

How to Predict Outcomes with Simple Linear Regression in Power BI

Authored by
mohammed looti

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Simple linear regression is a fundamental statistical technique designed to model and predict the relationship between two continuous variables: one **independent variable** (or predictor) and one **dependent variable** (or response). Mastering this technique within a visualization platform like Power BI allows analysts to extract crucial data-driven insights. While Power BI offers built-in features like adding a trend line to a scatter plot, leveraging advanced DAX functions provides greater control over the model parameters and allows for dynamic prediction capabilities. Before interpreting the results, it is essential to select the correct dependent and independent variables, assess the data for linearity, and identify potential **outliers** to ensure the model's validity. This comprehensive approach enables robust forecasts based on observed linear trends.

In the realm of statistics, simple linear regression provides a quantifiable method to define the relationship between a single **predictor variable** and a single **response variable**.

The following guide details a step-by-step process for implementing and utilizing a simple linear regression model directly within your **Power BI** environment, using the powerful built-in functions.

Step 1: Preparing and Loading the Dataset

The initial requirement for any analysis in **Power BI** is to properly load the relevant data. For this example, we will import a dataset named **my_data**. This table contains critical business metrics: the total **Ad Spend** (our predictor variable) and the subsequent total **Revenue** generated (our response variable) across several retail operations. This dataset will form the foundation for modeling the relationship between marketing expenditure and sales performance.

The screenshot shows the Power BI interface with the 'Table tools' ribbon selected. The ribbon includes options like 'Name' (set to 'my_data'), 'Mark as date table', 'Manage relationships', and 'Calculations' (with sub-options: 'New measure', 'Quick measure', 'New column', 'New table'). Below the ribbon, a data table is displayed with the following columns and rows:

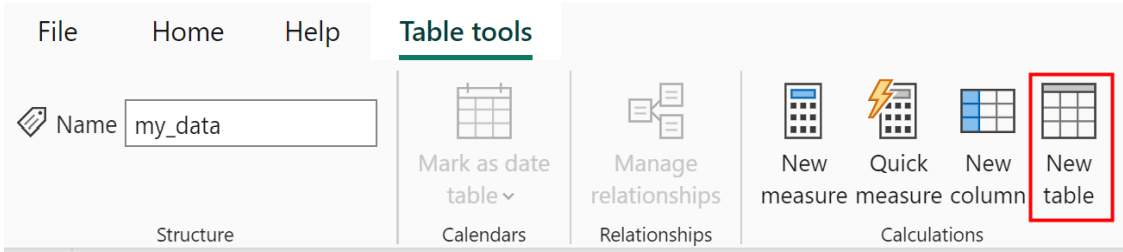
Store	Ad Spend	Revenue
A	4	12
B	5	15
C	7	19
D	8	16
E	8	15
F	9	18
G	10	20
H	12	24
I	13	23
J	13	23
K	14	28
L	17	24
M	19	30

Step 2: Implementing the Linear Regression Model Using DAX

To formally calculate the simple linear regression model, we will designate **Ad Spend** as our **predictor variable** (X) and **Revenue** as our **response variable** (Y). The goal is to determine the coefficients, or parameters, that best define the linear relationship, which follows the standard mathematical form:

$$\text{Response} = \beta_0 + \beta_1 * (\text{Ad Spend})$$

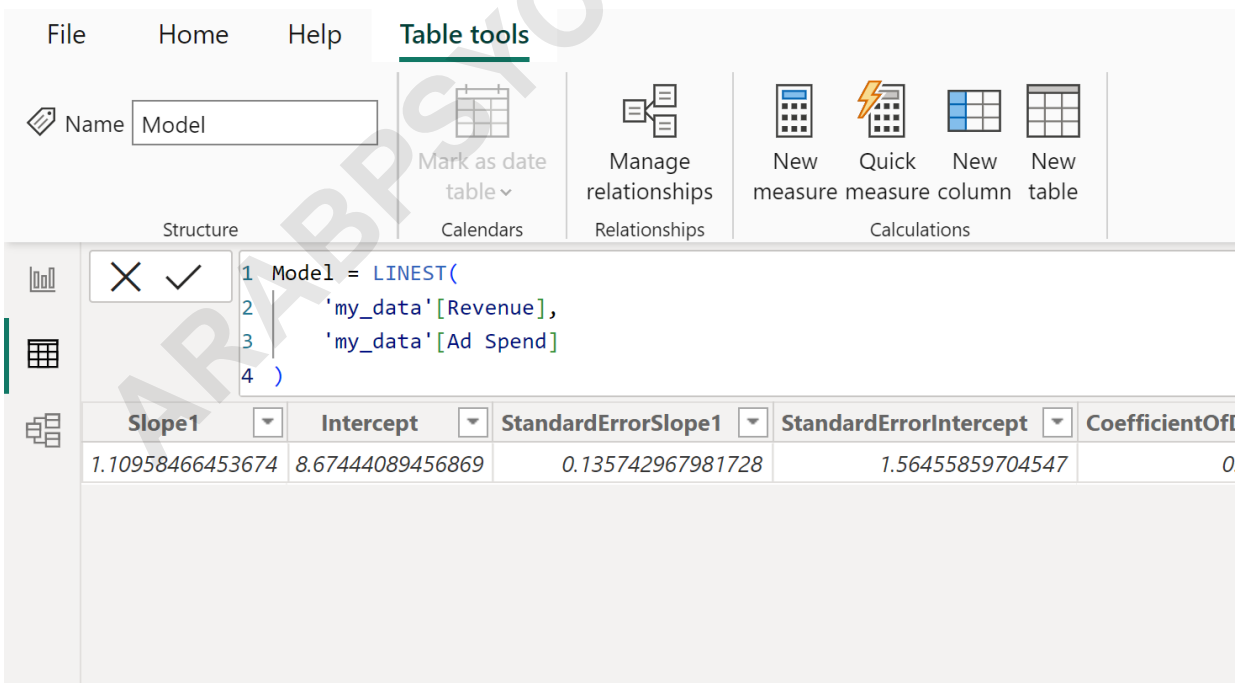
Within Power BI, we employ the powerful **DAX LINST** function to achieve this. Navigate to the **Table tools** tab in the ribbon and select the **New table** icon. This action initiates the process of creating a calculated table that will store the regression statistics.



Next, input the following formula into the formula bar. The **LINEST** function requires the response variable (Revenue) first, followed by the predictor variable (Ad Spend), both referencing our **my_data** table:

```
Model = LINEST(
'my_data',
'my_data'
)
```

Executing this DAX calculation will generate a new calculated table named **Model**. This table contains various statistical measures summarizing the fitted simple linear regression model, including the intercept, slope, and R-squared values, which are essential for model assessment.



Note: For detailed syntax and interpretation of the array of statistics returned, you can consult the official [documentation for the LINEST function in DAX](#).

From this output, the two most critical values are **Slope1** (which corresponds to β_1) and **Intercept** (which corresponds to β_0). These coefficients allow us to formally construct the specific fitted regression equation for predicting revenue based on ad spend:

$$\text{Revenue} = 8.67444 + 1.10958 * (\text{Ad Spend})$$

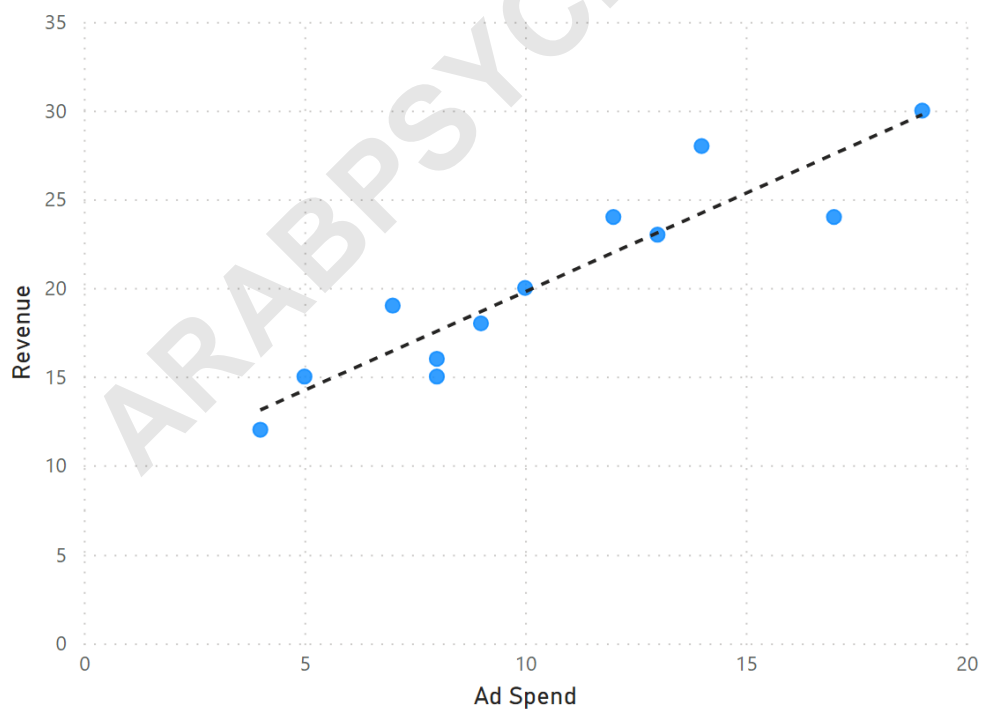
The **Intercept** (8.67444) signifies that if a store spends zero dollars on ads (Ad Spend = 0), the predicted baseline revenue is **\$8.67444**.

The **Slope1** (1.10958) indicates that for every one additional dollar spent on advertising, the predicted revenue increases by an average of **\$1.10958**, showcasing a positive correlation between the variables.

Step 3: Visualizing and Applying Dynamic Predictions

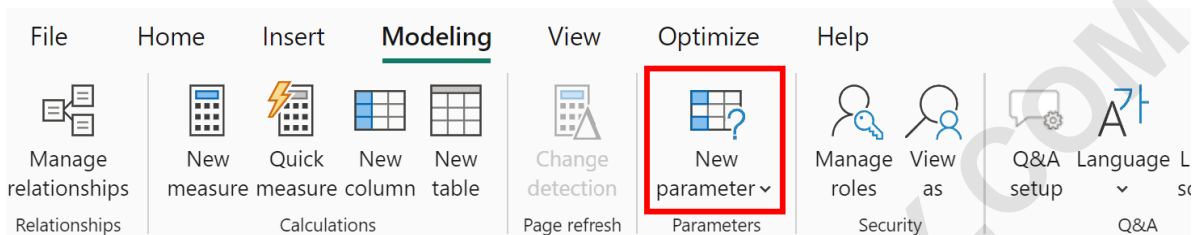
After fitting the model, a crucial step is visualization. We can start by inserting a standard **scatter chart** in the Report view, mapping **Ad Spend** to the x-axis and **Revenue** to the y-axis. This visualization instantly provides a graphical representation of the correlation between the two variables, often supplemented by adding a standard trend line to visually confirm the calculated slope.

Ad Spend and Revenue



To make the prediction model interactive, we will now implement a dynamic input control. This setup will allow users to adjust the hypothetical **Ad Spend** value using a slider bar and immediately view the corresponding **Predicted Revenue** calculated by our regression equation.

To create this input control, go to the **Modeling** tab in Power BI Desktop. Click the **New parameter** icon, and then select **Numeric range** from the subsequent dropdown menu. This action initiates the creation of a calculated table and a slicer visual simultaneously.



In the configuration window, name the parameter **Ad Spend**. We will set the range reflective of our data's context: **Minimum** value to **0** and **Maximum** value to **20**. Crucially, ensure the box next to **Add slicer to this page** is checked, then confirm by clicking **OK**. This action seamlessly integrates the control element into your report view.

Parameters



Add parameters to visuals and DAX expressions so people can use slicers to adjust the inputs and see different outcomes. [Learn more](#)

What will your variable adjust?

Numeric range

Name

Ad Spend

Data type

Whole number

Minimum

0

Maximum

20

Increment

1

Default

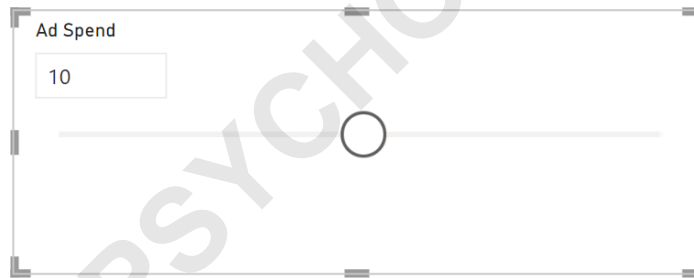
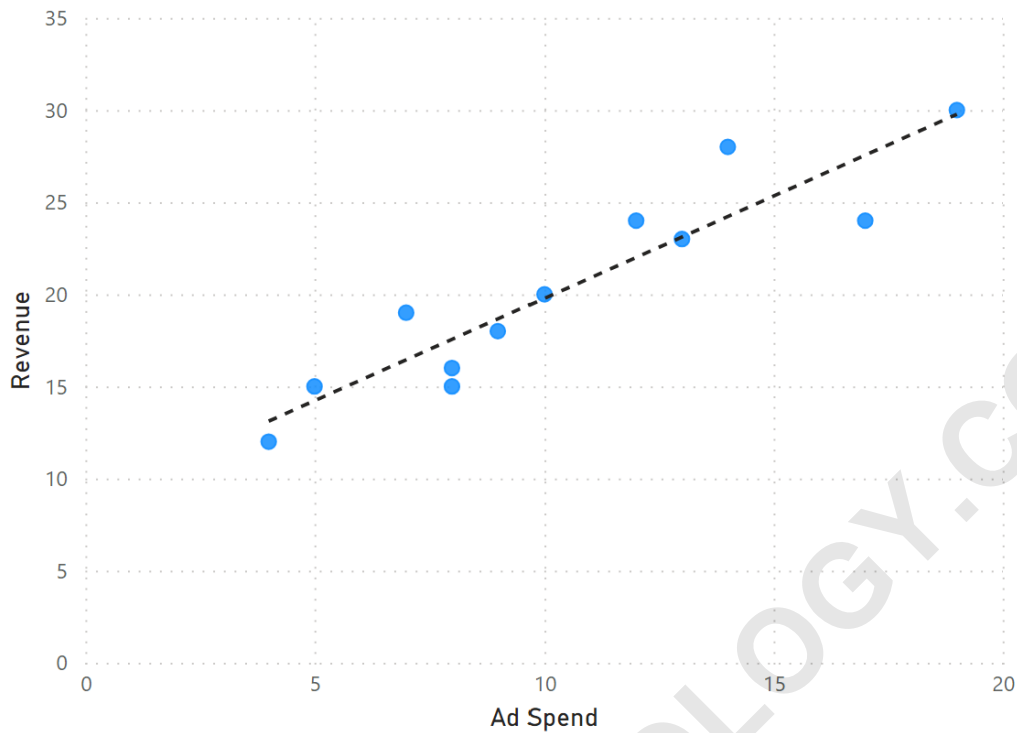
Add slicer to this page

Create

Cancel

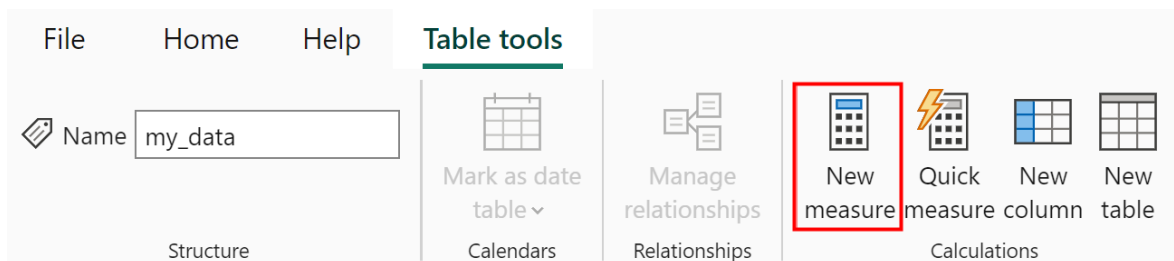
A new slicer visualization will appear on the canvas, allowing users to select any numerical value for **Ad Spend** between 0 and 20. This selected value will serve as the input for our prediction measure in the next step.

Ad Spend and Revenue



Step 4: Defining the Predicted Revenue Measure

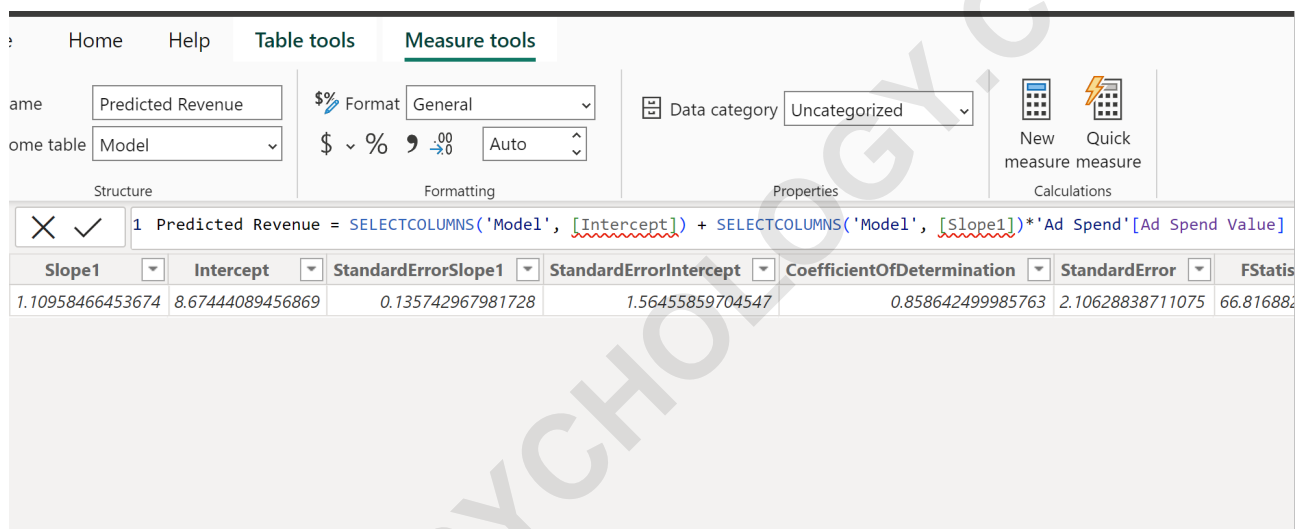
Now, we must create a **measure** that dynamically calculates the predicted revenue using the linear equation derived in Step 2, incorporating the value selected by the new slider. Switch to the Table view or Data view, navigate back to the **Table tools** tab, and click **New measure**.



Input the following **DAX** formula into the measure bar. This formula retrieves the calculated **Intercept** (β_0) and **Slope1** (β_1) from the **Model** table using **SELECTCOLUMNS**, and multiplies the slope by the current value of the **Ad Spend Value** parameter:

Predicted Revenue = SELECTCOLUMNS('Model',) + SELECTCOLUMNS('Model',)*'Ad Spend'

This newly created measure, **Predicted Revenue**, is the core of our dynamic prediction engine. It ensures that the calculation is always up-to-date based on the user's input from the slicer, effectively implementing the fitted regression equation: $Y = \beta_0 + \beta_1 X$.



The screenshot shows the Power BI interface with the DAX formula bar and a data table. The formula bar contains the following DAX formula:

```
Predicted Revenue = SELECTCOLUMNS('Model', [Intercept]) + SELECTCOLUMNS('Model', [Slope1])*'Ad Spend'[Ad Spend Value]
```

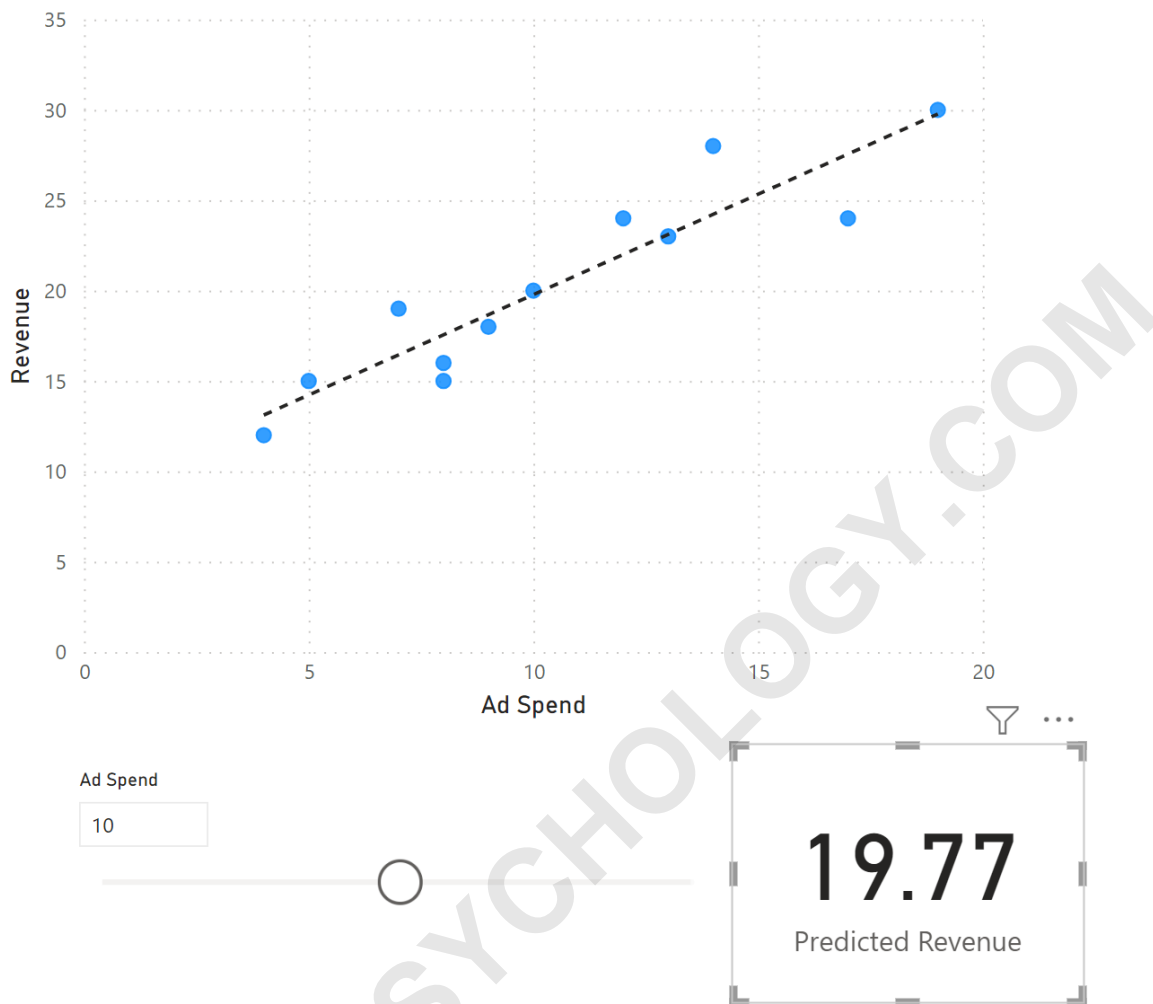
Below the formula bar, a table displays the following data:

Slope1	Intercept	StandardErrorSlope1	StandardErrorIntercept	CoefficientOfDetermination	StandardError	FStatistic
1.10958466453674	8.67444089456869	0.135742967981728	1.56455859704547	0.858642499985763	2.10628838711075	66.81688

Step 5: Visualization and Model Verification

To display the output of our new measure clearly, switch back to the Report view. Insert a **Card visualization** onto the canvas and assign the **Predicted Revenue** measure as the field. This card will now instantly reflect the predicted outcome corresponding to the **Ad Spend** value selected via the slicer.

Ad Spend and Revenue



The **Card visualization** serves as the output display, showcasing the calculated prediction based on the input variable. This dynamic display provides immediate feedback, transforming a static statistical model into an interactive business tool for forecasting.

For verification purposes, let's test a specific input. If the user sets the **Ad Spend** slider value to **10**, the **Predicted Revenue** displayed on the card should be approximately **19.77**. We can manually confirm this result by substituting the value into our original fitted regression equation:

$$\text{Revenue} = 8.67444 + 1.10958 * (\text{Ad Spend})$$

$$\text{Revenue} = 8.67444 + 1.10958 * (10)$$

$$\text{Revenue} = 19.77$$

This confirms the accuracy of the DAX measure. Users are now encouraged to manipulate the value on the **Ad Spend** slider to instantaneously observe how various levels of expenditure impact the **Predicted Revenue** value, providing actionable insights for budget planning.

Conclusion and Further Power BI Analysis

By utilizing the **LINEST** function in DAX, we successfully transitioned from raw data to a fully implemented and dynamic simple linear regression model within **Power BI**. This process demonstrates how to move beyond basic visualizations to perform rigorous statistical analysis and build interactive forecasting tools. This foundational method can be extended to handle more complex statistical models, providing significant analytical depth to your reports.

Explore these related tutorials to enhance your skills in performing other advanced data analysis and common tasks within the Power BI environment:

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