

## ECONOMIC MODELING PROCESSES USING MATLAB

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### **Abstract:**

*To study economic phenomena and processes using mathematical modeling, and to determine the approximate solution to a problem we need to choose a method of calculation and a numerical computer program, namely the package of programs MatLab. Any economic process or phenomenon is a mathematical description of its behavior, and thus draw up an economic and mathematical model that has the following stages: formulation of the problem, the analysis process modeling, the production model and design verification, validation and implementation of the model. This article is presented an economic model and its modeling is using mathematical equations and software package MatLab, which helps us approximation effective solution. As data entry is considered the net cost, the cost of direct and total cost and the link between them. I presented the basic formula for determining the total cost. Economic model calculations were made in MatLab software package and with graphic representation of its interpretation of the results achieved in terms of our specific problem.*

**Keywords:** economic modeling, numerical modeling, the net cost, direct cost, the total cost, MatLab

## 1. INTRODUCTION

Economic processes and phenomena have a wide variety of forms. So, is characterized by the fact that their expression is very complex due to many factors which depends on the specific context.

The book's aims to contribute to deepening the economic processes and phenomena and systematization knowledge related economic and numerical models that underpin them. Composition of economic and mathematical model is a very important and must be taken of the six stages. On the basis of these types of problems is mathematical analysis, which helps us to elaborate efficient methods of approximation of the solution or solutions as appropriate.

We have a problem with some economic data entry and exit, and the link between total cost and direct costs and the net is based on the MatLab software package. I made a program based on the data that was saved under the name ec.m, and the graphical representation of the total cost and net helps us determine the best solution.

## 2. ECONOMICS AND NUMERICS MODELS

Mathematical modeling is an effective tool used to study economic phenomena and processes necessary today in the scientific approach in almost all fields. Mathematical Modelling represent the description of the behavior of phenomena in a synthetic form, logical and mathematical formalized by surprise legations, and interdependences existing functionalities and saw a remarkable development.

A research tool, indispensable to any scientific work is geometry. The computer is necessary in the process of analyzing the data, forecasting activity in any mathematical modelling and processing of a large volume of information through the use of algorithms complexes under conditions of high precision. Data processing computer lead to an approximate solution.

Due to their table, economic phenomena and processes are characterized by:

- Regularly
- Stability.

Extent to which they carried out these phenomena make it possible formulation of conclusions with high accuracy and significance of their movement in time and space.

Any phenomenon or economic process allows a mathematical description of his behavior, from an economic theory and for developing a mathematical model to economic take the following steps:

1. Formulation of the problem.
2. The analysis process modeling.
3. Realization model.
4. Checking the model.
5. Validation model.
6. Implementation model.

Spectacular progress in the field of computers have influenced the development of numerical methods of calculation, namely the package of programs MatLab. Computers modern machinery is available for different categories of users.

If we have an economic transposed mathematical problem, then using numerical analysis will develop effective methods for approximation of the solution or solutions to this problem. But before you solve a problem with economic aid numerical analysis we need a "qualitative measure" adjustment by meshing or iterative methods, after which, taking into account the theorems of existence and uniqueness of the solution, an algorithm that allow us to solve the problem with our computer.

The method of calculating the number of programs MatLab package helps us determine approximate solution of economic problems. The criteria underpinning of such methods are:

- precision results;
- control errors;
- consistency, stability and convergence method;
- simple formulas for calculating etc.

### 3. MODELING ECONOMIC IN NATURE

Whether a company is  $n$  sections. To note with  $i$  the department:

- $D_i$  – Direct cost,
- $T_i$  – the total cost,
- $N_i$  – the net cost.

We will use the following formula:

$$T_i = D_i + \sum_{\substack{j=1 \\ j \neq i}}^n P_{ji} T_j, \quad i = \overline{1, n} \quad (1)$$

$\Rightarrow$

$$-\sum_{j=1}^{i-1} P_{ji} T_j + T_i - \sum_{j=i+1}^n P_{ji} T_j = D_i, \quad i = \overline{1, n} \quad (2)$$

Direct link between cost and the total cost is:

$$AT = D \Rightarrow T = DA^{-1} \quad (3)$$

The link between cost and total net cost is:

$$N_i = P_{ii} T_i, \quad i = \overline{1, n} \quad (4)$$

where

- Vector total cost is:  $T = (T_i)_{i=1,n}$
- Vector is a direct cost:  $D = (D_i)_{i=1,n}$
- Vector net cost is:  $N = (N_i)_{i=1,n}$

We believe a company with five sections: research, development, production, accounting and IT, know where the direct cost for each ward namely:

$$D_1 = 3, D_2 = 4, D_3 = 7, D_4 = 0,6 \text{ and } D_5 = 0,4 .$$

The link between direct cost and the total cost for the five sections is:

**Table no. 1**

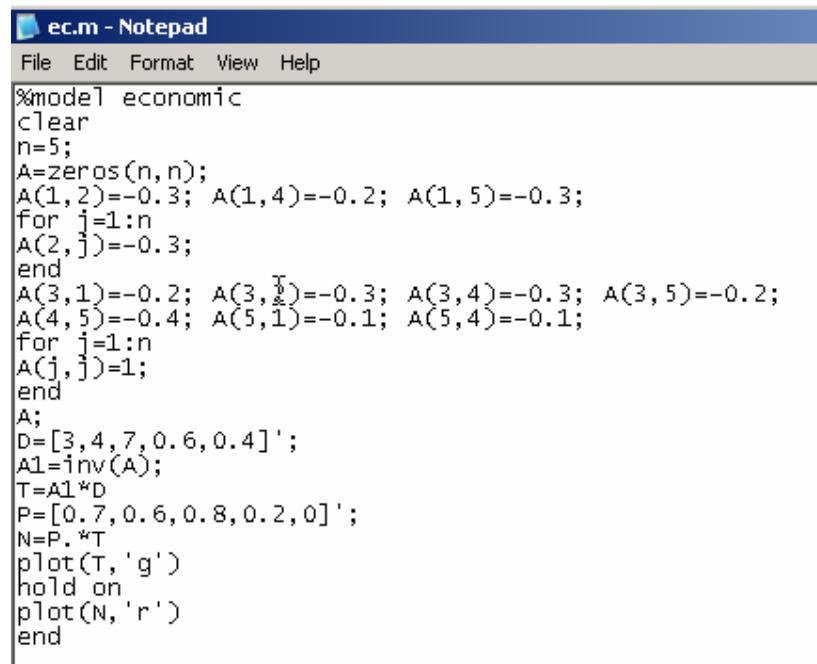
	1	2	3	4	5
1	0.7	0.3	0	0.2	0.3
2	0.3	0.6	0.3	0.3	0.3
3	0.2	0.3	0.8	0.3	0.2
4	0	0	0	0.2	0.4
5	0.1	0	0	0.1	0

Based on the theory we have:

$$N_1 = 0.7T_1, N_2 = 0.6T_2, N_3 = 0.8T_3, N_4 = 0.2T_4, N_5 = 0 .$$

To solve such a problem will use MatLab software package e.

Thus, with known data, using MatLab software package is the economic problem were introduced following data:



```

ec.m - Notepad
File Edit Format View Help
%model economic
clear
n=5;
A=zeros(n,n);
A(1,2)=-0.3; A(1,4)=-0.2; A(1,5)=-0.3;
for j=1:n
A(2,j)=-0.3;
end
A(3,1)=-0.2; A(3,2)=-0.3; A(3,4)=-0.3; A(3,5)=-0.2;
A(4,5)=-0.4; A(5,1)=-0.1; A(5,4)=-0.1;
for j=1:n
A(j,j)=1;
end
A;
D=[3,4,7,0.6,0.4]';
A1=inv(A);
T=A1*D
P=[0.7,0.6,0.8,0.2,0]';
N=P.*T
plot(T,'g')
hold on
plot(N,'r')
end

```

**Figure no. 1**

Since economic problem that the data were saved in MatLab as the ec.m, and if this problem get appeal:

```
>> ec
T =
    6.6403
   10.2513
   11.9581
    1.0683
    1.1709

N =
    4.6482
    6.1508
    9.5665
    0.2137
    0
```

Figure no. 2

Graphic representation of the total cost is:

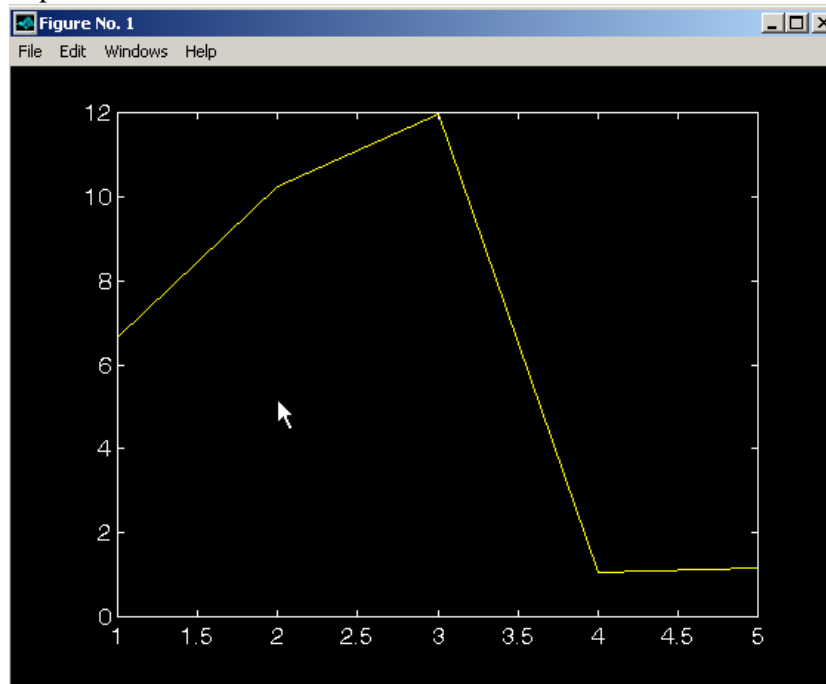
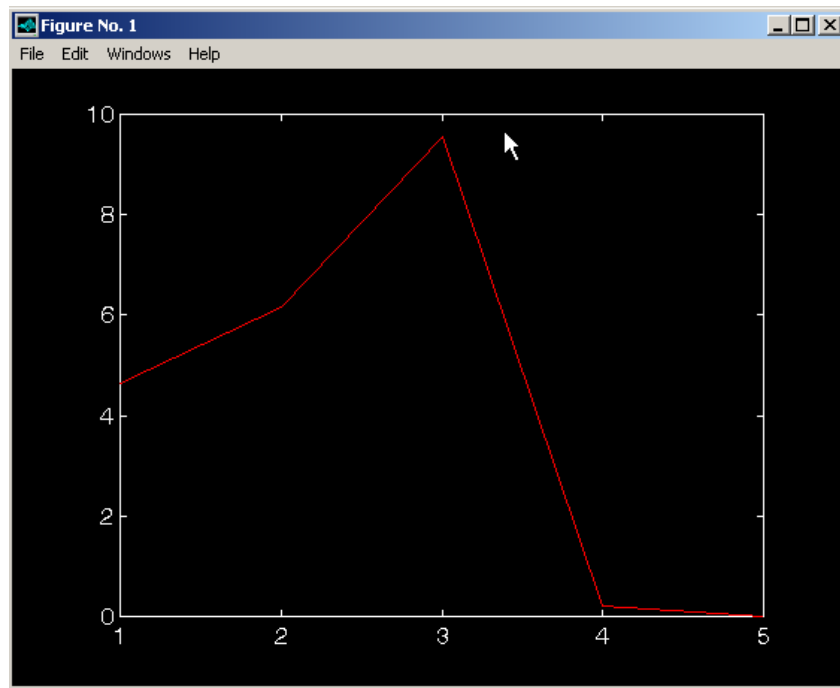


Figure no. 3

And the graphical representation of the net cost is:



**Figure no. 4**

Finally, takes place interpretation of the results from the viewpoint that specific issue is resolved. It is noted that all costs are influenced best production, which reached the maximum level and less than IT, which reached the minimum level.

#### **4. CONCLUSION**

The package of programs MatLab is a complex computer program which is based on mathematical modeling, and numerical calculation in which we can study economic phenomena and processes complex. Any economic process or phenomenon is a mathematical description of his behavior, and thus draw up an economic and mathematical model that has the following stages: formulation of the problem, the analysis process modeling, the production model and design verification, validation and implementation of the model. It presented an economic model and its modeling is using mathematical equations and software package MatLab, which helps us approximation effective solution. Data entry is the net cost, the cost of direct and total cost and the link between them. I presented the basic formula for determining the total cost. With the package of programs to perform calculations MatLab economic model and graphical representations from the viewpoint specific problem and notes that the production influences most costs.

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