments of CAPM and its criticism

The modern asset pricing theory started with the „Portfolio Selection: Efficient Diversification of Investments" [Markowitz, H. 1952]. It does not suggest any predictability; the main goal of Markowitz [1952] was to find a way to reduce the investment risk. In his work, he shows that by combining assets on different risk levels, there is a possibility to obtain the same Rate of Return (ROR) with lower risk or to obtain higher ROR at the same level of risk. Consequently, building a portfolio of assets with different risk levels allows reducing its overall risk. Another important point is that such diversification is not endless; it will stop at a best possible portfolio at a given risk level with a respective ROR. Hence, there are a lot of portfolios that could be counted as the best choice. The set of such portfolios is called an efficient frontier, which is a line that demonstrates the most efficient investments. Markowitz [1952] claims that an efficient investment should be done when the chosen portfolio is a part of the efficient frontier; otherwise, it is possible to improve the portfolio by adding more assets. In 1990, H. Markowitz was marked with the Nobel Prize award for his theory.

The idea of modern asset pricing theory lies in the basis of the Capital Asset Pricing Model (CAPM). CAPM was developed and introduced by Treynor [1961, 1962], Sharpe [1964], Lintner [1965] and Mossin [1966] separately. It turned out to be a fundamental asset pricing model for the upcoming econometrical models that test it.

CAPM is a one-factor model that shows how much an investor should be compensated for accepting risk when he or she buys a stock. The higher the risk he accepts, the higher the expected compensation above the risk-free rate. A stock should be chosen due to the Markowitz's efficient frontier in order to obtain a maximum ROR for a given risk level or minimum risk level for a given ROR.

CAPM is logical evolution of the portfolio theory. Its inventors emphasize that it is possible to create a market portfolio, which contains all of the possible assets, including human power, and is situated on the efficient frontier. Such portfolio should have the highest ROR with a given standard deviation. The only thing that should be figured out is a correlation of each asset with the market portfolio, which is represented by a beta coefficient in the model. The only problem is that such a portfolio is impossible to create.

CAPM has been a leading model of the asset pricing for the last six decades. It has been widely used by the academia and financial industry. The main advantages of the CAPM are the ability of graphical explanation and its easiness to use with a very clear output. Its simplicity, however, has two faces; first is the quick and understandable calculation of the expected ROR, when every regular investor may get the concept; the second reason is that the model simplifies the reality too much and totally ignores other important economic factors.

Despite the advantages that the model provides, it is still quite problematic due to some strong assumptions; ignoring specific risk, single-period transaction horizon or borrowing and lending at the risk-free return. Another controversial assumption is the perfect capital market. The assumptions are necessary to make the model work, but they are non-suitable with the reality. The tech testing of the model shared some problems which occurred due to mismatching of the real data to the theory. For example, Roll [1970] stresses the impossibility to observe a market portfolio; Basu [1977] argues that some financial ratios, like earnings–to–price (E/P), have a greater explanatory power; French [1980] observes the so–called weekend anomaly, where the average return on the S&P composite portfolio was reliably negative at weekends; DeBondt and Thaler [1985] show that stocks that had over--performed over long horizons tended to under-perform over subsequent years; Amihud and Mendelson [1986] discover the liquidity anomaly. The most prominent anomaly is the equity premium puzzle, which was discovered by Mehra and Prescott [1985]. They argued that the real stock prices are excessively higher than it should be at a given risk level relatively to the risk-free assets, as the asset pricing theory suggests. In order to match the data, an investor should be extremely risk averted, that is impossible both by the theory and the logic. In the late 1980s and later, many researchers were trying to resolve the puzzle, but no fully efficient solution was found [See: Mehra, 2006 and Große-Rüschkamp, 2012].

The largest criticism of the CAPM is mostly concentrated on the beta coefficient and its estimation methodology. At least three basic

econometric issues related to beta estimation problems are commonly known:

1. beta is estimated under rational expectations and there is no logical justification that an agent is rational only;
2. beta is estimated by a liner regression due to a normal distribution of returns that is not necessarily true in reality;
3. the known issue of problematic observability of a market portfolio which harms the estimation but suggests using a proxy that does not match the reality.

The systematic risk or beta coefficient, measuring it, has been in the limelight since its inception in the 1960s. For the last 60 years, academics and practitioners have been debating the merits of the CAPM, focusing on whether the beta is an appropriate measure of a risk. Moreover, the stability of the beta has always been a concern of empirical studies. The test of the CAPM is the observation of existence of a positive linear relationship between the beta and returns. Although the model postulates a positive trade-off between the beta and expected returns, researchers, in general, always find a weak, but positive beta-returns relationship over the sample period, as shown in Fama and Keneth [2004]. Hence, they claim that the results are inconsistent with the positive linear relationship between the beta and returns as prescribed by the CAPM.

4. Efficient Market Hypothesis and behavioral finance

Since J. M. Keynes introduced his "General Theory", all the economists have been divided in two mainstreams. The traditional school theory believes in the power of the market to regulate itself. It requires no interruptions in a market, because even a minimal interruption (taxation, subsidies etc.) affects the optimum. Keynesian school theory declines the perfectness of the market ability, therefore keeping a place to non-rational factors to influence an individual's decision. Keynesian school argues failure of a market to regulate itself in some areas like producing public goods or resisting the monopoly. From that point, every economic subject has two approaches or visions respectively to the mainstream. It is right to say about asset pricing also, when every mainstream has developed its own strong basis, depending on its vision.

4.1. Efficient market hypothesis (EMH)

This theory was developed by the traditional economy school. The main point is that a human is rational and his or her decisions depend directly on economic factors such as con-

sumption, income, inflation, etc. This theory assumes that an individual has a very clear and understandable preference system that might be represented by the utility function. Another strong assumption is that an individual has access to all needed information and he or she knows exactly how to use it. In asset pricing, this concept is represented in the efficient market hypothesis by Fama [1965].

According to Fama [1965], all possible and relevant information that an investor may have is already reflected in a stock price. The price is a reflection of economic information, but also of possible future information, like an expected profit or a dividend payoff and economic implications of non-economic factors, like political or legal decisions. In his Nobel Prize Award lecture, Fama [2013] argued that such a thing as a bubble cannot exist. There is just an economic situation that is given for some time period. This concept does not decline the existence of investors using non-rational factors, but emphasizes that their influence is minor, and every mispricing created by them is closed by rational-based investors that use the situation as an opportunity to gain an extra profit.

Samuelson [1965] publishes a proof of prices random–walk behaviour if a market holds the EMH. This usually is the theoretical support of the theory of Fama [1965]. Fama [1970] publishes a review of both the theory and the empirical evidence for the EMH. His paper makes an extension and redefinition for the theory. Additionally, it includes the definitions for efficient–market forms. It also claims that the stock market holds the micro efficiency, but not the macro efficiency. Samuelson [1998] shared such an opinion and argued that the EMH is more suitable with individual stocks rather than with the aggregate stock market. Additional strong support of the random walk is issued by Malkiel [1973] in his influential book „A Random Walk Down Wall Street".

4.2. Behavioural finance

Since Kahneman and Tversky [1979] introduced their prospect theory, the second approach which is based on psychological aspects of an investor, known as behavioral finance, was developed. Kahneman and Tversky [1979] show that the human nature cannot be rational in the sense of homo economicus. Our economic decisions depend not only on economic rational factors, but also on emotions, traditions, sociological factors and personality that has its own heuristics.

This concept was widely investigated and put to a test by Shiller [1979, 1981]. He emphasizes that non-rational investing can be obvio-

usly observed by excess overpricing or mispricing of some securities. Shiller [2010] believes that overconfidence, followed by lack of confidence, causes economic volatility. He argues that being consistent with rational expectations means to miss the most important dynamics underlying economic crises –the animal spirit. He thinks that as a consequence, the animal spirit, which was introduced by Keynes, should be integrated into the macroeconomic theory for better understanding of how the economy really works. [Shiller 2010, p. 167-170].

Asymmetric information is able to affect the economic behaviour of an individual, as is shown by Akerlof [1970]. The lack of information keeps a place to beliefs and assumptions about future prices. Brunnermeier [2001] claims that information may be not only asymmetric, but the same public announcement may be understood differently by different individuals due to their different background. Such asymmetry will obviously harm the asset pricing process, both in the static point of time and in a given period with dynamic price changes.

Following the idea of Kahneman and Tversky [1979] that an individual may be psychologically biased, some behavioral models emerged to explain under / overprising. De Long, et al. (DSSW [1990]) demonstrate that investors' sentiments may constantly affect the prices; Barberis, Shleifer and Vishny (BSV [1998]) in their model of investors' sentiment demonstrate how non-rational expectation relatively to price trending wrap the whole prices in the market; Daniel, Hirshleifer and Subrahmanyam (DHS [1998]) demonstrate the price affection of the investors' overconfidence; Hong and Stein (HS [1999]) assume gradual distribution of information. With it Fama [1998] argues that those behavioural models do well on the anomalies they are designed to explain though they confuse a „big picture". In addition, he emphasizes that the models share the same success, as well as the same empirical failure.

4.3. Discussion

Tests of efficiency basically test whether the properties of expected returns implied by the assumed model of market equilibrium are observed in actual returns. If the tests are rejected, we don't know whether the problem is an inefficient market or a bad model of market equilibrium. This is the joint hypothesis problem emphasized in Fama [1970] and in the Nobel Prize lecture [Fama, 2013].

It is hard to believe in the perfectness of the market since nothing perfect was found in the reality. Even if it was, it might bring a market to an undesirable situation, where the market will be dominated by a small group of individuals abusing other individuals. Sometimes an economic phenomenon takes place, because it is driven by the interests of some groups on account of others. That was observed during 2008 in the sub-prime mortgage crisis. The efficient market hypothesis denies the existence of bubbles and crises. All the information is already included in a stock price and every individual understands it and uses it in the right way. This assumption intuitively feels to be strong, it makes all humans identical and equal, which is impossible in real life.

Behavioural finance tries to integrate non--economic factors into the general economic theory. It sees a human not only as a different preference system, but as different nature and background. It also highlights that a market contains heterogeneous individuals with or without rational conceptions. Some market trends exist against rational logic and others as a consequence of public spirit. It is possible to observe some non-economic behaviour on the stock market, like panic. Since the individuals are different, their perception of the same occurrence may be different. Psychology drives the personality and its decisions. However, through a prominent influence of the psychological factors, it is impossible to avoid the rationality of human beings, exactly as we cannot deny the limitations of human nature, which affects our economic decisions. That is why, it is so important to combine the best achievements of the findings of both schools.

5. Economical Approach to Stock Pricing

The proposed model concerns a theoretical framework to determine prices of stocks, but not bonds or the options prices. If necessary, it is possible to make it suitable with those two in addition. Since the model is theoretical with no empirical support at this stage, it turns to economic approach of the stock pricing process rather than to the econometric one. The model is built according to literature study and combining the findings with my own thinking. The basis for the model is whatever expectations for possible future stock prices are. First, an individual should decide what his or her desirable ROR is and then realize the risk level that they have to absorb. Furthermore, an individual sees two parts: his or her budget constraint due to the expected ROR and risk level, which is represented by their Risk Appetite.

Budget constraint: During the valuation of a firm it is often right that the market value of its stock varies from the value of its assets in the books. This dissonance refers to a so-called reputation of a firm and may be positive or nega-

tive. Such dissonance is priced by the investors only. This phenomenon allows representing a stock price (S) as a combination of two parts: a price of true value (*Po*) and its dissonance (*Ps*):

$$S = Po \pm Ps \qquad (1)$$

Po is an objective price that arrives from a book data of a company. Since the data is written and measured in units of money, it is absolute. *Po* comes out of a firm's business activity. Probably, this is a practical result of such activity and has to be embodied in its stock price. Inasmuch as *Po* derives from accounting book data, we may call it true price. This price represents any risk that comes out from a firm. It is derived at micro level. One important assumption must be made about the *Po* – one dollar is one dollar. It means that the assets that are written in the books keep their value with no change even if the market gives an opportunity to gain profits from selling them.

Ps is a subjective price which is derived from traders'/investors' expectations. Due to uncertainty, traders/investors have some assumptions about the stock's future price. The expectations may be both, rational or non-rational as a consequence of lack of information or misinformation. Obviously, irrational investors have place to exist and their expectations affect the stock price as well. On other hand, there are possible changes in macroeconomic environment that does not necessarily affect a firm but have a wide influence on the traders. *Ps* is much more subjective. It complements the gap between the *S* and *Po*, so it is possible to call it the dissonance. In the stock price, the dissonance is the aggregation of all expectations of the agents. This price represents any risk that comes out from the aggregation of investors' decisions, for example due to the utility function, and it is derived on the macro level.

Investors mostly are risk averted. They ask for compensation for their investing in a form of ROR - rate of return. Higher risk requires higher compensation. However, when a shock happens, prices of all stocks fall down with no relation to risk. This way a panic twists the picture of the whole stock market. The expected rate of return is given by the following formula:

$$ROR = (S^1 / S^0) - 1 \qquad (2)$$

or due to equation (1) it is possible to write as well:

$$ROR = ((Po^1 \pm Ps^1) / S^0) - 1 \Rightarrow 1 + ROR =$$
$$= (Po^1 / S^0) \pm (Ps^1 / S^0) \qquad (3)$$

where S^1 represents the future stock price and S^0 represents the present stock price and hence is known.

The distribution of the stock prices is lo-gnormal. Therefore, equation (1) may be written as *ln(S) = ln(Po) ± ln(Ps)*. By running the regression of *ln(S)*, it is possible to obtain the coefficients: α is for (*Po*) and β is for (*Ps*). Since the present stock price and the future stock price are a part of the same regression, the co-efficients must hold. It is possible to write the equation (3) as follow:

$$1 + ROR = (\alpha / S^0)Po^1 \pm (\beta / S^0)Ps^1 \qquad (4)$$

The equation (4) depends on two variables. It looks like a budget constraint with constant SLOPE = α/β. Of course, the coefficients are close to being permanent for some firms, but they vary from a firm to a firm. This demonstrates how many Ps^1 will be changed with one point of change in Po^1 (reminder: S^0 is the present price). When an agent decides about his or her expected ROR, they mind the combination of the stock price.

Let's assume that there are no economic shocks or macroeconomic changes for some short period, e.g. a week. If so, *Po* will not change dramatically. In this case the changes in the stock price come only from *Ps*. *Ps* as a form of expectation is the real price maker. If some macroeconomic shock takes place; the prices will drop down the next day almost in every possible economic sector. However, by observing a firm's activity, there is no dramatic change for it in a very short run. Its *Po* will not be changed unless consumption retreat in some long run. The panic of the investors makes a market price fall even less than a firm's book value by making its *Ps* negative. Due to its flexibility, *Ps* is the real price maker.

In case of macroeconomic shocks the stock price for some period is equal to: S = Po - Ps, which means *Po > S*. This process creates a mispricing of a given stock, so in some long run the mispricing has to be fixed by adjusting one of two possible parts of the price. If a firm was ready or expected the shock and took care of it, its *Po* is not to be changed and, as the panic will pass through, its *Ps* will be adjusted to the same level before the start of the panic. If not, the panic will pull down all the prices and consequently *Po* has to be adjusted to a lower price.

<u>Defining Risk Appetite (RA):</u> Prasanna and Vause [2006] with Gonzalez-Hermosillo [2008] define the *Risk Appetite* as the willingness of investors to bear a risk. This risk is defined in the sense of Cochrane [2001] and the main assumptions are that the investors have rational expectations and the EMH occurs. We can raise a question: what if the expectations are non-rational and the possible utility function is not so comfortable for estimation in real life, as it is assumed by Prasanna and Vause [2006]. The answer is obvious – in order to define risks

and Risk Appetite, it is necessary to avoid the EMH. For this reason, let's turn to the fundamentals of asset pricing.

Let's assume that rational based and non-rational based investors take actions in the trade. The individuals of both groups are risk averted. They prefer a low, but sure ROR. Every group makes its decision by its belonging, e.g. rational traders use a utility function and non-rational ones use non-economic factors. The only way to avoid the differences of those two groups is creating a universal base. It means that every group may use the same instruments for their decision and it will not distort the market.

Johnson [2014] shows a binomial model in which the present stock price S^0 is the mean of two future possibilities when a future stock price may get the values of S^1 and S^2, relatively to the state of nature, where $S^1 > S^0 > S^2$ to avoid the arbitrage. It is given as follows:

$$S^0 = S^1 \pi + S^2 (1 - \pi) \qquad (5)$$
$$S^2 = (S^0 - S^1 \pi) / (1 - \pi) \qquad (6)$$

where π is the subjective probability to obtain higher future price S^1. S^1 is the desirable price for an agent and its probability is positive for him or her. In this case, the risk is to obtain S^2 and its probability is negative in the agent's vision. Probably, the risk is not to obtain S^1.

S^2 is undesirable for an agent, but the willingness to apply this price opens to an agent an opportunity to obtain the desirable S^1. In other words, the willingness of an agent for a loss gives him or her a possibility to gain. When an agent is ready to lose more (i.e. lower S^2), they may gain more, and the equation (7) reflects this trend. An individual minds all possible risks that are relevant to him or her. After a calculation, he aggregates the risks into money gain or loss and the result of such calculation is a possible future stock price. In other words, an agent calculates a possibility to obtain a stock price S^1 in some subjective probability due to his own beliefs. Once an agent has a decision about his minimum S^2, all possible combinations of the subjective probability π and the S^1 are acceptable to him. It creates a kind of an indifference loss curve which represents the Risk Appetite of an agent:

$$RA = (S^0 - \pi (Po^1 + Ps^1)) / (1 - \pi) \qquad (7)$$

The *Risk Appetite* is the willingness of an agent to absorb a maximum loss level. It depends on a future stock price and hence is influenced by two variables which are Po^1 and Ps^1. Moreover, the subjective probability with future stock price is undependable from the EMH and still unique for every individual. The calculation of a set of π and S^1 is used to define the RA but every agent makes his own calculation,

based on his own vision of the future. *RA* has its maximum. The maximum possible loss is the value of the stock price today and it holds when $S^2 = 0$. Also, there is no possibility of *RA < 0*.

The integration of a budget constraint and RA: The integration of *RA* and the budget constraint indicates the maximum risk level that individuals should bear with their ROR. The integration point indicates what the future stock price should be in order to obtain the ROR with his level of risk. Although this point should reflect the future objective price, which derives from a firm book data and the future subjective price which derives from an agent's expectations.

The desirable ROR^1 is the variable that an agent expects from holding a stock. From the budget constraint an agent's subjective price is dependent on the firm's activity and the possible information, as shown in equation (8), which is derived from equation (4):

$$Ps^1 = (So*(1 + ROR^1) - \alpha Po^1) / \beta \qquad (8)$$

Combing equations (8) with (7) we have:

$$RA = (S^0 (\beta + \pi + ROR^1) - \pi Po^1 (\beta + \alpha)) / \beta (1 - \pi) \qquad (9)$$

Equation (9) depends on Po^1, other variables are known for individuals since they decide about them. S^0 is observed on the market. *RA* is the willingness of an agent to bear a loss and according to the equation (9), it does not depend on the subjective price Ps^1, which is not directly observed. Po^1 is somehow predictable and hence the required level of *RA* may be figured out from the impact equation (9). Since *RA* is known, Ps^1 can be further figured out. After that, according to the equation (1), the future stock price can be found.

6. Conclusions

The main purpose of the article is to introduce a theoretical framework for asset pricing, based on the micro-economic decision model, through keeping advantages of the CAPM, avoiding its problems and making the model suitable for both rational and non-rational individuals. The framework for the stock pricing process presented above answers the proposition. It is built on another, more universal base and allows predictability about the future stock price for an individual.

On the micro level, an individual, based on the suggested framework, may predict a future price for a stock. Based on this prediction an individual will be ready to propose his or her own price for buying a stock, or to decide to avoid the transaction whether being rational-based or not. On the macro level, the aggregation of all the proposals is formatting the demand or

supply for a stock, depending on the expectations (optimistic or pessimistic). Subjective probabilities on the micro level are aggregated into an objective observable probability on the macro level.

Another important point of the article is that the model turns towards universality. It allows individuals based on rational and non-rational expectations to use the model and to generate the result in exactly the same way. The reason is that the model is based on the financial mathematics rather than on the personal factors determining the behaviour of an individual. All the individuals are driven by their personal factors that are known only to themselves. Those factors are reflected in their behaviour that is observable. That is why the model should avoid the personal factors, but still be consistent with the observable reality.

Such universality allows avoiding some problematic points of both traditional and behavioural approaches. The CAPM has several mismatches due to its strong assumptions on the one hand, and due to several controversial components, like the market portfolio, on the other hand. The behavioural approach leans on psychological factors that are difficult to observe or create an appropriate measure. The suggested framework considers an individual behaviour and uses a microeconomic model--like approach that is free from creation of the market portfolio. The risk compensation is due to the willingness of an individual to bear a risk. Within the suggested framework, more objective measures are taken into account.

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