2.2 ESTIMATING CALCULATIVE RATE OF INTEREST BY SIMULATION

The possibility of using calculative interest rate is evaluated on several ways in the national and international technical literature. Many empirical researches are dealing with the implementation of this method to prepare their investment decisions. The method introduced through the practical examples of empirical researches can sometimes produce not relevant results and can divert decision-makers from the right direction. The purpose of this study is to set the value of calculative interest rate estimated by orthodox method against the one estimated by unorthodox method with the suitability of estimation by simulation. After contrasting methods and availabilities summarized in the Hungarian and English professional literature, it is presented through a practical example how more effective is estimating the value of calculative interest rate by simulation when decision-maker is establishing an investment decision. The results of examination were illustrated by Gauss curve and cumulated relative frequency curve. The main question is whether it is acceptable that instead of traditional methods the estimation by unorthodox method is more usable to evaluate the ability of yield production of investment decisions.

Investments are very frequent in the daily routine of business enterprises. About the meaning of the word "investment" it can be stated that investments generally mean the short or long term lockups of liquid assets with the purpose of yield production. On the whole the consequence is that investment can be everything which meets the requirement of return. Investments affect the profitability of business enterprises, the liquidity conditions and due to the change in wealth statement they also affect the efficiency of management (Watts, 1988; Fröhling, 1992).

The professional literature interprets the specialties of investment decisions and the possibilities of practical implementation of them on four levels. First of all, investments are connected to facilities or to the improvement of business opportunities, so they can be graded long term. Secondly, the long life cycle infrers the factor of uncertainty and the possible lack of information. Next to these facts, specialty is also the limited mobility of fixed assets, so the assets used in the facilities can be passed on only with significant losses after the useful life cycle. The other specialty belongs to special costs like operating and managing costs. Finally it has to be added that the case of agricultural enterprises is particular because there the value of current assets are high.

The economic efficiency preparation of an investment can be implemented on three levels which are the followings: the preparation of project plan, the planning of turnover and costs, and the examination of sensibility. It is important to define the costs of the investment and the size of expected turnover and costs during the useful life (Godfrey-Espirrosa, 1996). If all the above-mentioned data is available, so the planned investment possibility of the business enterprise can be evaluated with the help of investment efficiency rates (net present value, period of return, internal interest rate). The purpose of this study is not to introduce these methods but to introduce without the aim of completeness -the possible relevance of each factor of investment efficiency calculations.

The operating costs of the design method is correct that the depreciation costs do not list the actual operating costs o the investments, so that the economic calculations are not borne version of the investment plan is a cost that will not actually be withdrawn from the company Nejad-Kabadayi, 2016; Zhang-Zheng, 2015).

So much study concentrated on the calculative rate of interest (Pylypenko, 2015; Magni, 2014; Stretcher et al. 2015) and said this calculative rate of the time value of money expresses. The calculative rate when determining the most professional company always uses the calculation of the current bank loan interest rates, but to develop several possible answers can be given Craig-Raman, 2016; Magni, 2015; Makrominas, 2016; Merlo, 2016; Pyo-Robinson-Shin, 2016; Thompson-Barry-Myers, 2015):
- The calculative rate of interest should have be the same with the development loans;
- Actual earnings per total fixed commitment of the company could be the basics of the calculative rate of interest;
- The current answer to achieving maximum income to be the size used in the calculative rate of interest.

The calculative rate of interest used in the calculation of net present value and interest rate of return (Paquian et al. 2016). In the following three chapter deal with the method of how could choose the calculative rate of interest.

The determination of a calculative interest rate in business enterprises is the result of a careful process. Business managements use external interest rates widely in business decision preparations. Decision makers mainly use calculative interest rates as discount factors while evaluating investments. The external interest rate is often used to estimate cost of capital or it is considered while calculating amortization factor (Coenenberg, 1999). Calculative interest rates can naturally be used for determining normal profit or for mapping economic cut-off points of business enterprises. The extent of cost of capital of profit-oriented business enterprises can be determined in the knowledge of market conditions. Generally three main factors must be considered for calculative interest rate estimation.

The first factor is the risk-free return rate without market risk \( r_0 \), which in developed market economies is equal to market reference return rates of long-term government bonds. The theoretical background of this is that the stock market from the aspect of microeconomics is considered an efficient, perfect and competitive market where the conditions of realizing Marxian extra profit or microeconomic profit are not given and as a result this return rate can be reached risk-free. In the stock market, as for the concept of government bonds, atomized demand and supply sides are opposed, the market is characterised by power symmetry, the market actors are perfectly informed and monopoly effects are eliminated as a result of the operation of the stock market. If the capital of business enterprises is invested in government bonds, on the one hand, it is not necessary to take economic risks and, on the other hand, the market reference return rate is guaranteed, which can be achieved risk-free on the long run because of a relative market balance. Of course, this reference return rate is low since it contains no risk offset.

The second factor influencing the extent of calculative interest rate is the average return rate to be realized on real markets \( \bar{r} \), that contains risk offset in addition to risk-free return rate. This return rate may be reached under normal market conditions but only if the given business enterprise is willing to take average market risks. Since average return on equity includes risk-free return, we call the difference of the average market return and risk-free return average risk charge (Illés, 2008).

\[
\bar{r} = r_0 = \text{átlagos piaci kockázati prémium}
\]

According to the above-mentioned derivations the risk of risk-free return is 0 \( (\beta=0) \), while the risk value of the average market return is 1 \( (\beta=1) \). The most obvious method to assess the risk of investment is to analyse the reaction of market portfolios on market movements. In this case we compare corporate returns with average market return and assign lineal to the points we get. Beta values are the steepness of these lineal. The greatest difficulty in real economic life is the fact that the product and service composition of corporate portfolios vary significantly which makes the estimation of average market return complicated (Witt-Witt, 1994; Mullian, 1989).

The third factor that determines the movement of external interest rate is the individual risk offset of business enterprises. The overall risk offset of a business enterprise can be determined using beta values. According to the conceptual model estimating calculative interest rate the expected risk charge is proportional to the beta movement. This means that all entrepreneurial investments are located along the return-risk lineal. As a consequence, if the beta of an investment is 0.5, the expected risk premium is exactly half of the expected risk.
charge of the market. If the beta value is 2, the expected risk charge of investments is precisely the double of the market risk offset. In summary, and according to the described conceptual model, we can say that the overall market premium of a business enterprise consists of average market risk offsets and the individual risk premium of the given business enterprise:

- Overall risk offset of business enterprises: \((\bar{r}_{ROI} - r_0) \times \beta\);
- Average market risk offset: \((\bar{r}_{ROI} - r_0)\);
- Unique risk premium of business enterprises: \((\bar{r}_{ROI} - r_0) \times \beta - (\bar{r}_{ROI} - r_0)\).

Based on the conceptual model of calculative interest rates we may say that the external interest rate \(r\) has three elements: (a) risk-free return rate, (b) average market risk offset, (c) unique risk offset.

\[ r = r_0 + (\bar{r}_{ROI} - r_0) \times \beta \]

The following diagram is the conceptual figure of the above-introduced return-rate-risk model that can be used to estimate the calculative interest rate of business enterprises.

![Figure 2.2.1: The conceptual diagram of return-rate-risk model](source)

*Source: own construction, used by Brealy-Myers, 2013*

The horizontal axis shows risk values (\(\beta\)), while the vertical axis shows the expected return of investments. The axial section of risk-free return intersects axis Y and if we connect this point to market portfolio return, we get the return-risk lineal. If we project corporate beta values on this, it shows the estimated extent of calculative interest rate of a business enterprise on axis Y. Figure 1 shows that whatever the beta value of a business enterprise, it must be on the return-risk lineal, otherwise, for example, a greater risk would bring less return which cannot be the aim of a rational entrepreneur.

In summary we can say that the conceptual model provides guidance for calculative interest rate estimation since it shows the negative consequences of irrational decisions and corrects them.

**Calculative interest rate estimation by Monte-Carlo simulation**

Risk analysis is a process that determines the frequency function of output data by taking into account the probability distribution of insecure input data on the market. Risk analysis is carried out in several steps (Bitz, 2006):

- Selecting relevant input data on the real market;
- Estimating the probability values of uncertain input extents;
- Determining uncertain input data values by Monte-Carlo simulation that are needed for output value estimation;
- Calculating output data in the knowledge of the input data;
- Determining and depicting relative and cumulated relative frequency functions of output data.

The entrepreneur first must estimate those input factors that determine the extent of calculative interest rate and must rank them into class intervals. According to the conceptual model these input factors are the following:

Long-term government bond market reference return ($r_0$), the average return on equity market rate ($\bar{r}_{ROI}$) and the individual risk factor of the business enterprise ($r_F$). Of course, entrepreneurs will use empirical data for the estimation of possible values of input data.

In the second stage entrepreneurs assign probabilities to the values in class intervals which are determined empirically or by using statistical information. Table 2.2.1 shows the class intervals of input data and their probabilities.

<table>
<thead>
<tr>
<th>Class intervals of input data and their probabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
</tr>
<tr>
<td>Market reference return of long-term government bonds ($r_0$) (%)</td>
</tr>
<tr>
<td>Probability $w$ (%)</td>
</tr>
<tr>
<td>Average return on equity rate (%)</td>
</tr>
<tr>
<td>$w$ (%)</td>
</tr>
<tr>
<td>Individual risk factor</td>
</tr>
<tr>
<td>$w$ (%)</td>
</tr>
</tbody>
</table>

Source: own construction

In the third stage entrepreneurs carry out necessary calculations while taking into account probabilities by random selection of input value combinations that is similar to processes on the real market and thus simulation imitates market processes by using the Monte-Carlo simulation model. Entrepreneurs need a generator supplying a random number which, in our case, may be a dice*.

<table>
<thead>
<tr>
<th>Average values of input data class intervals while taking into account probabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Random numbers</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
</tbody>
</table>

Source: own construction (* The table shows that we have 5 class intervals, so the random numbers can be 1-5. If an entrepreneur rolls a 6, he/she has to roll again.)

Before rolling the dice, he/she determines the average values of input class intervals and assigns them to the random numbers. Table 2.3.2 shows the data received. The target function needed for calculative interest rate estimation is the following (used during calculations).

$$r = r_0 + (\bar{r}_{ROI} - r_0) \times r_F$$

Where:
- market reference return of long-term government bonds (%)
• average market return on equity rate (%);
• individual (entrepreneurial) risk factor;
• average market risk premium (%)
• the overall risk offset of the business enterprise (%);
• individual risk premium of the business enterprise (%).

In order to determine the distribution of calculative interest rate, first we have to calculate the highest, lowest and average values of the external interest rate which is quite simple in the knowledge of the target function.

Highest value:

\[ r_{\text{MAX}} = r_{0_{\text{MAX}}} + (r_{\text{ROI_{MAX}}} - r_{0_{\text{MIN}}}) \times r_{F_{\text{MAX}}} \]

\[ r_{\text{MAX}} = 3,0 + (13,5 - 1,1) \times 1,25 = 18,5\% \]

Lowest value:

\[ r_{\text{MIN}} = r_{0_{\text{MIN}}} + (r_{\text{ROI_{MIN}}} - r_{0_{\text{MAX}}}) \times r_{F_{\text{MIN}}} \]

\[ r_{\text{MIN}} = 1,1 + (6,0 - 3,0) \times 1,8 = 3,5\% \]

Average value:

\[ \bar{r} = \bar{r}_0 + (\bar{r}_{\text{ROI}} - \bar{r}_0) \times \bar{r}_F \]

\[ \bar{r} = 2,05 + (9,75 - 2,05) \times 1,025 = 9,94\% \]

Table 2.2.3

<table>
<thead>
<tr>
<th>Random numbers</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
<th>7.</th>
<th>8.</th>
<th>9.</th>
<th>10.</th>
<th>11.</th>
<th>12.</th>
<th>13.</th>
<th>14.</th>
<th>15.</th>
<th>16.</th>
<th>17.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(r_0)</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>(\bar{r}_{\text{ROI}})</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>(r_F)</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: own construction

Table 2.2.4

<table>
<thead>
<tr>
<th>Number</th>
<th>Input data belonging to random numbers</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(r_0)</td>
<td>(\bar{r}_{\text{ROI}})</td>
</tr>
<tr>
<td>1.</td>
<td>2,3</td>
<td>6,7</td>
</tr>
<tr>
<td>2.</td>
<td>1,8</td>
<td>9,7</td>
</tr>
<tr>
<td>3.</td>
<td>2,3</td>
<td>9,7</td>
</tr>
<tr>
<td>4.</td>
<td>1,8</td>
<td>8,2</td>
</tr>
<tr>
<td>5.</td>
<td>2,8</td>
<td>6,7</td>
</tr>
<tr>
<td>6.</td>
<td>1,8</td>
<td>12,75</td>
</tr>
<tr>
<td>7.</td>
<td>1,8</td>
<td>8,2</td>
</tr>
<tr>
<td>8.</td>
<td>1,3</td>
<td>12,75</td>
</tr>
<tr>
<td>9.</td>
<td>2,8</td>
<td>9,7</td>
</tr>
<tr>
<td>10.</td>
<td>2,8</td>
<td>9,7</td>
</tr>
<tr>
<td>11.</td>
<td>1,8</td>
<td>12,75</td>
</tr>
<tr>
<td>12.</td>
<td>1,3</td>
<td>9,7</td>
</tr>
<tr>
<td>13.</td>
<td>1,3</td>
<td>8,2</td>
</tr>
<tr>
<td>14.</td>
<td>1,8</td>
<td>9,7</td>
</tr>
<tr>
<td>15.</td>
<td>2,3</td>
<td>8,2</td>
</tr>
<tr>
<td>16.</td>
<td>2,8</td>
<td>8,2</td>
</tr>
<tr>
<td>17.</td>
<td>2,3</td>
<td>8,2</td>
</tr>
</tbody>
</table>

Source: own construction
Besides highest, lowest and average external interest rate values, entrepreneurs must determine further calculative interest rate values by Monte-Carlo simulation. The random numbers needed for this are included in Table 2.2.3 and they are determined by entrepreneurs using a generator. Managers generate further seventeen values, besides the three starting values, so there are twenty values for the distribution function. This is considered to be a good starting point for editing, on the one hand, a Gauss curve and, on the other hand, a cumulative distribution curve. Using the random numbers in Table 2.2.3, and in the knowledge of the entrepreneurial target function, the further 17 calculative interest rates can relatively easily be determined (Table 2.2.4).

The next step is to sequence the highest, lowest, average and the estimated 17 values in an ascending order (Table 2.2.5) which enables us to edit a Gauss curve and a calculative interest rate distribution function.

**Table 2.2.5**

<table>
<thead>
<tr>
<th>Rank</th>
<th>The number of calculative interest rate</th>
<th>Value of calculative interest rate (%)</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Lowest value</td>
<td>18.5</td>
<td>3</td>
</tr>
<tr>
<td>2.</td>
<td>r₈</td>
<td>14.8</td>
<td>(4.9%)</td>
</tr>
<tr>
<td>3.</td>
<td>r₆</td>
<td>14.7</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>r₁₁</td>
<td>14.7</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>r₁₂</td>
<td>11.2</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>r₁₄</td>
<td>11.1</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>r₃</td>
<td>11.0</td>
<td>9</td>
</tr>
<tr>
<td>8.</td>
<td>r₁₀</td>
<td>10.9</td>
<td>(9.2%)</td>
</tr>
<tr>
<td>9.</td>
<td>Average value</td>
<td>9.9</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>r₄</td>
<td>9.3</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>r₉</td>
<td>8.8</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>r₂</td>
<td>8.7</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>r₁₃</td>
<td>8.4</td>
<td>4</td>
</tr>
<tr>
<td>14.</td>
<td>r₇</td>
<td>8.4</td>
<td>(11%)</td>
</tr>
<tr>
<td>15.</td>
<td>r₁₅</td>
<td>8.4</td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>r₁₇</td>
<td>8.4</td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>r₁₈</td>
<td>8.4</td>
<td>3</td>
</tr>
<tr>
<td>18.</td>
<td>r₅</td>
<td>6.2</td>
<td>(14.7%)</td>
</tr>
<tr>
<td>19.</td>
<td>r₁</td>
<td>6.2</td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>Highest value</td>
<td>3.5</td>
<td>1</td>
</tr>
</tbody>
</table>

*Source: own construction*

Managers edit the Gauss curve of calculative interest rates in a way that the interest rate values from Table 2.2.5 are depicted on the horizontal axis and the relevant frequency values on the vertical axis. The cornerstones of the calculative interest rate (highest, lowest, average values) and the Gauss curve (Figure 2.2.2) edited by using the 17 values determined by simulation provide a good opportunity to determine a reliable calculative interest rate. The Gauss curve demonstrates that it is advisable for entrepreneurs to choose a 9.2% calculative interest rate since about 50% of known interest rate values are located near this value. It is well-known from technical literature that cumulated relative frequency curves provide further relevant background information compared to Gauss curves for decision makers or for experts taking part in decision preparation (Schmalen, 1999). Entrepreneurs get calculative interest rate distribution curves by recording estimated calculative interest rate values on the horizontal axis and assigns cumulated relative frequencies to individual interest rate values on the vertical axis (Figure 2.2.3).
Figure 2.2.2: Gauss curve of the calculative interest rate
Source: own construction

Figure 2.2.3: The cumulated relative frequency curve of calculative interest rates
Source: own construction

Figure 2.2.3 well demonstrates that the frequency curve of calculative interest rates can be divided into well-separated sections that show the average interest rate values belonging to different probability values.

1. There is a 20% probability that the external interest rate will be between 14.7 and 18.5% - 16.6% on average, which are unrealistically high values according to the model.

2. Very low calculative interest rates, 4.9% on average, can only be forecasted by a probability of 15% since the proper offset of the risk the entrepreneur is taking would not be produced.

3. Relatively high external interest rate values, 11% on average, have a probability of 20% according to model calculations, which is also very low.

4. The probability that calculative interest rate on the market is on average 9.2% (8.4 - 9.9%) is quite significant, 45%. In the knowledge of model calculations we can say that external interest rates usually belong to this range.

The cost of capital factor supported by Monte-Carlo simulation and derived from return requirements is between 8.4 and 11.2% with a probability of 65%. This means that the relatively most frequent values of enterprises belong to this range, with an average of 9.8%.
Based on the model calculations carried out in the study we suggest that decision makers should choose a calculative interest rate of 9.8%. According to trial calculations this return requirement can be considered as realistic on the market since the target function used for calculative interest rate estimation takes the probabilities of given input factors into account thoroughly. All in all we can state that the model including risk analysis can determine the level of return requirement which efficiently assists the work of decision makers.

**Orthodox versus unorthodox model calculation**

An inappropriately calculated return on capital requirement is not only disadvantageous but it can be economically harmful for the business enterprise.

Let us examine a machinery investment economy calculation in which we estimate calculative interest rate without risk analysis and with risk analysis support (Francis, 1983).

The basic data needed for calculations are the following:
1. Long-term government bond market reference return \( r_0 = 2.5\% \)
2. Average market return on capital rate \( \bar{r}_{ROI} = 10.5\% \)
3. Individual risk factor \( r_p = 1.15 \)
4. Invested amount \( I_0 = 600 \) mPE
5. Sold product quantity \( Q = 380 \) m pieces
6. Useful lifespan of machinery \( n = 5 \) years
7. The changeable first cost of product \( FPv = 0.575 \) PE/piece
8. The price of product \( p = 1 \) PE/piece

*The results of calculations are the following:*

Calculative interest rate without risk analysis (Pohl, 1989):
\[
r = 2.5 + (10.5 - 2.5) \times 1.15 = 11.7\%
\]

Calculative interest rate with risk analysis (calculated earlier): \( r = 9.8\% \)

Net present value when calculative interest rate is 11.7%:
\[
q = \frac{0.117 \times (1 + 0.117)^5}{(1 + 0.117)^5 - 1} = \frac{0.20345}{0.73886} = 0.275
\]
\[
NPV_{orthodox} = -600 + \frac{380 \times (1 - 0.0575)}{0.275} = -600 + 587.3 = -12.7 \text{mPE}
\]

→ a beruházás nem gazdaságos

Net present value when calculative interest rate is 9.8%:
\[
q = \frac{0.098 \times (1 + 0.098)^5}{(1 + 0.098)^5 - 1} = \frac{0.15640}{0.59592} = 0.262
\]
\[
NPV_{unorthodox} = -600 + \frac{380 \times (1 - 0.0575)}{0.262} = -600 + 616.4 = +16.4 \text{mPE}
\]

→ a beruházás gazdaságos

Internal rate of return of the business enterprise:
\[
IRR = 9.8 + 1.9 \times \frac{16.4}{[-12.7 + 16.4]} = 9.8 + 1.07 = 10.9\%
\]

The economy calculation results of investment according to different calculative interest rates (Figure 2.2.4).

In the knowledge of the net present values calculated by calculative interest rates estimated by different principles and the investment curve (Figure 2.2.4) edited with the help of output data, we can say that interest rates determined by over-simplification (orthodox method) is not economical while the interest rate estimated by simulation (unorthodox method) used as a discount factor shows economical courses of business (Cooyne, 1984).

The inner return rate of the studied investment is 11% in the actual economic environment which is considered good based on known market return rates. As a
consequence, if we calculate an interest rate without considering the probabilities of input factor realizations, it will be disadvantageous for the company and economically harmful. In the present case the business enterprise will lose an excess return over 16 mPE which could be seen as a profit and means comparative advantage on the market since if an advantageous investment is not implemented it will result in significant loss of return. In the studied investment situation the business enterprise not only lost economic profit but cost of capital as return requirement - as well (Keating, 1986).

**Figure 2.2.4: Net present values in the case of different discount factors**

*Source: own construction*

The study first introduces reference works in the technical literature dealing with calculative interest rates and then introduces the conceptual model on external interest rate estimation in detail which is a good base to lay the foundation for demonstrating the necessity of further developing return requirement estimation methods used in the technical literature and in practice.

The improved method of careful calculative interest rate estimation results in the urge to follow dynamic principles instead of static, rigid principles. This principle takes into account the probabilities input extent realization which enables us to determine "real function relations" (Gauss curve, distribution function).

The model demonstrating the theoretical background of external interest rate determination draws our attention to the fact that decision makers should consider economic regularities (e.g. higher risk should only be undertaken if a proper market premium can be realized) instead of routinely-done or ill-considered interest rate estimation methods.

The simple knowledge of factors determining calculative interest rates does not guarantee relevant interest rate estimation. The simulation method introduced in the study draws our attention to the fact that mapping the probabilities of individual input values is essential on the market besides determining the real extent of input factors. This procedure can be used to "imitate" market processes from real market environments which probably enable more reliable calculative interest rate estimation. The reason for this is that the simulation model enables us to generate a great number of output values while taking into account random influences on the market. A great number of output values supply enough information for decision making.

Based on the conceptual models introduced in the study and the results of the economy calculations of investments, we can draw the conclusion that not carefully defined calculative interest rates used as capital costs and discount factors may cause significant losses for business enterprises. If discount factors are higher than justified, even economical
investments cannot be realized, this is, on the one hand, a return requirement, on the other hand, it can cause economic damages, a loss of market and a drop in turnover because of the loss of excess return.

REFERENCES
