

EXCEL DATA TABLE AS AN EFFICIENT TOOL FOR FINANCIAL SIMULATIONS

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Abstract: What-if analysis (sensitivity analysis) is used when we want to look at the extent to which each change affects the overall outcome. Most What-if analyzes are actually mathematical calculations, which is a specialty of Excel. Sometimes the formula depends on multiple inputs and we need to see how different input values affect the result. A data table allows you to set one or two variables within a data set, where each variable can have an unlimited number of possible values. This method can be used both for the preparation of simpler forecasts and for the development of advanced business models. In this way, we gain insight into how changes in our assumptions affect financial results, which enables better planning and strategic decision-making based on data. In the example of the simulation, we showed how the combination of the price of the product and the number of units sold affect the profit, which facilitates the decision on the optimal price and production plan. The aim of the study is to present the advantages of this tool, so that future users gain a significant advantage in terms of accuracy, efficiency and clear planning of activities.

Key words: Excel, What-if Analysis, Data Table, Financial Simulation, Planning, Decision-making

1. INTRODUCTION

In business, we often encounter a number of "what if" questions: What if the costs rise? What if you have to adjust the size of your team? [1] Would you be able to sell more items if you had a discount this week? Or would you make more money by increasing the price? [2] Excel's What-If Analysis tool functions as a strategic partner for each user in addressing these issues. What-if analysis is a powerful function that is essential in decision-making processes because it allows users to predict possible results and plan accordingly. In Excel, there are three basic tools for conducting this analysis: Goal Seek, Scenario Manager, and Data Table [3]. Goal Seek focuses on adjusting one variable to achieve the desired outcome. Unlike it, when it is necessary to consider several variables, the Data Table or Scenario Manager is used [4]. The difference between the Scenario Manager and the Data Table is that the Data Table cannot process more than two variables (one for the row input cell and one for the column input cell). However, a Data Table can include as many different values of a variable as needed for analysis. So, if more than two variables need to be analyzed, the Scenario Manager is used. Scenario Manager can have a maximum of 32 different values, but it is possible to create as many scenarios as desired [5].

In this study, a Data Table tool was used to show simulations that help identify the optimal combination of product price and sales volume, taking into account fixed and variable costs. To this end, we have created a model that serves as a basis for further analysis. The purpose of such a financial model is to provide some insight into the future business. Clients and executives want to see a range of possible outcomes, and that's where the sensitivity analysis comes in. In fact, it is not uncommon for a client not to look at the financial model at all, but wants to look at the results exclusively in the Data Table format, along with the selected financial data [6]. Therefore, it is important to understand the mechanism of creating a Data Table and to know how to interpret its results, to ensure that the analysis works properly. Given that the Data Table tool is often underused both in business and in literature, the aim of the study is to fill this gap and show all stakeholders how, in an efficient and simple way, quality analysis can be obtained to better decision-making.

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2. DATA TABLE

A data table is a range of cells in which values can be changed in specific cells to get different responses to a problem. They can be One-variable data tables or Two-variable data tables, depending on the number of variables and formulas to be tested.

In a Data Table with one variable, only one input value can be changed, either in a row or in a column. It contains only one input cell. For example, the company wants to find out what its income will be by changing the cost of raw materials, so a table is made with a set of data with materials and their price [7]. A one-dimensional spreadsheet is also used when, for example, it is necessary to assess how different interest rates affect the monthly mortgage installment. Values of the variable are entered in a single column or row, and the results are displayed in a neighboring column or row.

In a Data Table with two variables, we can change two input values, one in a row and one in a column. It contains two input cells. A two-dimensional table is used, for example, to assess how different combinations of interest rates and loan repayment periods affect the monthly mortgage installment [5]. It can also be used to predict future earnings per share (EPS) for businesses. Another way to verify the justification of forecast values, such as income, is to use the compound annual growth rate (CAGR) [6].

2.1. Methodology

When conducting What-if analysis, Excel uses the Forecast group commands on the Data tab. Data Table is the third tool in this group, in addition to Goal Seek and Scenario Manager. The Data Table allows you to set one or two variables. As with the other two tools, we also need to prepare data with the Data Table. It is also necessary to know what we want to get as a final result. For the sake of clarity, we made two models. The first model represents a basic table that is not touched. Then the first model served us to prepare the data in another separate table that will further help us create a Data Table with it.

The next step is to create a two-dimensional table and manually enter input values. This is done by specifying one set of values horizontally and the other vertically. In our example, we show the price per unit horizontally, and the amount of products sold vertically. In this step, the most important thing is to link the output value. In this case, the formula used to derive profit from the Prepared Table for Data Table – Formula for Profit Simulation, must be replicated above the vertical list of variables (upper left corner). This connects our new Data Table to the original variable.

When the table structure is complete, we need to mark all cells with data that will be used to form a table, and then from the Data tab, click on What If Analysis, where the Data Table option is selected from the menu and the box dialog is automatically opened. This can be one of the most demanding steps when setting up a data table. Financial analysts are often unsure where the row cell is marked (Row Input Cell) and where the column cell is marked (Column Input Cell). The easiest way to clarify this is that the row refers to the assumptions that are in the upper part of the table, while the column refers to the assumptions on the left side of the table [8].

When we select OK, Excel returns the matrix we use to compare the outcomes of different changes and make more precise decisions.

2.2. Results

The Data Table allows us to look at the potential outcome of a financial model under different circumstances. In this context, we present a simulation aimed at identifying the optimal combination of product price and sales volume taking into account fixed and variable costs. All items in the displayed simulation are defined tentatively to demonstrate the functionality of the tool.

The first step when creating a data table is to have a predefined model (Table 1). We named it Reference Table – Input Parameters and Profit Calculation.

Table 1. Input Parameters and Profit Calculation

Reference Table – Input Parameters and Profit Calculation		
Description	Value (€)	Formula
Input Parameters		
Monthly quantity of products sold	50	=C6
Price per unit	10	=C7
Fixed cost	1,000	=C8
Variable cost per unit	6	=C9
Calculation		
Total revenue	500	=C6*C7
Total variable costs	300	=C6*C9
Total costs (fixed + variable)	1,300	=C8+C12
Profit	-800	=C11-C13

The reference table included the following input parameters: Monthly quantity of products sold, Price per unit, Fixed cost and Variable cost per unit. Based on the input parameters, key financial indicators were calculated.

Then, we drew from that model in another table (Table 2) key items that will later be used for reference in the Data Table analysis. We named that table the Prepared Table for Data Table – Formula for Profit Simulation.

Table 2. Prepared Table for Data Table

Prepared Table for Data Table – Formula for Profit Simulation		
Monthly quantity of products sold	50	=C18
Price per unit	10	=C19
Variable cost per unit	6	=C20
Fixed cost	1,000	=C21
Profit	-800	=(C18*C19) - (C20*C18+C21)

In this table, we have prepared the data needed for the next step, including the profit calculation formula.

Then we approach the creation of a two-dimensional Data Table analysis (Picture 1). Our goal is to show how profit changes depending on the price per unit and the quantity of products.

The screenshot displays the Excel interface for setting up a Data Table. On the left, the 'Reference Table – Input Parameters and Profit Calculation' and the 'Prepared Table for Data Table – Formula for Profit Simulation' are shown. The 'Prepared Table' has the following data:

Prepared Table for Data Table – Formula for Profit Simulation		
Monthly quantity of products sold	50	=C18
Price per unit	10	=C19
Variable cost per unit	6	=C20
Fixed cost	1,000	=C21
Profit	-800	=(C19*C18)-(C20*C18+C21)

The 'Data Table' dialog box is open, showing 'Row input cell' as '\$C\$19' and 'Column input cell' as '\$C\$18'. Below the dialog, the resulting Data Table grid is shown, with the first column containing values from -800 to 800 in increments of 100, and the top row containing values 10, 12, 15, 18, 20, and 25.

Picture 1. Activating Data Table for Profit Analysis

In the lower right corner of Picture 1, the setting for future analysis is shown. It is important to correctly place the formula in the corner of the table, where we referenced the Profit (=C22) cell. We then defined the rows and columns for the input variables. To the right of the formula, we have listed all the prices we want to test in order, and below the formula we have entered all the quantities. It is recommended that these variables be precisely defined so that users can identify the moment of transition from loss to profit. The goal is to automatically fill the selected table with the profit values for each combination of price and quantity using this tool.

Then we selected the table, went to the Data tab, chose What-If Analysis from the drop-down menu, and selected Data Table. A box dialog appears where you must select a cell in which you want to change the value in the row and column. For the value of Row input cell, we referenced the Price per unit cell (\$C\$19), and for the value of Column input cell Monthly quantity of products solid (\$C\$18).

By clicking OK in the previous step, Excel does the calculation for us and automatically fills in the table and gives an overview of all combinations at the same time, which can be seen in Table 3. Additional formatting has also been done to make it easier to see and highlight the most profitable combination.

Table 3. Data Table Results

Monthly quantity of products sold	Price per unit						
	-800	10	12	15	18	20	25
	50	-800	-700	-550	-400	-300	-50
	100	-600	-400	-100	200	400	900
	200	-200	200	800	1,400	1,800	2,800
	300	200	800	1,700	2,600	3,200	4,700
	400	600	1,400	2,600	3,800	4,600	6,600
	500	1,000	2,000	3,500	5,000	6,000	8,500
	600	1,400	2,600	4,400	6,200	7,400	10,400
	700	1,800	3,200	5,300	7,400	8,800	12,300
	800	2,200	3,800	6,200	8,600	10,200	14,200

The obtained results show what the income will be based on different combinations of input parameters. It is clear that profits grow with an increase in the price per unit and the amount of products sold. When the price is € 10, the profit is negative for all quantities up to 200 units, and turns into a positive only from 300 units. For prices of € 15, the profit becomes positive for quantities of 200 units, while the highest profit in the table is € 14,200, realized at a price of € 25 and a quantity of 800 units. A higher price per unit allows for a positive profit at a smaller amount, which can affect demand and therefore decision makers need to further analyze such things. What is the advantage of this tool is that we can subsequently analyze the effects of variable entries without changing the existing table structure. Input parameters in given rows and columns can be changed and Excel will automatically do new combinations of profit amounts. This makes it an indispensable tool for decision-makers who want to quickly and efficiently assess multiple scenarios [3].

Although there is no need for additional visuals in this particular case, a graph can also be used in the case when decision makers prefer a visual display (Graph 1). There is a large selection of data visuals in the Charts field, and one that Excel recommends can be selected.

Graph 1. Comparative Profit Lines by Product Pricing



In the graph shown, it can be seen that each line displays a profit projection for a certain price per unit through different sales volumes. The visual analysis of the chart clearly shows that a higher price per unit of product leads to faster profit growth. The chart helps managers and decision-makers to see how price changes affect profits.

3. CONCLUSION

The primary role of the Data Table is to conduct a sensitivity analysis within the framework of financial modeling and valuation. It is very useful to understand the mode of operation of the tool so that it can be applied to business or private situations instead of manual calculations. As financial models represent the best estimates of what the future can bring to a business, it is useful to examine how sensitive the value of a company is to changes in various assumptions. It provides a range of possible outcomes for a particular data and can highlight a margin of safety before something goes seriously wrong [6]. After several created Data Tables, it becomes clear that this takes up very little time and that there is no justification for not using this tool in financial modeling.

For future research, it is especially important to consider the role of artificial intelligence in speeding up sensitivity analysis. Professionals who want to improve scenario planning are taught sensitivity analysis techniques guided by artificial intelligence that are tailored to today's high-risk financial environments. Artificial intelligence simplifies this process by quickly modeling multiple permutations and automatically identifying key drivers [6].

4. REFERENCES

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