

How to perform a Jarque-Bera Test in Excel

Authored by
stats writer

December 27, 2025

RECOMMENDED CITATION

stats writer (2025). *How to perform a Jarque-Bera Test in Excel*. PSYCHOLOGICAL SCALES. Retrieved from <https://scales.arabpsychology.com/?p=109201>

The Jarque-Bera Test (JB Test) stands as a foundational method in inferential statistics, specifically designed as a test of fit to evaluate whether sample data originates from a population with a normal distribution. This assessment of normality is crucial because many parametric statistical models, such as t-tests and ANOVA, rely on the assumption that the residuals or the data itself are normally distributed. Failure to meet this fundamental assumption can invalidate the results of subsequent analyses, leading to inaccurate conclusions.

While specialized statistical software offers dedicated modules for this analysis, Microsoft Excel provides a quick and accessible pathway to perform the Jarque-Bera test. Typically, if you have specialized statistical add-ins installed in Excel, the test can be executed using a simple proprietary function, often denoted as `=JB(data_range)`. This function efficiently processes the dataset and yields two critical output components: the test statistic and the associated p-value.

Interpreting the output is straightforward and relies on comparing the p-value against a predetermined significance level, commonly set at 0.05. If the calculated p-value is greater than 0.05 ($p > 0.05$), we conclude that there is insufficient evidence to reject the null hypothesis of normality, meaning the data is likely consistent with a normal distribution. Conversely, if the p-value is less than 0.05 ($p < 0.05$), we reject the null hypothesis, suggesting that the data significantly deviates from normality and possesses characteristics such as excessive skewness or kurtosis.

The Statistical Foundation: Understanding the Goodness-of-Fit Concept

The **Jarque-Bera test** is classified as a specific type of goodness-of-fit test. Its primary purpose is to ascertain how well the distributional shape of an observed sample aligns with the theoretical properties of a perfect normal distribution. The core logic behind this test revolves around measuring deviations in the third and fourth moments of the sample data--specifically, the skewness and the kurtosis.

A truly normal distribution possesses defining characteristics: a skewness value of zero (perfect symmetry around the mean) and a kurtosis value of three (or an excess kurtosis of zero). The Jarque-Bera test statistic mathematically combines the deviations of the sample's observed skewness and kurtosis from these ideal normal values. Consequently, the test statistic is always calculated as a positive number. When the sample data closely approximates normality, the test statistic will be near zero; however, the farther the observed characteristics deviate from the theoretical norm, the larger the test statistic becomes, signaling a lack of normality.

The test statistic of the Jarque-Bera test is always a positive number and if it's far from zero, it indicates that the sample data do not have a normal distribution. This inherent structure ensures that the test only detects departures from the expected shape, regardless of whether the deviation is due to heavy tails or extreme asymmetry.

Core Concepts: Defining Skewness and Kurtosis

To fully appreciate the JB Test, it is vital to grasp the roles of skewness (S) and kurtosis (C). Skewness measures the asymmetry of the probability distribution around its mean. A positive skew indicates a long tail extending to the right, while a negative skew indicates a long tail extending to the left. Any significant skewness suggests the distribution is not perfectly symmetrical, thereby violating the requirements for a normal distribution.

Kurtosis, on the other hand, measures the "tailedness" and peakedness of the distribution. It quantifies how much of the data falls into the tails versus the center. Distributions with high kurtosis (leptokurtic) have fatter tails and a sharper peak than the normal distribution, while those with low kurtosis (platykurtic) have lighter tails and a flatter peak. Since the JB test incorporates both these measures, it provides a powerful, combined assessment of distributional shape against the benchmark of normality.

Deconstructing the Jarque-Bera Test Statistic (JB)

The calculation of the Jarque-Bera test statistic, denoted as **JB**, summarizes the combined influence of deviations in skewness and kurtosis relative to the sample size. It is a fundamental calculation that must be performed before determining the p-value. The formula efficiently weights the squared skewness and the squared excess kurtosis, ensuring that the result is always non-negative.

The formal definition of the test statistic is provided below, highlighting its dependence on sample size and the estimated sample moments:

$$JB = (n/6) * (S^2 + (C^2/4))$$

The components of this equation are defined as follows:

n: the number of observations in the sample

S: the sample skewness (calculated using the sample formula)

C: the sample kurtosis (calculated as excess kurtosis, where C=0 for a normal distribution)

A crucial statistical property of the JB statistic is its distribution under the assumption of normality. Under the null hypothesis (H0: the data is normally distributed), the JB statistic asymptotically follows a Chi-squared distribution with two degrees of freedom, often written as $JB \sim \chi^2(2)$. This forms the basis for accurate p-value calculation.

Interpreting the Null Hypothesis and P-Value

Hypothesis testing using the Jarque-Bera method requires clearly defined hypotheses. The null

hypothesis (H_0) posits that the data distribution is normal. The alternative hypothesis (H_A) is that the data distribution is not normal. The JB test is inherently a right-tailed test, meaning we are interested in large values of the test statistic, which signify large deviations from zero skewness and zero excess kurtosis.

The resulting p-value is the probability of observing a test statistic as extreme as, or more extreme than, the one calculated, assuming the null hypothesis is true. If the p-value is small (typically less than the significance level $\alpha = 0.05$), we conclude that the observed data is unlikely to have come from a normal population, and we reject H_0 . If the p-value is large ($p > 0.05$), we fail to reject H_0 , suggesting the data provides no strong evidence against the assumption of normality. This tutorial explains how to conduct a Jarque-Bera test in Excel.

Performing the Jarque-Bera Test Step-by-Step in Microsoft Excel

While some specialized Excel add-ins may provide a single function for the Jarque-Bera Test, it is highly beneficial to understand the underlying mechanics. By manually calculating the necessary statistics--sample size, skewness, and kurtosis--we can ensure accuracy and build a robust, reproducible JB test using standard Excel functions. Follow these precise steps to conduct a full Jarque-Bera test for any given dataset within an Excel spreadsheet.

Use the following steps to perform a Jarque-Bera test for a given dataset in Excel.

Preparing Your Data for the Jarque-Bera Test in Microsoft Excel (Step 1)

Step 1: Input the data. The initial and most fundamental step in any statistical analysis is the organization and input of the raw data. Ensure that your entire dataset is neatly arranged within a single column in your Excel spreadsheet. Consistency in data entry minimizes errors in subsequent calculations, particularly when defining the data range for Excel functions.

First, input the dataset into one column:

	A	B	C	D	E	F
1	Data					
2	4					
3	5					
4	5					
5	6					
6	9					
7	12					
8	13					
9	14					
10	14					
11	19					
12	22					
13	24					
14	25					
15						
16						
17						
18						

Detailed Calculation of the JB Statistic in Excel (Step 2)

Step 2: Calculate the Jarque-Bera Test Statistic. Once the data is input, the next crucial step is to calculate the components required for the **JB** formula: the sample size (n), the sample skewness (S), and the sample kurtosis (C). Excel provides built-in functions that streamline the calculation of these statistical moments, avoiding the need for manual, complex summation formulas.

Next, calculate the JB test statistic. Column F shows the formulas used, which include using the COUNT, SKEW, and KURT functions on your data range (e.g., A2:A31). It is essential to remember that Excel's KURT function already calculates the excess kurtosis, making the output directly usable as variable C in the Jarque-Bera formula.

The formula for the final JB statistic combines these calculated values, confirming the dependence on the squared skewness and one-quarter of the squared excess kurtosis, multiplied by the sample size factor (n/6). This systematic calculation ensures precision.

	A	B	C	D	E	F	G
1	Data						
2	4		observations	n	13	=COUNT(A2:A14)	
3	5		sample skewness	S	0.3367	=SKEW(A2:A14)	
4	5		sample kurtosis	C	-1.2171	=KURT(A2:A14)	
5	6						
6	9		JB test statistic	JB	1.0481	=(E2/6) * (E3^2+(E4^2)/4)	
7	12						
8	13						
9	14						
10	14						
11	19						
12	22						
13	24						
14	25						
15							
16							
17							
18							

Determining Significance: Calculating the P-Value (Step 3)

Step 3: Calculate the p-value of the test. The final step involves converting the calculated **JB** test statistic into a statistical p-value. As established previously, under the assumption of normality, the JB statistic is distributed approximately as a Chi-squared distribution with two degrees of freedom. We utilize the `CHISQ.DIST.RT` function in Excel, which calculates the right-tailed probability of the Chi-squared distribution.

Since the Jarque-Bera test is inherently right-tailed--large JB values indicate extreme deviations from normality--using the right-tailed function is critical for obtaining the correct p-value. If the calculated JB statistic resides far in the right tail of the distribution, the corresponding p-value will be small, signaling the need to reject normality. Ensure the degrees of freedom parameter is set to '2' when using the `CHISQ.DIST.RT` function.

	A	B	C	D	E	F	G
1	Data						
2	4		observations	n	13	=COUNT(A2:A14)	
3	5		sample skewness	S	0.3367	=SKEW(A2:A14)	
4	5		sample kurtosis	C	-1.2171	=KURT(A2:A14)	
5	6						
6	9		JB test statistic	JB	1.0481	=(E2/6) * (E3^2+(E4^2)/4)	
7	12						
8	13		p-value	p	0.5921	=CHISQ.DIST.RT(E6, 2)	
9	14						
10	14						
11	19						
12	22						
13	24						
14	25						
15							
16							

Conclusion: Drawing Inferences from the JB Test Result

The result of the p-value calculation is the decisive factor in our hypothesis test. In the illustrated example, the p-value of the test is **0.5921**. This calculated value must be compared against the standard significance level, typically $\alpha = 0.05$.

Since this p-value is not less than 0.05 ($0.5921 > 0.05$), we consequently fail to reject the null hypothesis. We do not have sufficient evidence to say that the dataset is not normally distributed. This finding suggests that the observed sample characteristics (skewness and kurtosis) are statistically insignificant when compared to the theoretical expectations of a normal distribution. Therefore, the assumption of normality is upheld for this dataset, allowing us to proceed with parametric statistical tests that rely upon this condition.