

**ANALYSIS AND MODELATION OF THE CONSUMER'S BEHAVIOUR OF FINANCIAL PRODUCTS
ON THE ROMANIAN CAPITAL MARKET**

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Abstract: The study of the consumers' behavior of financial products is based upon the hypothesis according to which they behave rationally that is they try to aim their objectives at the highest level possible, taking into account the restrictions that they are forced to face. Having this context the basic idea that guides the consumers' behavior of financial products is maximizing the forecasted utility. Utility will be maximized when a certain combination of forecasted gains and risks is preferred in report with the other combinations. The consumers of financial products establish their objectives in the conditions of the estimated risk and profitability and they have to make a choice taking into account the uncertainty conditions.

JEL classification: G00, G11

Key words: consumer behavior, financial product, utility function, risk, uncertain

Introduction

At the beginning of this century the world is passing through a period of profound changes, of social, economic and financial crises, changes concerning the political regimes and the structure of the global economy through the integration of the financial flows, fact that favors the global economy's development.

Globalization – a long discussed process – represents a reality whose consequences are felt by everyone. The global economic integration was accelerated on different directions, the speed being a characteristic of these times. Information travels faster and faster, the access to information is easier to be obtained due to technological evolution and this fact makes that the environment we live in to continuously change. Each domain of activity is influenced by this process and the financial markets are considered a real engine for globalization.

The process of globalization is stirred by two phenomena with profound impact upon the evolution of the human society that is the technological progress within the domain of information processing and circulation and the markets' liberalization tendencies, especially the capital one that determines movements of capitals towards the areas that offer higher profits.

In the financial sector, nowadays, one can observe a tendency of concentration that will give birth to great financial corporations. The existence of such financial giants and the necessity of existing a new economy's settlement background and adequate control are two aspects that can be in argument because the great corporations do not

want a strict settlement of the financial sector, being interested in the markets' larger opening. Nevertheless the central banks should exert a closer supervision of the financial activity together with the discouragement of speculative capital movements, so that when making for an immature market with a fragile institutional environment should avoid severe impacts.

Animated by the desire of answering the customers in the best way possible but taking into account the market risk reduction, the access to new resources, within the global approach of markets one can observe the companies' closer and closer tendency of collaboration. Competition, technologies, markets' reorganization and not at last the consumers' behavior are determinant factors for the convergence of industries, tendency that occurs more and more at present.

Analyzing the evolution of the international financial market one can say that the future global financial market will be characterized by the existence of some great financial holdings built around the greatest commercial banks. And this due to the fact that within the commercial banks there is already a structure (Basel Committee for Banking Supervision) that tries to settle a unitary frame in establishing the activity on financial markets. The greatest problem that has to be surpassed in order to get to the stage of global financial market is the one regarding the settlement of risk administration.

The infrastructure of the global financial market will be built through the development of the existing informational networks, especially the internet. The informational networks of the global financial market will turn into networks with a high level of security that will allow not only the flow of financial transactions from any geographical point on the globe but the access to pertinent and verified information as well.

The transactions' clearing house will be made through informatics systems of the interconnected financial centers, thus forming a system of global clearing house.

It is obvious the fact that when there will exist a global financial market we will not speak of national financial markets, neither of the categories of consumers specific to different countries. The integration of the Romanian financial market on the global financial market will be made through the integration into the financial market of the European Union, together with its development at global dimensions.

Taking into account that the greatest financial institutions that carry their activity in Romania are institutions with foreign capital and they are part of financial groups with international activity and the banks with Romanian capital will be achieved by international financial groups and analyzing the rhythm of development and reorganization of the Romanian economy with the purpose of adapting to the realities and exigencies of the developed economies, we consider that there is not any possibility that in future a financial institution with Romanian capital to become a financial group that should activate on the global financial market. The most probable, Romania's integration within the global financial market will be achieved through the participation of the capital market through the Stock Exchange (that will form a single entity that should include RASDAQ market, the Financial Monetary Stock Exchange and Sibiu Stock Exchange), at the formation of a regional capital market.

The only alternative for the Romanian financial market to be visible and to have an important role within the context of globalization is that Romania should create a specialized market for a completely new financial product that should answer efficiently to the global consumers' necessities for such products.

The financial product can be regarded from a double point of view. On one hand the product is destined to customers and is defined according to this. The financial products are immaterial, the customer being the one who gives them birth. On the other hand, the delivery of a product to a customer requests the attendance of a set of operations, very often with an administrative character. So a financial product is requested initially by a customer and its transmission is accompanied by a set of operations.

At present, on the financial market any person has the quality of a consumer. The consumers are divided into two categories – individuals and companies, categories aimed by the institutions that offer financial products and services. This segmentation has as a background different documents requested by each of these categories when they want to buy a financial product or service.

Within the two categories of consumers one can find more sub-categories, division achieved after different criteria. But irrespective of the criteria of division, of the category that he belongs to, each consumer is viewed individually by the financial banking institutions from reasons of risk guarantee that these institutions assume in their activity.

On the banking financial market there is a high level of personalization among services and products, which, in the case of banks does not aim the highest level of satisfaction of the consumers, but the need to cover the risk of the banking financial institutions. Unlike banks, the societies of financial investment services aim the consumer and his needs' satisfaction at the highest level.

In an extended acceptance, a consumer of financial banking products can be considered any investor fellow, starting with the one that has deposits in the bank and ending with the one that buys a commercial society listed at the stock exchange.

Any decision of a consumer on the financial market must have at the base the definition of at least 5 aspects, namely:

- a) establishing the profitability objectives (with this indicator one can compare different opportunities of investment and according to the established level as a target, one can set the structure of the investment portfolio);
- b) establishing the time horizon for the investment (that is establishing the period of time in which the profitability objectives should be achieved);
- c) establishing the investor's risk profile that is tightly connected to the aimed objective of profitability, the risk of an investment being directly proportional with its rated capacity. From the risk's profile point of view, investors are divided into three categories: investors with risk aversion, neutral ones but with preferences for risk as well;
- d) establishing an amount of money that will be invested. There is a principle according to which it is good to invest as much as the investor affords to lose. Omitting this recommendation, that views more the investor's psychic comfort, the invested amount depends on a lot of factors among which we can mention: the investor's liquidities, the incomes that he obtains on a constant base, his risk profile, the proposed level of profitability and the future usage of the amounts gained from investment;
- e) establishing the structure of the investment portfolio, that depends mainly on the investor's risk profile, as well as on the associated risk of different financial instruments (quantified by different companies of specialized rating).

Analysis consumers' behavior

The study of the consumers' behavior of financial products is based upon the hypothesis according to which they behave rationally that is they try to aim their objectives at the highest level possible, taking into account the restrictions that they are forced to face.

Rationality on financial market implies a lot of hypotheses, among which there can be mentioned:

- portfolios' formation is made according to the criteria of profitability and risk;
- the market's portfolio is a reference point for any formed portfolio;
- the portfolio can change due to the appearance of new, relevant information that can be perceived identically by investors.

Having this context the basic idea that guides the consumers' behavior of financial products is maximizing the forecasted utility. Utility will be maximized when a certain combination of forecasted gains and risks is preferred in report with the other combinations.

The consumers of financial products establish their objectives in the conditions of the estimated risk and profitability and they have to make a choice taking into account the uncertainty conditions. Specialists make appeal to the utility function associated to the amount of money invested in financial titles:

$$U = f(R, \sigma),$$

where U is the utility function in the optimistic probability of obtaining a gain, function that surprises the way the investor evaluates an investment with a certain estimated profitability R and with a certain risk σ .

The utility function is the easiest function to use in choosing among different possibilities. According to the theory of utility the chosen element for an investor is the most useful from the set of possible choices.

The fundamental axioms that permit the construction of a utility function are:

- **comparativeness** that allows the investors to choose between two secure financial titles and two risky portfolios. Thus the first variant A is preferred to the second one B, if $A > B$, B instead of A, if $B > A$ or to be indifferent if $A = B$ and $B = C$ because $A = C$.
- **transitivity** makes possible the choice between three financial titles or portfolios. For instance the investor always prefers A instead of B or C, if $A > B$ and $B > C$ because $A > C$. The investor remains uninterested if $A = B$ and $B = C$ because $A = C$.
- **continuity** allows the investor to find another financial title or to make another portfolio represented by D if $A > B > C$ and there is a probability p for A, $1 - p$ for C. For instance portfolio D is formed of A and C and has the probability $1 - (p + 1 - p)$ and $D = B$;
- **independence** grants the investor's integration of two financial titles or portfolios equal with the same probability with another financial title or portfolio, finally obtaining other portfolios (for example). So if $A = B$ with probability p, there is C with probability $1 - p$ that together with A or B will form portfolio D or E, with probability 1 and equivalents $D = E$.
- **monotony** permits the investor to form the initial portfolios A and B, to prefer one of the two, combining the two financial titles or portfolios C and D ($C > D$) with probability p and q ($p > q$). The result is $A > B$ and the investor prefers A.

The five axioms allow the construction of the utility function associated to the amount of money invested in financial titles or portfolios.

The function $U = f(R, \sigma)$ is an ascending function in report with R for any rational investor. This means that for $R_1 > R_2$ it results $U(R_1, \sigma) > U(R_2, \sigma)$.

In report with σ , the function can be descending for the investors with aversion to risk or ascending for the investors with appetite for risk.

The relation between utility and the capital invested in a portfolio expresses the investor's attitude in front of risk. This attitude can be one of the following¹:

- aversion against risk;
- indifference against risk;
- acceptance of risk

For the **aversion against risk**, the utility function has the following form:

$$U = a - b \cdot c^2, \text{ where } a > 0 \text{ and } b > 0, c = \text{gain}$$

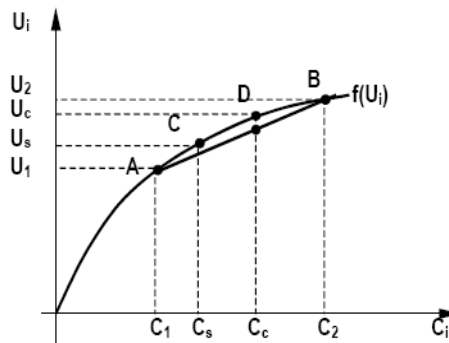


Figure no. 1 Utility and aversion against risk

From the graph's analysis we observe the following things:

- utility increases together with the increase in time of the invested capital;
- the rate of increase at a certain level of the capital is smaller than the rate of increase of the preceding levels;
- the marginal utility decreases.

The investors' reaction in front of the results of the expected utility viewed as a speculation (game), as against the secure results, qualifies the attitude against risk.

We suppose that the symbols from figure 1 have the following significations for the investor:

- the marginal utility is a "game" (speculation) between levels C_1 and C_2 ;
- the expected gain is $x_1 C_1 + x_2 C_2$ where $x_1 = x_2$ and $x_1 + x_2 = 1$;
- the utility of each result is U_1 and U_2 ;
- the expected capital is $C_s = \frac{C_1 + C_2}{2}$ and graphically is represented through the point that is situated in the middle of the right line AB with $A = f(U_1)$ and $B = f(U_2)$.

The expected utility for $U(C_s)$ is U_s . In order to determine the utility associated to a certain capital C_c a parallel crosses D point at the horizontal axis and the point where intersects the horizontal axis is U_c .

One can observe that **the expected utility associated to speculation (uncertainty) is always smaller than the one associated to certainty ($U_s < U_c$)**.

As a conclusion to this, aversion to risk is specific to the investors that accept the certain equivalences of smaller speculations than the expected values ($C_c < C_s$).

Aversion against risk is a geometrical drawing function as it follows:
 $U = a + bC$, with $a > 0$ and $b > 0$

The graphic of this function is presented in fig 2

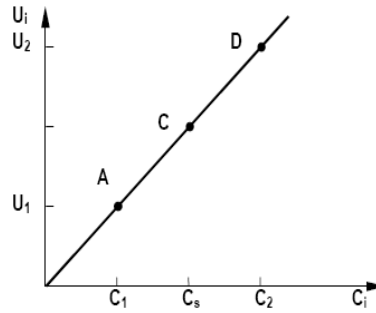


Figure no.2 Utility and indifference against risk

The increase in utility is constant for each successive increase of capital. The indifference against risk is characterized through:

- the investor's constant marginal utility;
- the certain equivalent of speculation equal to the expected value.

The acceptance of risk is not a geometrical drawing function but it has the following form:

$$U = a + b \cdot c^2, \text{ with } a > 0 \text{ and } b > 0$$

The repeated increases of capital determine increases with a higher rate of utility (fig. 3).

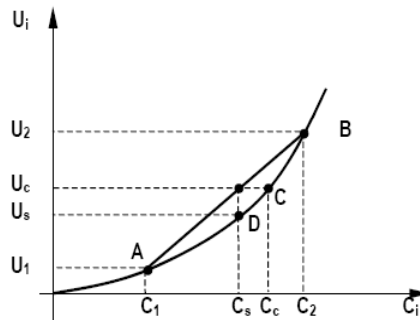


Figure no.3. Utility and acceptance of risk

Within figure no. 3 one can observe that the investor's level of aversion against risk is determined by the nature of the utility function.

The acceptance of risk is characterized through:

- utility increases at an increase of the invested capital;
- the speculation's certain equivalent is often higher than the expected value;
- there is paid a premium directly proportional with the speculation's dimension.

Within financial theory economic agents are considered to be characterized through aversion against risk. Taking into account these conditions, the criteria of

maximizing utility is equivalent with the criteria represented by profitability and risk (expectation for profitability – dispersion).

This criteria evaluates the final wealth and the combination associated to this, according to the correlation between the expectation of profitability and the dispersion specific to these.

In other way, more combinations with different expected profitability will have the same value if they have risks proportionally different and vice versa. Thus, it is nevertheless possible the configuration of some different combinations of forecast gains and risks that have the same signification for an investor. It results that each investor has a set of combinations of profitability and risk, that characterizes his rational behavior. The multitude of these equivalent combinations (with the same signification for an investor) is called *curves of indifference*.

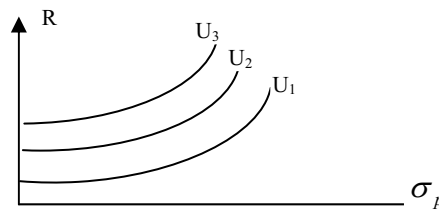


Figure no.4. Curves of indifference between profitability R and the risk σ for different utilities U_1, U_2, U_3

Certainly each investor does not have a single curve of indifference, but an infinite multitude. Each curve represents the multitude of the forecast gains and risks that have the same signification. Each investor will want to place the resources in order to obtain the greatest forecast utility.

In fig. 5 and 6 there are presented the curves for the utility functions that define the aversion against risk at different levels.

In fig. 5 the function's concavity is small and the certain equivalence for the speculated capital C_s is C_d .

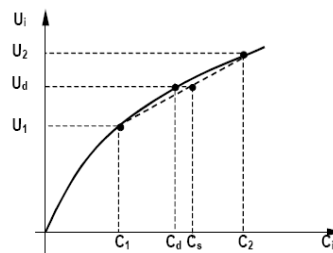


Figure no 5. A smaller aversion against risk

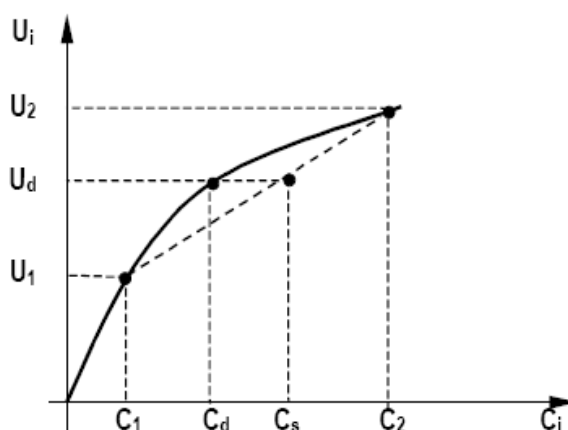


Figure no 6. A greater aversion against risk

In fig. 6 the function's concavity is greater and the certain equivalence for the speculated capital C_s is C_d .

The payment date for a speculation C_s can be calculated to determine the expected profitability of the investment. A greater aversion against risk has a smaller price, than a smaller aversion against risk. The profitability rate is calculated taking into account the following relation:

$$R = \frac{C_s}{C_d} - 1$$

where: R = the profitability rate of the invested capital;

C_s = the expected result of investment;

C_d = the investment's dimension.

It is obvious that the utility function with the greater concavity characterizes the investors that have a greater aversion against risk. In order to obtain the level of aversion against risk there must be measured the concavity of the utility function. Thus risk aversion can be both absolute and relative.

Arrow and Pratt have identified two indicators which can be used to measure the aversion's degree regarding the risk, namely:

- absolute risk aversion (ARA)
- relative risk aversion (RRA)

The absolute risk aversion measures the investor's reaction in front of the uncertain changes of his capital. For a particular capital's level or a utility's curve point, the absolute risk aversion is measured by the relative change which appears on the function's slope at that moment:

ARA ignores the level of possessions:

$$ARA = -\frac{U''(C)}{U'(C)}$$

U' = the first degree utility's function abducted in the utility's curve point corresponding to a level of the invested capital C

U'' = the second degree utility's function abducted

The relative risk aversion measures in percentages the capital's changes uncertainty:

$$RRA = -\frac{U''(C)}{U'(C)} \cdot C$$

Where C= the invested capital.

Between two investors who invest different capitals, the one characterized by a greater risk aversion is the one who has greater RRA. For an investor with a risk aversion, a RRA which decreases with the growth of the invested capital C shows a decrease of the risk aversion correlated with the growth of the invested capital.

For a financial product consumer it is expected that he is aware of the market products prices that he is interested in p_i (for example their stock exchange share rate, bonds etc) , has decided the consume budget B (the amount of money that he is willing to spend to buy the desired financial products) and he couches preferences meaning the utility which he confers to each consumed unit from a certain financial product , utility which he desires to be maximum.

We will note with $x_i, i = \overline{1, n}$ the amount from each financial products which the consumer has in mind.

From a mathematic point of view the combination of the financial products is described by the vector X:

$$X = (x_1, x_2, \dots, x_n)$$

Whereas the consumer's preference in the financial products space is expressed by the utility function $u(x)$ the pattern of choosing financial products by the consumer has the configuration:

$$\begin{cases} u(X) = u(x_1, x_2, \dots, x_n) \rightarrow \max \\ \sum_{j=1}^n p_j \cdot x_j \leq B, \\ x_j \geq 0, j = \overline{1, n} \end{cases}$$

The second condition of the problem is called budget restriction.

This is a mathematical programming problem, which resides in maximizing of a narrow concave function with linear restriction. The solution to such problem exists and it is unique. This optimum solution is called the balance point of the optimum choice of financial products made by the consumer.

The necessary and sufficient conditions to solve the problem are the Kuhn-Trucker conditions for the next Lagrange function:

$$\begin{aligned} L(x, \lambda) &= u(x) + \lambda(B - p \cdot x) = \\ &= u(x_1, x_2, \dots, x_n) + \lambda \left(B - \sum_{i=1}^n p_i \cdot x_i \right) \end{aligned}$$

The conditions are:

$$\left\{ \begin{array}{l} \frac{\partial L}{\partial x_j} = \frac{\partial u}{\partial x_j} - \lambda \cdot p_j \leq 0, \quad j = \overline{1, n} \\ x_j \frac{\partial L}{\partial x_j} = x_j \left(\frac{\partial u}{\partial x_j} - \lambda \cdot p_j \right) = 0, \quad j = \overline{1, n} \\ \frac{\partial L}{\partial \lambda} = B - \sum_{j=1}^n p_j \cdot x_j \geq 0 \\ \lambda \frac{\partial L}{\partial \lambda} = \lambda \left(B - \sum_{j=1}^n p_j \cdot x_j \right) = 0 \end{array} \right.$$

Here the partial abducted and the variables X_1, X_2, \dots, X_n are calculated in the optimum point $(x_1^*, x_2^*, \dots, x_n^*, \lambda^*)$

From the Kuhn-Trucker conditions results that if $x_j^* > 0$ then:

$$\frac{\partial u}{\partial x_j} - \lambda^* \cdot p_j = 0$$

meaning that: $\frac{\partial u}{\partial x_j} = \lambda^* \cdot p_j, \quad j = \overline{1, n}$

Therefore the marginal utilities are in proportion with the corresponding financial products prices.

Geometrically speaking, the previous property means that in the optimum point the normal vector $p = (p_1, p_2, \dots, p_n)$ of the budget hyper-plane and the utility

function gradient vector $grad u(x) = \left(\frac{\partial u}{\partial x_1}, \frac{\partial u}{\partial x_2}, \dots, \frac{\partial u}{\partial x_n} \right)$ are collinear, meaning

$$grad u(x) = \lambda^* \cdot p$$

From the above conditions we deduce:

$$\frac{\frac{\partial u}{\partial x_j}}{p_j} = \lambda^* > 0 \text{ because it is supposed that } p_j > 0, \quad j = \overline{1, n}$$

Therefore the optimum Lagrange multiplier λ^* must be positive and then in the Kuhn-Trucker conditions we have:

$$\lambda \left(B - \sum_{j=1}^n p_j \cdot x_j \right) = 0$$

It results that all income is consumed to acquire the optimum combination of financial products.

From those previous stated we can draw the following conclusions:

- for every financial products consumer exists the utility function , which is his final purpose – to choose a certain financial products combination from the combinations available to him which best satisfies his needs;
- the base restrictions for a consumer are the financial restrictions: total costs for purchasing the financial products can not exceed the sum of his incomes;
- the consumer must divide the available income for investments in such way that the ratio between the marginal utility of the financial product and its price would be the same for all the financial products

The responsible consumers with a good financial education which can trustworthy buy services at the best prices represent an essential component of a unique efficient market. The consumers' capacity to take responsible and informed decisions has a positive impact on long term on both economy and society.

Given those reasons, the financial education must be promoted through all citizens because we all have to take important decisions in certain life situations:

When we ask for a mortgage or study credit, when we invest in stock or bonds market, when we take an insurance policy or when we make reserves for pension.

Nevertheless the intelligent management of personal finances is a true provocation for most people. For most of us it is difficult to keep our budget under control or to make realistic plans for the future. Moreover we are often unable to understand the risks and obligations of some very intricate financial products.

As a result of lack of financial knowledge it is very possible not to choose the products that best correspond to our needs.

Globalization process in the financial domain, even though initially structured around the similar one from the commercial sector has surpass by proportion and rhythm any expectations of the practitioners and theoreticians. The financial globalization effect is noticeable through the increase of the investment opportunities package, those not being limited anymore on national capital markets.

At the same time we can establish an intensification of international competition for investment opportunities that determined an explosive increase of international financial flows particularly in the last twenty-five years.

In conclusion financial education is extremely important for anyone. This way the consumers become aware of the existing financial risks and opportunities and can take decisions regarding the use of financial products.

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