

GET

FILE='C:\Users\Toshiba\Documents\OVGU\SS2021\Marketing Methods & Analysis\Exercise\EX5-Regression\Case study\Case Study Customer Satisfaction.sav'.

```
>Warning # 5281. Command name: GET FILE
>SPSS Statistics is running in Unicode encoding mode. This file is encoded in
>a locale-specific (code page) encoding. The defined width of any string
>variables are automatically tripled in order to avoid possible data loss. You
>can use ALTER TYPE to set the width of string variables to the width of the
>longest observed value for each string variable.
DATASET NAME DataSet1 WINDOW=FRONT.
DATASET ACTIVATE DataSet1.
DATASET CLOSE DataSet3.
DATASET ACTIVATE DataSet1.
DESCRIPTIVES VARIABLES=lvexpect lvvalue lvcomp
/STATISTICS=MEAN STDDEV MIN MAX.
```

## Descriptives

NB:Checking the data requirements to ensure:

1.Variable show variation i.e the standard deviations not the same.

2.Sample size is sufficiently large.

\*Rules of Thumb:

1)n  $50+8*k$  to tests the overall relationship (k = number of independent variables)--  
> n=1639 > 74 ( $50+8*3$ )

2)  $104+k$  to test for **individual parameter effects** ("Customer expectations", "Perceived value", "customer complaints")Sample size should be sufficiently large--->  
n = 1639 > 107 ( $104+3$  variables)

## Notes

Output Created		14-JUN-2021 13:41:39
Comments		
Input	Data	C:\Users\Toshiba\Documents\OVGU\SS2021\Marketing Methods & Analysis\Exercise\EX5-Regression\Case study\Case Study Customer Satisfaction.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	1639
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	All non-missing data are used.
Syntax		DESCRIPTIVES VARIABLES=lvexpect lvvalue lvcomp /STATISTICS=MEAN STDDEV MIN MAX.
Resources	Processor Time	00:00:00.06
	Elapsed Time	00:00:00.03

## Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Customer Expectations	1639	9.99	16.28	13.0009	.99957
Perceived Value	1639	6.42	14.41	9.9990	1.01018
Customer Complaints	1639	.00	1.00	.2288	.42019
Valid N (listwise)	1639				

### REGRESSION

```

/DESCRIPTIVES MEAN STDDEV CORR SIG N
/MISSING LISTWISE
/STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL ZPP
/CRITERIA=PIN(.05) POUT(.10)
/NOORIGIN
/DEPENDENT lvsat
/METHOD=ENTER lvexpect lvvalue lvcomp

```

```
/SCATTERPLOT=(lvsat ,*ZRESID)
```

```
/RESIDUALS DURBIN HISTOGRAM(ZRESID) NORMPROB(ZRESID) .
```

## Regression

### Notes

Output Created		14-JUN-2021 14:01:36
Comments		
Input	Data	C: \Users\Toshiba\Documents\OVGU\SS2021\Marketing Methods & Analysis\Exercise\EX5-Regression\Case study\Case Study Customer Satisfaction.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	1639
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any variable used.
Syntax		REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL ZPP /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT lvsat /METHOD=ENTER lvexpect lvvalue lvcomp /SCATTERPLOT=(lvsat , *ZRESID) /RESIDUALS DURBIN HISTOGRAM(ZRESID) NORMPROB(ZRESID).
Resources	Processor Time	00:00:06.55
	Elapsed Time	00:00:05.44

### Notes

	Memory Required	3552 bytes
	Additional Memory Required for Residual Plots	864 bytes

### Descriptive Statistics

	Mean	Std. Deviation	N
Overall Customer Satisfaction	13.9999	1.00219	1639
Customer Expectations	13.0009	.99957	1639
Perceived Value	9.9990	1.01018	1639
Customer Complaints	.2288	.42019	1639

### Correlations

		Overall Customer Satisfaction	Customer Expectations	Perceived Value
Pearson Correlation	Overall Customer Satisfaction	1.000	.492	.766
	Customer Expectations	.492	1.000	.478
	Perceived Value	.766	.478	1.000
	Customer Complaints	-.144	-.073	-.137
Sig. (1-tailed)	Overall Customer Satisfaction	.	.000	.000
	Customer Expectations	.000	.	.000
	Perceived Value	.000	.000	.
	Customer Complaints	.000	.001	.000
N	Overall Customer Satisfaction	1639	1639	1639
	Customer Expectations	1639	1639	1639
	Perceived Value	1639	1639	1639
	Customer Complaints	1639	1639	1639

### Correlations

		Customer Complaints
Pearson Correlation	Overall Customer Satisfaction	-.144
	Customer Expectations	-.073
	Perceived Value	-.137
	Customer Complaints	1.000
Sig. (1-tailed)	Overall Customer Satisfaction	.000
	Customer Expectations	.001
	Perceived Value	.000
	Customer Complaints	.
N	Overall Customer Satisfaction	1639
	Customer Expectations	1639
	Perceived Value	1639
	Customer Complaints	1639

### Variables Entered/Removed<sup>a</sup>

Model	Variables Entered	Variables Removed	Method
1	Customer Complaints, Customer Expectations, Perceived Value <sup>b</sup>	.	Enter

a. Dependent Variable: Overall Customer Satisfaction

b. All requested variables entered.

### Model Summary<sup>b</sup>

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.780 <sup>a</sup>	.609	.608	.62756	1.953

a. Predictors: (Constant), Customer Complaints, Customer Expectations, Perceived Value

b. Dependent Variable: Overall Customer Satisfaction

NB: From Durbin Watson test ([https://www3.nd.edu/~wevans1/econ30331/Durbin\\_Watson\\_tables.pdf](https://www3.nd.edu/~wevans1/econ30331/Durbin_Watson_tables.pdf))  $d=1.953$ ,  $n = 200$   $p\text{-value} < 5\%$ ,  $k=3$  predictors

$dL=1.738$

$dU=1.789$ . **No autocorrelation** is within the bounds  $[dL, dU] \rightarrow [1.738, 1.789]$  and the test statistic above (Durbin Watson = 1.953) is within this range.

R Square indicates that 3 predictors jointly explain 61% of the variance. Adjusted for their number, the predictors explain 61% of the dependent variable.

### ANOVA<sup>a</sup>

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1001.261	3	333.754	847.453	.000 <sup>b</sup>
	Residual	643.914	1635	.394		
	Total	1645.175	1638			

a. Dependent Variable: Overall Customer Satisfaction

b. Predictors: (Constant), Customer Complaints, Customer Expectations, Perceived Value

Overall Model is significant  $F(3,1635) = 847.453$ ,  $p < 0.001 \rightarrow$  At least one independent variable is related to the dependent variable (can explain the dependency)

### Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.124	.215		23.863	.000
	Customer Expectations	.164	.018	.163	9.257	.000
	Perceived Value	.677	.018	.683	38.484	.000
	Customer Complaints	-.092	.037	-.038	-2.458	.014

### Coefficients<sup>a</sup>

Model		95.0% Confidence Interval for B		Correlations		
		Lower Bound	Upper Bound	Zero-order	Partial	Part
1	(Constant)	4.702	5.545			
	Customer Expectations	.129	.198	.492	.223	.143
	Perceived Value	.643	.712	.766	.689	.595
	Customer Complaints	-.165	-.019	-.144	-.061	-.038

### Coefficients<sup>a</sup>

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Customer Expectations	.771	1.296
	Perceived Value	.761	1.314
	Customer Complaints	.981	1.019

a. Dependent Variable: Overall Customer Satisfaction

NB: No linear dependence expected between independent variable—we look at tolerance and VIF values

**VIF = 1/Tolerance**

If VIF > 10 → detection of multicollinearity between the variables **Tolerance = (1 - R<sup>2</sup>)**

Range [0, 1]: **Tolerance = 1** → no multicollinearity **Tolerance = 0** → perfect multicollinearity

### Collinearity Diagnostics<sup>a</sup>

Model	Dimension	Eigenvalue	Condition Index	(Constant)	Variance Proportions	
					Customer Expectations	Perceived Value
1	1	3.284	1.000	.00	.00	.00
	2	.708	2.153	.00	.00	.00
	3	.005	25.077	.27	.07	.95
	4	.003	33.942	.73	.93	.05

## Collinearity Diagnostics<sup>a</sup>

Model	Dimension	Variance ... Customer Complaints
1	1	.03
	2	.95
	3	.02
	4	.00

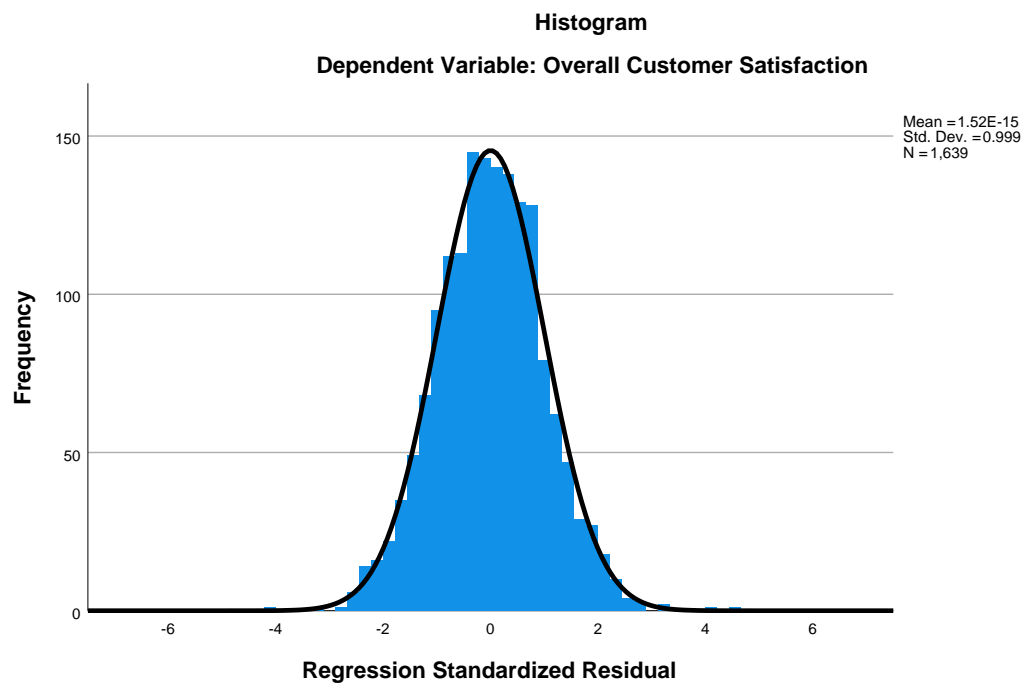
a. Dependent Variable: Overall Customer Satisfaction

## Residuals Statistics<sup>a</sup>

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	11.3182	17.2009	13.9999	.78184	1639
Residual	-2.62906	2.90435	.00000	.62698	1639
Std. Predicted Value	-3.430	4.094	.000	1.000	1639
Std. Residual	-4.189	4.628	.000	.999	1639

a. Dependent Variable: Overall Customer Satisfaction

## Charts

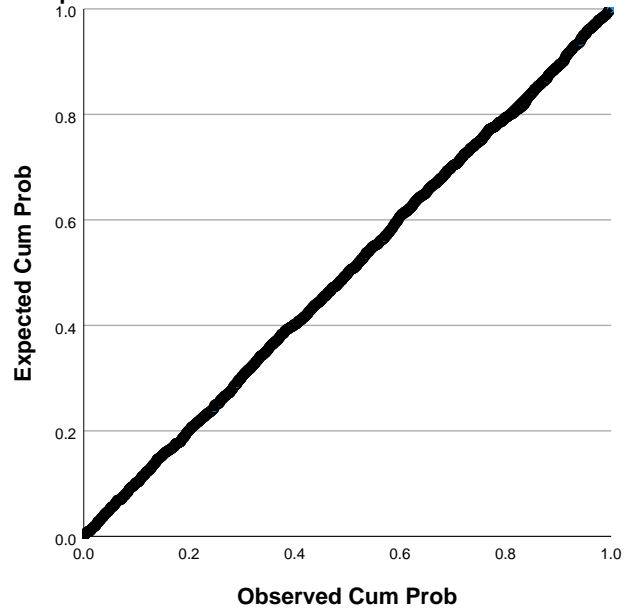


NB: The error term/residuals is normally distributed



**Normal P-P Plot of Regression Standardized Residual**

**Dependent Variable: Overall Customer Satisfaction**



**Scatterplot**

**Dependent Variable: Overall Customer Satisfaction**

