# Normality Testing

# Actually, normality testing used for checking the variable data is normally distributed or not. Actually this normality testing is necessary part. Because after completing this only we can determine which method (pearson or spearman) we can use for completing the correlational analysis. To do this normality testing Anderson darling, Lilliefors, and shapiro-wiki tests are used.

# **Statistical Hypothetical Testing: Normality tests for Sample : Dataset : economic status**

Significant level = 0.05 (5%)

Confidence level = 0.95 (95%)

Variable = GDP

(\*) Whether or not GDP is normally distributed?

H­0: GDP is normally distributed

H­1: GDP is not normally distributed

ad.test(GDP)

Anderson-Darling normality test

data: GDP

A = 0.25343, p-value = 0.7268

Decision: p-value= 0.7268 > α=0.05 => Accept H0 at 5% significant level

lillie.test(GDP)

Lilliefors (Kolmogorov-Smirnov) normality test

data: GDP

D = 0.051776, p-value = 0.7333

Decision: p-value= 0.7333 > α=0.05 => Accept H0 at 5% significant level

shapiro.test(GDP)

Shapiro-Wilk normality test

data: GDP

W = 0.98988, p-value = 0.6552

Decision: p-value= 0.6552 > α=0.05 => Accept H0 at 5% significant level

Conclusion - According to the Anderson-Darling test (p = 0.7268), Lilliefors test (p = 0.7333), and Shapiro-Wiki test (p = 0.6552), at 5 % significant level “GDP” data is normality distributed.

**Summary statistics about GDP**

summary(GDP) Min. 1st Qu. Median Mean 3rd Qu. Max.

23803 43991 48730 48962 54060 68523

**Montercarlo graph for GDP**

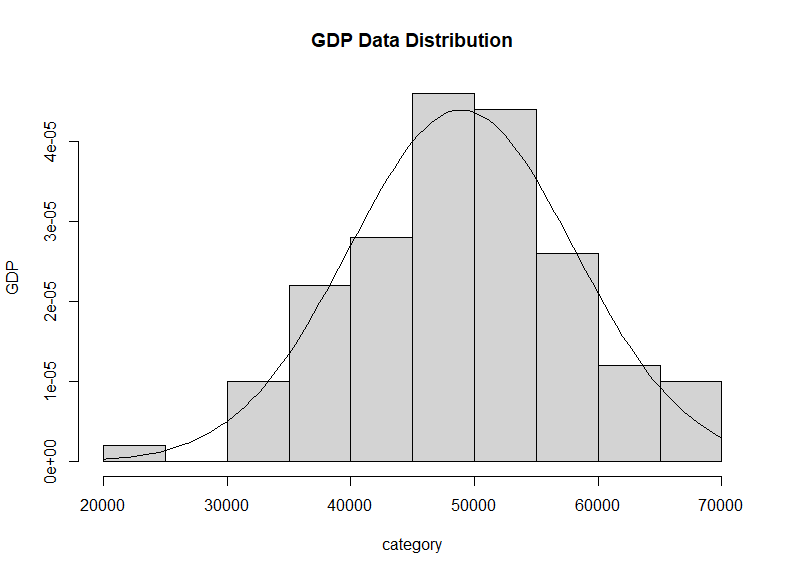


Figure 1 - GDP data distribution

**Interpretation of Montercarlo graph**

According to the above plot bell curve GDP is normally distributed at 5% significant level.

**Quintile comparison plot**

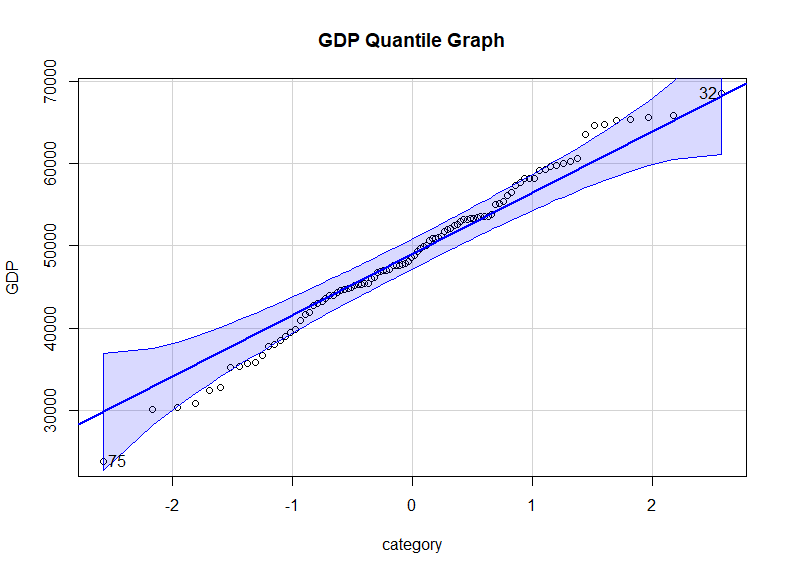


Figure 2 - Quintile comparison plot for GDP

**Interpretation of quintile comparison plot**

Based on above quintile plot, it clearly describes lot of data points are overlapped the absolute line and available within this envelop. So then, GDP values can be considered as normally distributed at 5 % significant level.

# **Statistical Hypothetical Testing: Normality tests for Sample : Dataset : economic status**

Significant level = 0.05 (5%)

Confidence level = 0.95 (95%)

Variable = Unemployment\_Rate

(\*) Whether or not Unemployment\_Rate is normally distributed?

H­0: Unemployment\_Rate is normally distributed

H­1: Unemployment\_Rate is not normally distributed

ad.test(Unemployment\_Rate)

Anderson-Darling normality test

data: Unemployment\_Rate

A = 0.62141, p-value = 0.1029

Decision: p-value= 0.1029 > α=0.05 => Accept H0 at 5% significant level

lillie.test(Unemployment\_Rate)

Lilliefors (Kolmogorov-Smirnov) normality test

data: Unemployment\_Rate

D = 0.072104, p-value = 0.2269

Decision: p-value= 0.2269 > α=0.05 => Accept H0 at 5% significant level

shapiro.test(Unemployment\_Rate)

Shapiro-Wilk normality test

data: Unemployment\_Rate

W = 0.97753, p-value = 0.08526

Decision: p-value= 0.08526 > α=0.05 => Accept H0 at 5% significant level

Conclusion - According to the Anderson-Darling test (p = 0.1029), Lilliefors test (p = 0.2269), and Shapiro-Wiki test (p = 0.08526), at 5 % significant level “Unemployment\_Rate” data is normality distributed.

summary(Unemployment\_Rate) Min. 1st Qu. Median Mean 3rd Qu. Max.

1.162 3.389 5.168 5.045 6.076 10.440

**Montercarlo graph for Unemployment\_Rate**

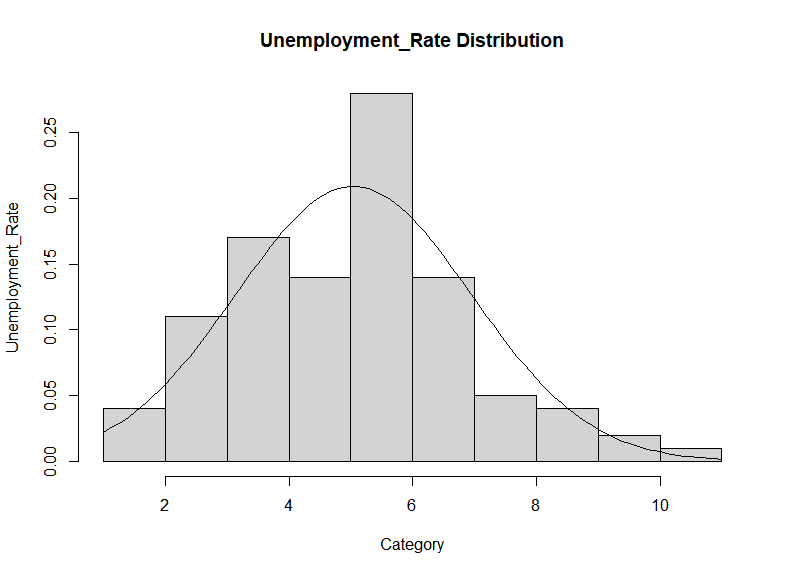


Figure 3 - Unemployment\_Rata data distribution

**Interpretation of Montercarlo**

According to the above plot bell curve Unemployment\_Rate is normally distributed at 5% significant level.

**Quintile comparison plot**

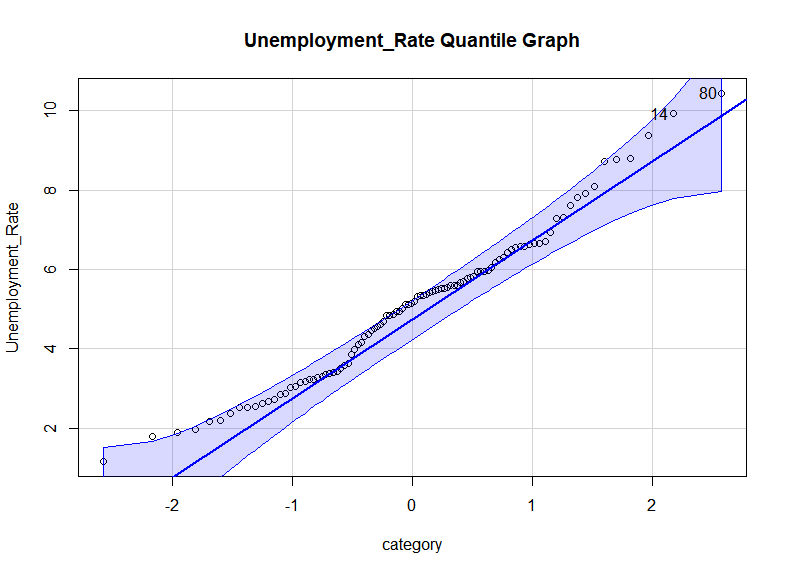


Figure 4 - Quintile comparison plot for Unemployment\_Rate

According to the above quintile plot, it clearly describes some data points are overlapped the absolute line. And also huge amount of data points available within this envelop. So then, Unemployment\_Rate values can be considered as normally distributed at 5 % significant level.

# **Statistical Hypothetical Testing: Normality tests for Sample : Dataset : economic status**

Significant level = 0.05 (5%)

Confidence level = 0.95 (95%)

Variable = Interest\_Rate

(\*) Whether or not Unemployment\_Rate is normally distributed?

H­0: Interest\_Rate is normally distributed

H­1: Interest\_Rate is not normally distributed

d.test(Interest\_Rate)

Anderson-Darling normality test

data: Interest\_Rate

A = 0.33355, p-value = 0.5059

Decision: p-value= 0.5059 > α=0.05 => Accept H0 at 5% significant level

lillie.test(Interest\_Rate)

Lilliefors (Kolmogorov-Smirnov) normality test

data: Interest\_Rate

D = 0.055555, p-value = 0.6289

Decision: p-value= 0.6289 > α=0.05 => Accept H0 at 5% significant level

shapiro.test(Interest\_Rate)

Shapiro-Wilk normality test

data: Interest\_Rate

W = 0.98568, p-value = 0.3551

Decision: p-value= 0.3551 > α=0.05 => Accept H0 at 5% significant level

Conclusion - According to the Anderson-Darling test (p = 0.5059), Lilliefors test (p = 0.6269), and Shapiro-Wiki test (p = 0.3551), at 5 % significant level “Interest\_Rate” data is normality distributed.

summary(Interest\_Rate) Min. 1st Qu. Median Mean 3rd Qu. Max.

-0.2413 2.3446 3.0977 3.0649 3.7044 6.8527

**Montercarlo graph**

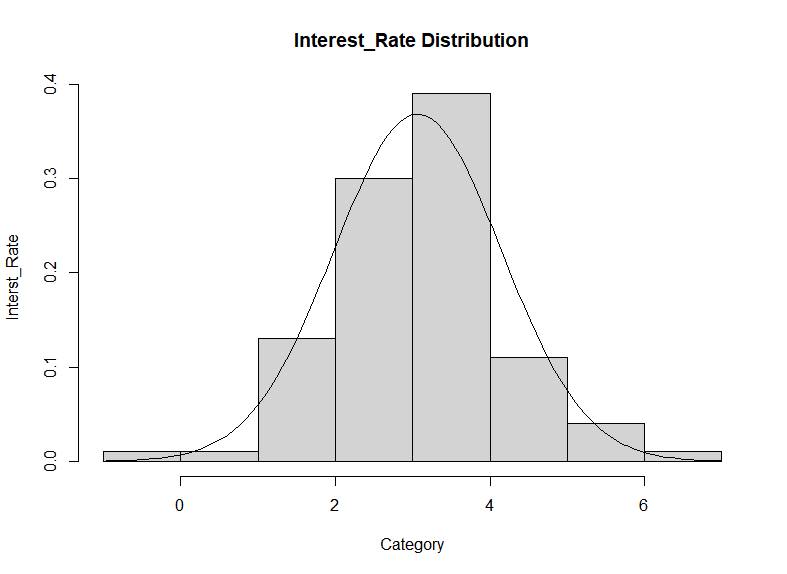


Figure 5 - Interest\_Rate data distribution

**Interpretation of Montercarlo**

According to the above plot bell curve Interest\_Rate is normally distributed at 5% significant level.

**Quintile comparison plot**

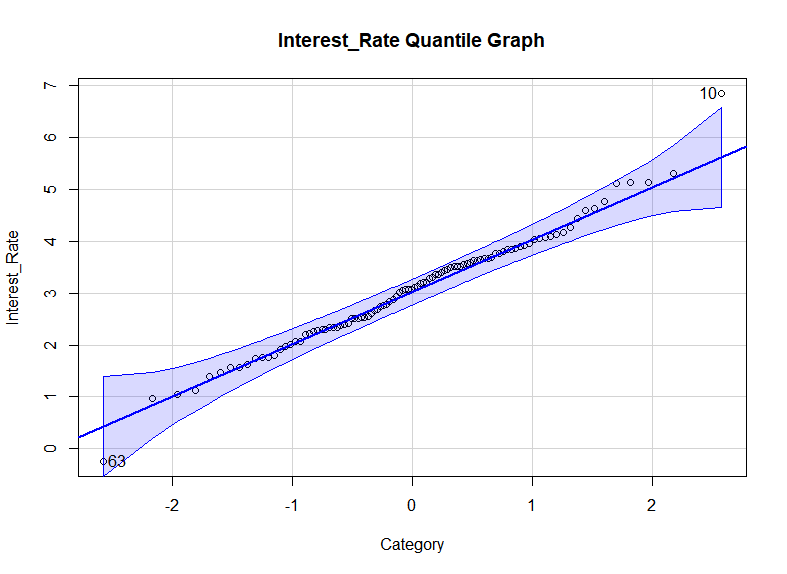


Figure 6 Quintile graph for Interest\_Rate

According to the above quintile plot, it clearly describes huge number of data points are overlapped the absolute line. And also huge amount of data points available within this envelop. So then, Interest\_Rate values can be considered as normally distributed at 5 % significant level.

# **Statistical Hypothetical Testing: Normality tests for Sample : Dataset : economic status**

Significant level = 0.05 (5%)

Confidence level = 0.95 (95%)

Variable = Inflation\_Rate

(\*) Whether or not Inflation\_Rate is normally distributed?

H­0: Inflation\_Rate is normally distributed

H­1: Inflation\_Rate is not normally distributed

ad.test(Inflation\_Rate)

Anderson-Darling normality test

data: Inflation\_Rate

A = 0.29563, p-value = 0.5886

Decision: p-value= 0.5886 > α=0.05 => Accept H0 at 5% significant level

lillie.test(Inflation\_Rate)

Lilliefors (Kolmogorov-Smirnov) normality test

data: Inflation\_Rate

D = 0.052647, p-value = 0.7098

Decision: p-value= 0.7098 > α=0.05 => Accept H0 at 5% significant level

shapiro.test(Inflation\_Rate)

Shapiro-Wilk normality test

data: Inflation\_Rate

W = 0.98992, p-value = 0.6578

Decision: p-value= 0.6578 > α=0.05 => Accept H0 at 5% significant level

Conclusion - According to the Anderson-Darling test (p = 0.5886), Lilliefors test (p = 0.7098), and Shapiro-Wiki test (p = 0.6578), at 5 % significant level “Inflation\_Rate” data is normality distributed.

summary(Inflation\_Rate) Min. 1st Qu. Median Mean 3rd Qu. Max.

-0.1239 1.4330 2.0502 2.1068 2.6840 4.1898

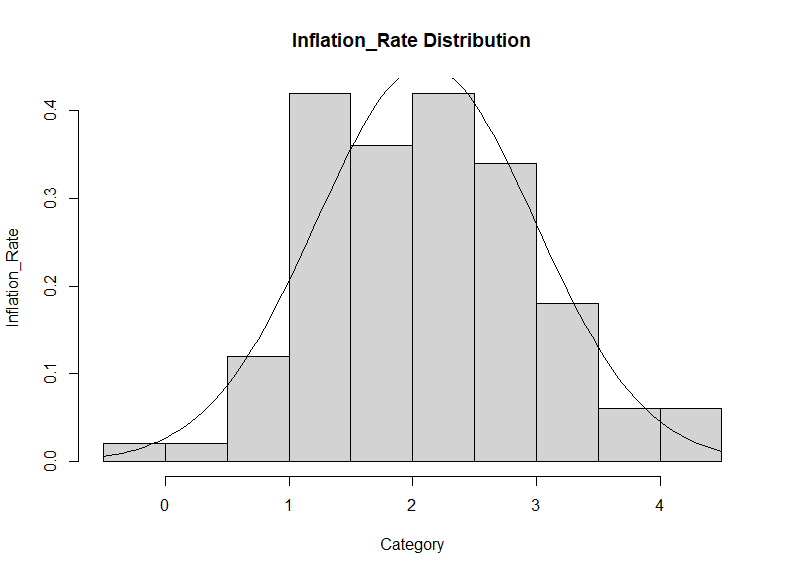


Figure 7 Inflation\_Rate data distribution

**Interpretation of Montercarlo**

According to the above plot bell curve Inflation\_Rate is normally distributed at 5% significant level.

**Quintile comparison plot**

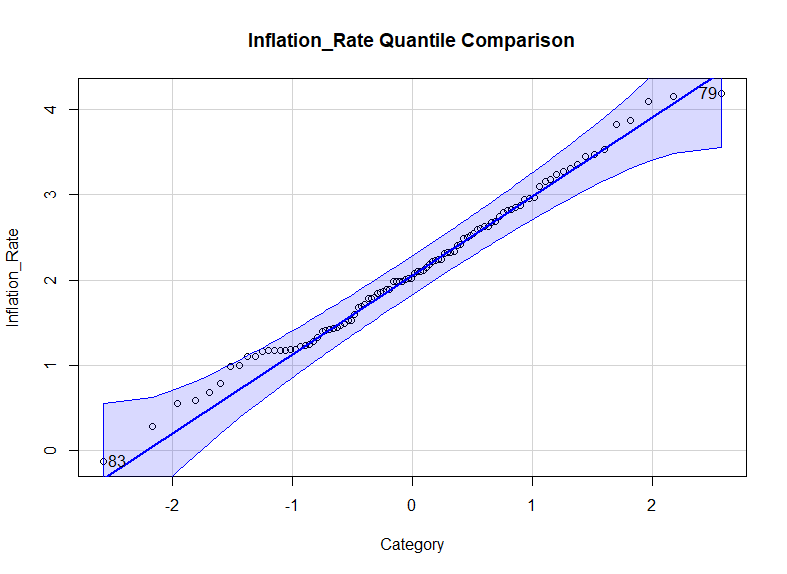


Figure 8 Quintile graph for Inflation\_Rate

According to the above inflation\_Rate quintile plot, it clearly describes larger number of data points are overlapped the absolute line. And also huge amount of data points available within this envelop. So then, Inflation\_Rate values can be considered as normally distributed at 5 % significant level.

# **Statistical Hypothetical Testing: Normality tests for Sample : Dataset : economic status**

Significant level = 0.05 (5%)

Confidence level = 0.95 (95%)

Variable = Consumption

(\*) Whether or not Consumption is normally distributed?

H­0: Consumption is normally distributed

H­1: Consumption is not normally distributed

ad.test(Consumption)

Anderson-Darling normality test

data: Consumption

A = 0.33749, p-value = 0.498

Decision: p-value= 0.498 > α=0.05 => Accept H0 at 5% significant level

lillie.test(Consumption)

Lilliefors (Kolmogorov-Smirnov) normality test

data: Consumption

D = 0.067674, p-value = 0.3139

Decision: p-value= 0.3139 > α=0.05 => Accept H0 at 5% significant level

Shapiro.test(Consumption)

Shapiro-Wilk normality test

data: Consumption

W = 0.98822, p-value = 0.5247

Decision: p-value= 0.5247 > α=0.05 => Accept H0 at 5% significant level

Conclusion - According to the Anderson-Darling test (p = 0.498), Lilliefors test (p = 0.3139), and Shapiro-Wiki test (p = 0.5247), at 5 % significant level “Consumption” data is normality distributed.

summary(Consumption) Min. 1st Qu. Median Mean 3rd Qu. Max.

9464 20629 25098 25090 28473 43511

**Montercarlo Graph For Consumption**

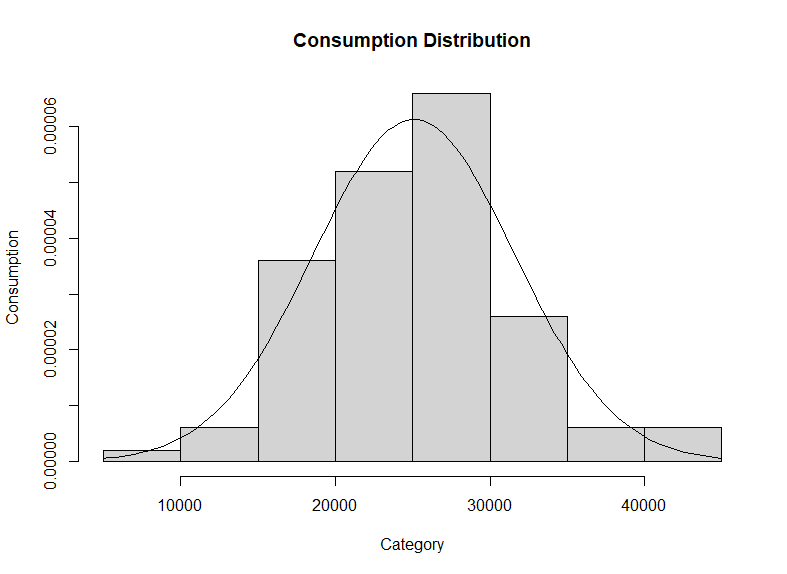


Figure 9 Consumption data distribution

**Interpretation of Montercarlo**

According to the above plot bell curve Consumption is normally distributed at 5% significant level.

**Quintile comparison plot**

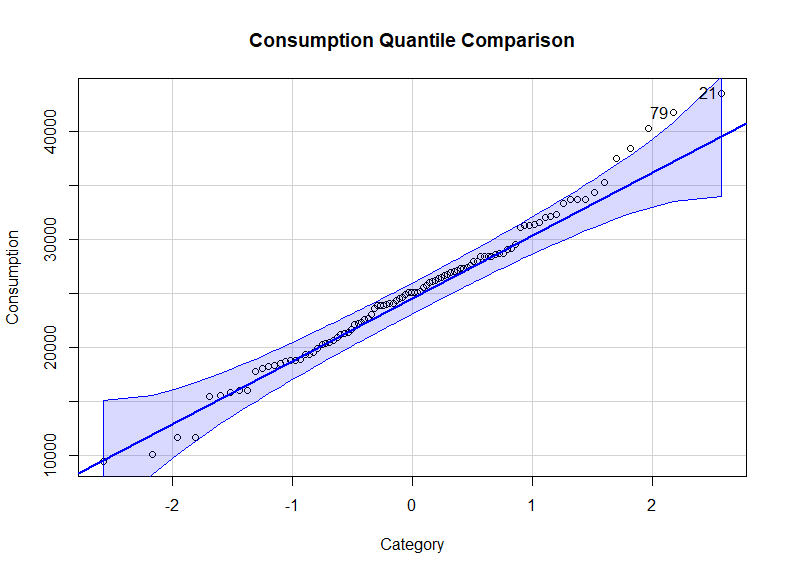


Figure 10 Consumption quintile comparison plot

According to the above Consumption quintile plot, it clearly describes larger number of data points are overlapped the absolute line. And also huge amount of data points available within this envelop. So then, Consumption values can be considered as normally distributed at 5 % significant level.