
ELEMENTS OF SIGNIFICANCE CONCERNING THE INTEREST RATE AND ITS ROLE IN THE BANKING ACTIVITY

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Abstract

In this paper, the author presents some significant elements on the interest rate, which plays an important part in the banking activity model. The analysis methods reveal the forms of the interest rate, used by the central bank and those used by the credit institutions. The rates of nominal and real interest are presented, and also the rate of simple interest, the average rate of interest, the composed interest. The purpose of these indicators differs depending on the requirements and activities of each institution.

Key words: interest rate, loans, balance, contract, reserve

A number of introductive notions

According to the Government Ordinance no. 13 of August 24th, 2011 concerning the remunerative and penalizing interest rate for the money liabilities, as well as the regulation of certain financial-fiscal steps within the banking domain, the remunerative interest is representing the interest due by the debtor of the liability bound to give an amount of money at a specific term, calculated for the period previous to the maturity date of the liability, while the penalizing interest is representing the interest due by the debtor of the money liability for the non-fulfillment of the respective liability at the maturity term.

In the specialized literature of the domain, there have been elaborated a diversity of modes to express the interest rate, the author considering as the most relevant the ones submitted below:

- The amount of money which is paid for a loan, representing a certain percentage of the borrowed amount (DEX);
- The price paid for borrowing, respectively, utilizing an amount of money over a certain period of time, namely the amount which the debtor is bound to pay to the creditor, for the money taken as loan (Wikipedia);
- The modality to remunerate the creditor by the debtor for the utilization of the borrowed capital. From this point of view, the interest is representing the “price” of the borrowed capital, being studied as absolute value as well as relative value (Dardac Nicolae, Barbu Teodora, „Currency”).
- The interest rate represents the price which has to be paid, at the time agreed by contract, in order to get promptly a certain number of monetary (Jesús Huerta de Soto, „Currency, banking credit and economic cycles”);
- Price of the goods at the actual moment expressed in goods from future moments (Murray N. Rothbard, „Man, Economy and State: A Treatise on Economic Principles”).

Computing methods for the interest rate

Before submitting the most significant categories of interest rates used in Romania, it is important to point out that one of the instruments of monetary policy utilized by the National Bank of Romania, as central bank, is given by the interest rate (rate of reference). Meantime, the crediting institutions, generally speaking, and the commercial banks, in particular, are utilizing the interest rate as modality to obtain incomes, respectively profit, from the activity of intermediating the demand and offer of capitals. The run activity implies the operations carried on with non-banking clients, with other crediting institutions from the banking system and/or the central bank, setting up differentiated interest rates for each and every category.

Significant aspects of the interest rates applied by the central bank

- *The interest rate of reference* is set up as an arithmetic average weighted with the volume of transactions, the interest rates of the drawn deposits, the reverse repo operations and the repo operations from the month previous to the one for which the announcement is made;

- *The interest rate of monetary policy* is the interest rate applied by the NBR when achieving repo operations, run through auctions over one week period at a fix interest rate;

- *The interest rate relating to permanent crediting facilities* is the rate at which the crediting institutions can borrow for one day time from the National Bank of Romania ;

- *The interest rate relating to permanent deposit facilities* is representing the rate at which the crediting institutions are making overnight deposits (one day time) with NBR by the end of the day.

In this context, in the simplified balance sheet of the Central Bank we shall consider the following structure: gold and foreign currencies 36.000; state bonds 54.000; self-capital 54.000; deposits of the commercial banks (other than the RMO) 18.000 m.u. The centralized balance sheet of the commercial banks at the level of the economy includes the following balance sheet elements: deposits 200.000; cash and immobilized assets 90.000; loans from the Central Bank (rescont) 72.000; state bonds 36.000; inter-banking loans 18.000; self-capital 54.000. Initially, at the moment 0, the rate of the minimum compulsory reserve rata was 12%, afterwards the Central Bank deciding the decrease it at the level of 9% (moment 1) and, respectively, its increase at the level of 14% (moment 2). Meantime, the commercial banks are acquiring from the Central Bank treasury notes amounting 10.000 mil. m.u. The situation submitted above is grasping the general effects of the alterations of the minimum compulsory reserve rate.

The minimum banking reserves established by the monetary authority are calculated in percentages, separately for each category of deposit, applying the relations:

$$RMO = \sum_{i=1}^n r_i \cdot d_i$$

where: RMO = the minimum compulsory reserve expressed in absolute value; r_i = the compulsory minimum rate applied to deposits of type „i”; i = the type of banking deposit; d_i = the absolute size of the deposits of type „i”.

The calculations led to the data included by the following tables:

The moment 0: $RMO = 12\% \cdot \text{deposits} = 12\% \cdot 360.000 = 43.200$ mil. m.u.

Simplified balance sheet the Central Bank (M_0) mil.m.u.

ASSETS	Value	PASSIVE	Value
Gold and foreign currencies	36.000	Self-capital	54.000
Credits granted to Commercial Banks (rescont)	72.000	RMO (Commercial Banks)	43.200
Treasury Notes	54.000	Deposits (other than RMO)	18.000
		Cash (X_0)	46.800
TOTAL ASSETS	162.000	TOTAL PASSIVE	162.000

$$X_0 = \text{Issued banknotes} = 162.000 - (54.000 + 18.000 + 46.800) = 46.800$$

Centralised balance sheet of the Commercial Banks (M_0) mil. m.u.

ASSETS	Value	PASSIVE	Value
Cash and immobilized assets	90.000	Self-capital	54.000
RMO	43.200	Deposits	360.000
Treasury Notes	36.000	Loans from the Central Bank (rescont)	72.000
Deposits to the Central Bank	36.000	Inter-banking loans	18.000
Credits Y_0	298.800		
TOTAL ASSETS	504.000	TOTAL PASSIVE	504.000

$$Y_0 = \text{Credits} = 504.000 - (90.000 + 36.000 + 36.000 + 43.200) = 298.800$$

The moment 1: $RMO = 9\% \cdot \text{deposits} = 9\% \cdot 360.000 = 32.400$ m.u.

The value of the treasury notes: the Central Bank: $54.000 - 10.000 = 44.000$;
the Commercial Banks : $36.000 + 10.000 = 46.000$

Simplified balance sheet the Central Bank (M_1) mil.m.u.

ASSETS	Value	PASSIVE	Value
Gold and foreign currencies	36.000	Self-capital	54.000
Credits granted to Commercial Banks (rescont)	72.000	RMO (Commercial Banks)	32.400
Treasury Notes	44.000	Deposits (other than RMO)	18.000
		Cash (X_1)	46.800
TOTAL ASSETS	152.000	TOTAL PASSIVE	152.000

$$X_1 = \text{Issued banknotes} = 152.000 - (54.000 + 32.400 + 18.000) = 47.600$$

Centralised balance sheet of the Commercial Banks (M_1) mil. m.u.

ASSETS	Value	PASSIVE	Value
Cash and immobilized assets	90.000	Self-capital	54.000
RMO	32.400	Deposits	360.000
Treasury Notes	46.000	Loans from the Central Bank (rescont)	72.000
Deposits to the Central Bank	36.000	Inter-banking loans	18.000
Credits Y_1	299.600		
TOTAL ASSETS	504.000	TOTAL PASSIVE	504.000

$$Y_1 = \text{Credits} = 504.000 - (90.000 + 32.400 + 46.000 + 36.000) = 299.600$$

The moment 2: $RMO = 14\% \cdot \text{deposits} = 9\% \cdot 360.000 = 50.400 \text{ m.u.}$

Simplified balance sheet the Central Bank (M_0)

mil.m.u.

ASSETS	Value	PASSIVE	Value
Gold and foreign currencies	36.000	Self-capital	54.000
Credits granted to Commercial Banks (rescont)	72.000	RMO (Commercial Banks)	50.400
Treasury Notes	44.000	Deposits (other than RMO)	18.000
		Cash (X_2)	29.600
TOTAL ASSETS	152.000	TOTAL PASSIVE	152.000

$$X_2 = \text{Issued banknotes} = 152.000 - (54.000 + 50.400 + 18.000) = 29.600$$

Centralised balance sheet of the Commercial Banks (M_0)

mil. m.u.

ASSETS	Value	PASSIVE	Value
Cash and immobilized assets	90.000	Self-capital	54.000
RMO	50.400	Deposits	360.000
Treasury Notes	46.000	Loans from the Central Bank (rescont)	72.000
Deposits to the Central Bank	36.000	Inter-banking loans	18.000
Credits Y_2	281.600		
TOTAL ASSETS	504.000	TOTAL PASSIVE	504.000

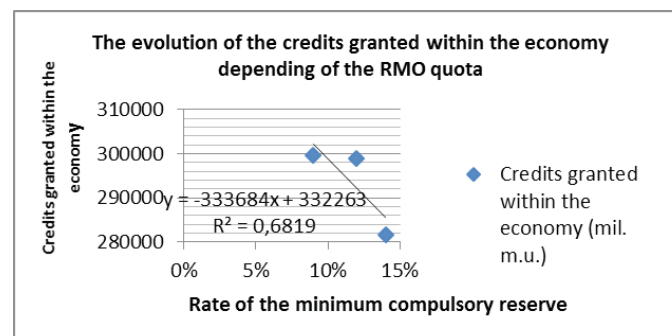
$$Y_2 = \text{Credits} = 504.000 - (90.000 + 50.400 + 46.000 + 36.000) = 281.600$$

Summarising, we get the data of the following table:

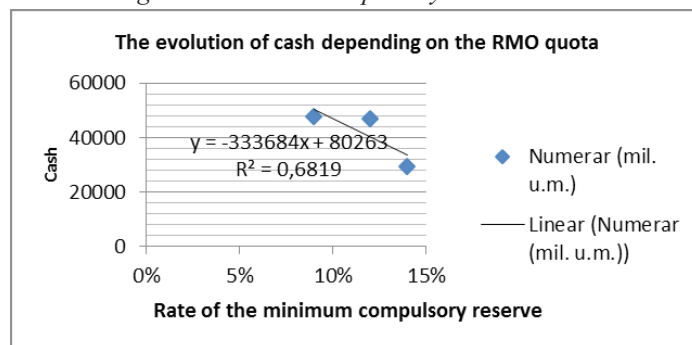
M	Rate RMO (%)	The minimum compulsory reserve (mil. m.u.)	Crediting the economy (mil. m.u.)	Cash (mil. m.u.)
M_0	12%	43.200	298.800	46.800
M_1	9%	32.400	299.600	47.600
M_2	14%	50.400	281.600	29.600

Analysing the outcomes, we state out that the diminishing of the minimum compulsory reserve generated an increase of the volume of the credits granted within the economy by the crediting institutions and of the quantity of banknotes issued by the Central Bank while the increase of the compulsory minimum reserve generate the decrease of these two elements of balance sheet. The representation of the correlation between the variables is submitted below:

Corelograme of the minimum compulsory reserve – credits granted within the economy



Corelograme minimum compulsory reserve rate - cash



The interest rates applied by the crediting institutions

- *Interest rates relating to the operations with non-banking clients for deposits and credits.* The interest rates relating to the deposits made up by the clients are called passive rates of the interest as, for the crediting institutions, these elements of balance sheet are sources of financing, being included in the category of debts (balance sheet passive). The interest rates relating to the credits are called active rates of the interest as they are representing the utilisation of the resources of the crediting institutions and, consequently, are located in the balance sheet active.

- *Interest rate on the inter-banking market* are representing the rates at which the crediting institutions are drawing financial resources from other crediting institutions, respectively, are placing financial resources at crediting institutions. For the inter-banking operations, the National Bank of Romania is publishing two rates, namely: ROBID (Romanian Interbank Bid Rate) which is the average of the interest rates at the deposits drawn on the inter-banking market and ROBOR (Romanian Interbank Offered Rate) which represents the average of the interest rates at the placed deposits (loans) on the inter-banking market.

The rate of the nominal interest and the rate of the real interest

- *The rate of the nominal interest* is expressed by the current market interest;
- *The rate of real interest* is the rate obtained after adjusting the nominal rate by the inflation rate.

„The Fisher effect” is expressing the correlation existing between the two types of rates through the following computing relation:

$$(1 + r_{d_r}) = \frac{1 + r_{d_n}}{1 + r_i} \Rightarrow r_{d_r} = \frac{1 + r_{d_n}}{1 + r_i} - 1$$

where: r_{d_r} = the real rate of interest; r_{d_n} = the nominal rate of interest; r_i = the inflation rate

Out of the previously submitted aspects, it is resulting that the rate of real interest is directly proportional with the rate of nominal interest and reversely proportional with the degree of the monetary represented by the inflation.

The rate of the simple interest

- *The simple interest* is established in the situation when the period making the subject of the analysis is less than one year and the interest is not capitalized, in which case the following formula applies:

$$D = \frac{K_i \cdot n_z \cdot r_d}{360 \cdot 100}$$

where: D = interest, expressed as absolute size; K_i = initial capital representing the loan value or the value of the deposit made up; n_z = the time, expressed in days; r_d = the nominal interest rate, expressed as percentage.

To underline the fact that the economic year is considered as of 360 days (12 months, each one having 30 days).

The setting up of the average rate of interest in the case of applying the simple interest.

The average rate of interest is established in the situations when several credits/deposits are considered, each of them bearing different rates of interest and concluded for different periods of time, applying the following formula:

$$\bar{r}_d = \frac{\sum_{i=1}^n K_i \cdot n_{zi} \cdot r_{di}}{\sum_{i=1}^n K_i \cdot n_{zi}}$$

The composed interest applies in the situations when the contractual period exceeds one year and the interest is reinvested at each maturity term.

• *The setting up of the composed interest calculated for a whole number of periods.*

Knowing the fact that $K_f = K_i + D$ it is resulting that $D = K_f - K_i$

where:

K_f = final capital; K_i = initial capital; D = interest as absolute value.

The capital valorised in the case that the annual amount and the interest rate are constant, is obtained on the basis of the relation:

$$K_f = K_i(1 + r_d)^n$$

where: K_f = final capital; K_i = initial capital; r_d = nominal interest rate expressed as percentage; n = time expressed in number of years.

Considering the previous relation, we can establish the other elements as follows:

$$K_i = \frac{K_f}{(1 + r_d)^n}$$

$$\frac{K_f}{K_i} = (1 + r_d)^n \Rightarrow \sqrt[n]{\frac{K_f}{K_i}} = 1 + r_d \Rightarrow r_d = \sqrt[n]{\frac{K_f}{K_i}} - 1$$

$$n = \frac{\log \frac{K_f}{K_i}}{\log(1 + r_d)}$$

• *The setting up of the composed interest in the case when the annual sum is constant while the interest rates are variable.*

$$K_f = K_i \prod_{i=1}^n (1 + r_{di})$$

$$D = K_f - K_i$$

The rate of the made up interest and the rate of the perceived interest

- *The rates of the made up interest* are representing the level of the interest remunerating the money availabilities of those who are setting up banking deposits. In most of the cases the rate of the made up interest is lower than the one perceived for credits. Sometimes, after paying all the commissions perceived by the bank, it may happen that the amount withdrawn by the client is smaller than the one initially deposited. The factors which influence the level of this interest are: the inflation rate, the rate of the re-financing interest as well as the interests' rate applied by the other commercial banks.

- *The rates of the perceived interest* express the interest received by the crediting institutions from their clients' beneficiaries of the granted credits, the influence factors on the level of this one being: the degree of monetary erosion, the level of the operational expenses of the institutions, the risk degree, the banking profit, the minimum compulsory reserve etc.

Current account operations

The operations related to the cashing and/or payments taking place between the crediting institutions and various entities are recorded through current accounts, by utilizing in this respect the following methods:

- *The direct method* implying that the operations are recorded chronological, in double party, as the current account, as any other account is kept with its two parts, debit and credit. By contract, it is agreed a term of periodical closing of the account, at which end the sold of capital, the numbers sold and the related interest are calculated. In case that the interests rates are mutually equal, the numbers sold is considered, this being established by the algebraic addition of the numbers relating to the debiting interest and the crediting ones. In case that there are different rates of interest to apply for the debiting and crediting operations, the interest is calculated such as and the sold is established. By adding the sold of the operations themselves with the sold resulting from interests, we get the sold of the reciprocal relations by the end of the respective period.

- *The method in scale* assumes that the operations are recorded in simple party and chronological order. The difference as against the previous method consist of the fact that the sold of the capital and the sold of numbers are calculated after each operation, underlining their type, either debtor or creditor, over the time interval in which this one existed such as, respectively, from the date of the previous operation up to the date of the respective operation. The duration expressed in number of days is calculated as difference between the date when the sold appears and the date of the next sold.

The interests arbitrage in the optimization of the placements on short term

In order to identify and select the optimum variante for placing the capital on short term between the domestic and the external market, by comparing the applied interest rates, we apply to the calculation of the degree of the valorisation of the capital.

- On the domestic market, the degree of the valorisation of the capital is established as follows:

$$G_{vi} = K \cdot (1 + rd_i)$$

where: G_{vi} = the degree of the valorisation of the capital on the domestic market; K = placed capital; rd_i = the rate of the domestic interest (%).

- The placement of the capital on the external market must take into consideration also the risk of unfavourable variation of the exchange rates, the degree of the capital valorisation (G_{ve}) being calculated according to the formula:

$$G_{ve} = K \cdot (1 + rd_e) \cdot \frac{CVT}{CVP}$$

where: G_{ve} = the degree of the valorisation of the capital on the external market; K = placed capital; rd_e = the rate of the external interest (%); CVT = exchange rate at term; CVP = exchange rate at the moment (date) of the placement of capital.

The three situations of the placement of capital which might be recorded are synthetized below:

Cele trei situații ale plasării capitalului care se pot înregistra sunt sintetizate în cele ce urmează:

- The situation of equilibrium (which, in fact, is un-achievable)

$$(1 + rd_i) = (1 + rd_e) \cdot \frac{CVT}{CVP}$$

- The placement is optimum on the external market

$$(1 + rd_i) < (1 + rd_e) \cdot \frac{CVT}{CVP}$$

- The placement is optimum on the internal market

$$(1 + rd_i) > (1 + rd_e) \cdot \frac{CVT}{CVP}$$

Conclusions

The interest rate is one of the instruments applied in the business system of credit granting institutions, to obtain profit. The margin between the given interest and the received interest form the core of the profit acquiring model.

The study on various types and forms of interest outlined the relevant correlations between the indicators that describe the interest. Thus, the rate of real interest and the rate of nominal interest are directly proportional, while the rate of real interest and the degree of the monetary represented by the inflation are reversely proportional.

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