



MANONMANIAM SUNDARANAR UNIVERSITY  
Tirunelveli  
DIRECTORATE OF DISTANCE AND CONTINUING EDUCATION

**M.Com**  
**COMPUTER APPLICATIONS IN**  
**BUSINESS**

## **COMPUTER APPLICATIONS IN BUSINESS**

**UNIT I** Introduction to SPSS Opening a data file in SPSS – Variable view – Data view – Entering data into the data editor – Saving the data file– Table creation – Descriptive statistics: Percentile values, Measures of central tendency, Measures of dispersion, Distribution – Cronbach’s Alpha test – Charts and graphs - Editing and copying SPSS output.

**UNIT II** Parametric Tests in SPSS Compare means: One-sample t-test, Independent Samples t-test, Paired-samples t-test and One-way ANOVA, Two-way ANOVA - Correlation: Bi-variate, Partial and Multiple. Simple linear regression.

**UNIT III** Non-parametric Tests in SPSS Chi-square test - Mann Whitney’s test for independent samples – Wilcoxon matched pairs sample test– Friedman’s test– Wilcoxon signed rank test – Kruskal Wallis test

**UNIT IV** Introduction to Tally Prime Tally Prime: Introduction – Starting Tally Prime – Creation of a Company - Selecting company - Shutting a company - Altering company– Creating Accounting groups and ledgers –

Vouchers – Practical problems for a new and existing business and not-for profit organization. Accounting reports: Introduction – Displaying Trial balance, Profit and Loss Account, Balance sheet, Day book, Purchase register, Sales register, Cash flow /Funds flow and ratio analysis – Practical problems.

**UNIT V** Inventory and GST in Tally Prime Inventory: Introduction to Inventory Masters – Creation of stock group – Creation of Godown – Creation of unit of measurement – Creation of stock item – Entering inventory details in Accounting vouchers – Practical problems. GST: Introduction – Enabling GST – Defining tax details – Entries in Accounting vouchers – View invoice report – Practical problems.

# UNIT I

**UNIT I** Introduction to SPSS Opening a data file in SPSS – Variable view – Data view – Entering data into the data editor – Saving the data file– Table creation – Descriptive statistics: Percentile values, Measures of central tendency, Measures of dispersion, Distribution – Cronbach’s Alpha test – Charts and graphs - Editing and copying SPSS output.

### **Introduction to SPSS**

SPSS software is used for data analysis using statistical techniques. There are many statistical packages are available for data analysis Minitab, STATA, Systat. But SPSS is the most widely used software. SPSS contains two views. They are two views in the SPSS such as data view and variable view. Data view is used to store data and variable view is used to define variables.

### **VARIABLE VIEW**

Variable View contains descriptions of the attributes of each variable in the data file. In Variable View:

- Rows are variables.
- Columns are attributes of variables.

You can add or delete variables and modify attributes of variables, including the following attributes:

- Variable name – this is the field that is used to provide a name for the variable that is to be used.
- Data type – this field is used to provide the type of the data that is to be used. It can be numeric, string, date, dollar etc.
- Number of digits or characters – this field is used to specify the length of the data that is to be entered.
- Number of decimal places – this field is used to specify the number of decimal places that is needed for a specific variable.
- Descriptive variable and value labels – this field is used to give an elaborate description of the variable being used in the database.
- User-defined missing values – this field is used to specify how the missing values are to be shown in a data base.
- Column width – this field is used to specify the required size of the column.
- Measurement level – this is used to specify whether the variable is nominal, ordinal or a scale.

All of these attributes are saved while saving the data file.

## **TYPES OF SCALES**

### **NOMINAL SCALE:**

Nominal scale is the system of assigning number symbols to events in order to label them. Nominal scale provides convenient ways of keeping track of people objects and events. One cannot do much with the numbers involved; it indicates no order or distance relationship and has no arithmetic origin.

**Example:** The assignment of numbers to players in order to identify them. One cannot usefully average the numbers on the back of a group of foot ball players and come up with a meaningful value.

### **ORDINAL SCALE:**

Measurements with ordinal scales are ordered in the sense that higher numbers represent higher values. However, the intervals between the numbers are not necessarily equal.

**For example:** on a five-point rating scale measuring attitudes toward gun control, the difference between a rating of 2 and a rating of 3 may not

represent the same difference as the difference between a rating of 4 and a rating of 5. There is no "true" zero point for ordinal scales since the zero point is chosen arbitrarily. The lowest point on the rating scale in the example was arbitrarily chosen to be 1. It could just as well have been 0 or -5.

**INTERVAL SCALE:**

On interval measurement scales, one unit on the scale represents the same magnitude on the trait or characteristic being measured across the whole range of the scale. Interval scales provide more powerful measurement than ordinal scale for interval scale also incorporates the concept of equality of interval

**For example**, a good example of an interval scale is the Fahrenheit scale for temperature. Equal differences on this scale represent equal differences in temperature, but a temperature of 30 degrees is not twice as warm as one of 15 degrees

**RATIO SCALE:**

Ratio scales are like interval scales except they have true zero points. Ratio scale represents the actual amounts of variables. Measures of physical dimensions such as height, weight, distance etc are examples. Generally all



statistical techniques are usable with ratio scale values multiplication and division can be used with this scale but not with other scales.

## **VARIABLES**

### **METRIC VARIABLE:**

A variable is metric if we can measure the size of the difference between any two variable values. Age measured in years is metric because the size of the difference between the ages of two persons can be measured quantitatively in years. Other examples of metric variables are length of education measured in years, and income measured in monetary units.

### **ENTERING DATA**

Construct a data base using the following variables for 30 cases

1. Serial Number

2. Gender.    Female (  ) Male (  )

3. Please write your age.    \_\_\_\_\_ years

4. Please tick the highest level of education completed.

(  ) School     (  ) Diploma     (  ) Graduate     (  ) Post-graduate     (  )

Professional

5. Please select your current occupation.

(  ) House-wife     (  ) Student     (  ) Self-Employed     (  ) Government Employee

(  ) Private Sector     (  ) Unemployed



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- Gender
- Age
- Education
- Occupation
  - Mention the type for all the variables as numeric
  - Specify the width as required
  - Make all the decimal values 0
  - Under the label column mention the full form for all the variables
  - Under values
    - Gender- 1=Female and 2= Male(mention 1 in value box and male in value label box)
    - Education- 1=school, 2= diploma, 3= graduate,4= post graduate,5= professional
    - Occupation- 1= house wife,2= student,3= self employed,4= employed in govt,5= employed in pvt,6= un employed
- STEP4: The data editor appears as follows
- Please remember that data editor SPSS data editor works like excel work sheet

	Name	Type	Width	Decimals	Label	Values	Missing	Column	Align	Measure
1	sno	Numeric	3	0	serial no	None	None	8	Right	Nominal
2	age	Numeric	2	0	age	None	None	8	Right	Scale
3	gender	Numeric	1	0	gender	{1, m}...	None	8	Right	Nominal
4	educatio	Numeric	1	0	education	{1, school}...	None	8	Right	Ordinal
5	occup	Numeric	1	0	occupation	{1, house wife	None	8	Right	Nominal
6										

The screenshot shows the SPSS Data Editor interface. The title bar reads 'pra - SPSS Data Editor'. The menu bar includes File, Edit, View, Data, Transform, Analyze, Graphs, Utilities, Window, and Help. The toolbar contains various icons for file operations and data analysis. The active window shows a data table with 10 rows and 7 columns. The columns are labeled 'sno', 'age', 'gender', 'educatio', 'occup', and 'var'. The data is as follows:

	sno	age	gender	educatio	occup	var
1	1	25	1	1	1	
2	2	26	2	2	5	
3	3	45	1	3	6	
4	4	32	1	5	4	
5	5	51	1	4	2	
6	6	28	2	1	3	
7	7	41	1	1	1	
8	8	62	2	2	5	
9	9	49	2	3	6	
10	10	53	1	5	1	

Ten cases have been entered in the data editor

Column represents variables and row represents cases. Cases here means respondents

### ENTERING MULTIPLE TICKS

When multiple tick is possible for a given question then each and every options show enter as separate variable

Q: Please tick the items you would normally purchase when you visit a retail outlet.

Fresh fruits and vegetables		Bakery	
Grocery		Dairy	

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Cleaning aids		Beverages	
General merchandise		Frozen food	
Processed food			

For the above question one customer may tick many options. Each and every options namely Fresh fruits and vegetables, Grocery, Cleaning aids etc should enter separately if particular option is ticked then the value 1 may be assigned with particular options is ticked and 0 may be assigned when it not ticked then frequency analysis may be perform.

The frequency analysis will give the following out put

**Items frequently purchased by respondents**

Items	Purchase (%)	Not purchase (%)	Rank
Fresh fruits and vegetables	70	30	I
Bakery items	61.5	38.5	II
Grocery items	52	48	III
Cleaning aids	52	48	IV
Dairy items	47.5	52.5	V
General merchandise	44	56	VI
Beverages	42	58	VII
Frozen food	31.5	68.5	VIII
Processed food	24	76	IX

**Interpretation for the result**

The above table indicates that 70% of the respondents purchase fresh fruits and vegetables, 61.5% of the respondents purchase bakery items, 52% of the respondents purchase grocery items and cleaning aids, 47.5% of the respondents purchase dairy items, 44% of the respondents purchase general merchandise, 42% of the respondents purchase beverages, 31.5% of the respondents purchase frozen food, 24% of the respondents purchase processed food. This indicates that high preference is given to fresh fruits and vegetables and least preference is given to processed food.

### **ENTERING OF RANKING QUESTIONS**

What are the reasons for investing in small savings securities like NSC and PPF, if you have more than one reason **rank them** according to order of priority?

- a) To save tax \_\_\_\_\_ b) High return \_\_\_\_\_ c) Consistent return \_\_\_\_\_  
d) High safety \_\_\_\_\_ e) National interest \_\_\_\_\_ f) Easy to  
operate \_\_\_\_\_

What are the inconvenience and discomfort do you have for investing in small savings?

And **Rank them**

- a) Long term \_\_\_\_\_ b) Less awareness \_\_\_\_\_ c) Low return \_\_\_\_\_

d) Poor service\_\_\_\_\_ e) Schemes are not attractive\_\_\_\_\_ f) Inconvenient to operate\_\_\_\_\_

### **Reason for Investing in small saving securities**

The major reasons identified from pilot study for investing small saving securities are listed in the questionnaire and the investors are asked to rank them based on priority attached to each reason. Based on the average score the reasons are ranked.

### **REASON FOR INVESTING IN SMALL SAVING SECURITIES**

S. No	Criteria	Mean Value	Rank
1	To Save Tax	5.05	I
2	High Safety	4.33	II
3	Consistency of Return	3.81	III
4	High Return	3.63	IV
5	National Interest	3.63	IV
6	Easy To Operate	3.58	V

From the above table it is very clear that people are investing in small saving securities mainly to save tax and the average score for that reason is 5.05 in the 1 to 6 point scale. The small saving schemes are Government sponsored schemes;

hence, there is high level of safety which is the next important reason for investing in small savings. Some college teachers really show national interest and they prefer small savings schemes because the fund collected from this goes to the Government to sponsor schemes and to finance deficit budget.

### **Inconvenience in Small savings schemes**

Small savings schemes have long maturity period and the people site that as the major inconvenience they face in the small savings schemes. Based on the order of priority assigned to other inconvenience by the investors is given in the table.

#### **INCONVENIENCE IN SMALL SAVINGS SCHEMES**

1	Long Term	3.81	I
2	Low Return	3.72	II
3	Schemes are not attractive	3.45	III
4	Poor Service	3.22	IV
5	Less Awareness	3.20	V
6	Inconvenient to operate	2.96	VI

#### **SORT CASE**

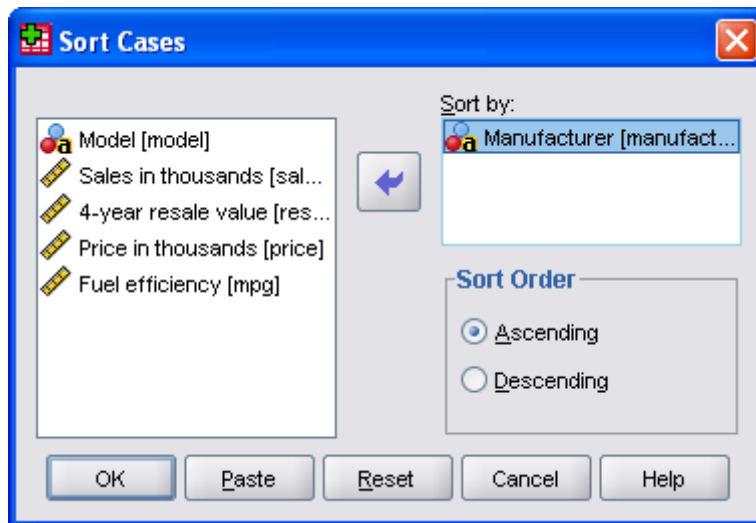
**PURPOSE:**



To sort the file in an order based on a variable. In this case the file car sales are sorted in an ascending order of the manufacturer.

**PROCEDURE:**

- Open the file car sales
- Data → sort cases
- The sort cases dialog box appears



Select the 'sort by' variable as manufacturer and sort order as ascending.

Before sorting:

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	manufact	model	sales	resale	price	mpg
1	Acura	CL	14,114	18,225	.	26
2	Chrysler	Town & Country	53,480	19,640	.	.
3	Chevrolet	Metro	21,855	5,160	9,235	45
4	Hyundai	Accent	41,104	5,860	9,699	31
5	Saturn	SL	80,620	9,200	10,695	33
6	Toyota	Tacoma	64,087	9,675	11,528	23
7	Hyundai	Elantra	66,692	7,625	11,799	27
8	Ford	Ranger	220,650	7,850	12,350	23
9	Ford	Escort	70,227	7,425	12,070	30
10	Ford	Focus	175,670	.	12,315	30
11	Saturn	SC	24,546	10,690	12,635	33
12	Dodge	Neon	76,034	7,790	12,640	29
13	Plymouth	Neon	32,734	7,790	12,640	29
14	Honda	Civic	199,685	9,890	12,895	32
15	Toyota	Corolla	142,535	10,025	13,108	33
16	Chevrolet	Cavalier	145,519	9,250	13,260	27
17	Nissan	Sentra	42,543	8,450	13,499	30
18	Chevrolet	Prizm	32,299	9,125	13,960	33
19	Mitsubishi	Mirage	26,232	8,325	13,987	30
20	Saturn	SW	5,223	10,790	14,290	31
21	Jeep	Wrangler	55,557	13,475	14,460	17
22	Volkswagen	Golf	9,761	11,425	14,930	26
23	Hyundai	Sonata	29,460	8,910	14,999	25
24	Saturn	LS	49,869	.	15,010	28
25	Honda	Accord	200,902	13,210	15,100	27

After sorting:

	manufact	model	sales	resale	price	mpg
1	Acura	CL	14,114	18,225	.	26
2	Acura	Integra	16,919	16,360	21,500	28
3	Acura	TL	39,384	19,675	28,400	25
4	Acura	RL	8,588	29,725	42,000	22
5	Audi	A4	20,397	22,255	23,990	27
6	Audi	A6	18,780	23,555	33,950	22
7	Audi	A8	1,380	39,000	62,000	21
8	BMW	323i	19,747	.	26,990	26
9	BMW	326i	9,231	28,675	33,400	24
10	BMW	526i	17,527	36,125	38,900	25
11	Buick	Century	91,561	12,475	21,975	25
12	Buick	Regal	39,350	13,740	25,300	23
13	Buick	LeSabre	83,257	13,360	27,885	25
14	Buick	Park Avenue	27,851	20,190	31,965	24
15	Cadillac	Catera	11,185	18,225	31,010	22
16	Cadillac	Eldorado	6,536	25,725	39,665	22
17	Cadillac	DeVille	63,729	22,525	39,895	22
18	Cadillac	Seville	15,943	27,100	44,475	22
19	Cadillac	Escalade	14,785	.	46,225	15
20	Chevrolet	Metro	21,855	5,160	9,235	45
21	Chevrolet	Cavalier	145,519	9,250	13,260	27
22	Chevrolet	Prizm	32,299	9,125	13,960	33
23	Chevrolet	Malibu	135,126	11,225	16,535	25
24	Chevrolet	Lumina	24,629	10,310	18,890	25
25	Chevrolet	Impala	107,995	.	18,890	27

The file car sales have been sorted in an ascending order of manufacturer's name.

## MERGE FILES

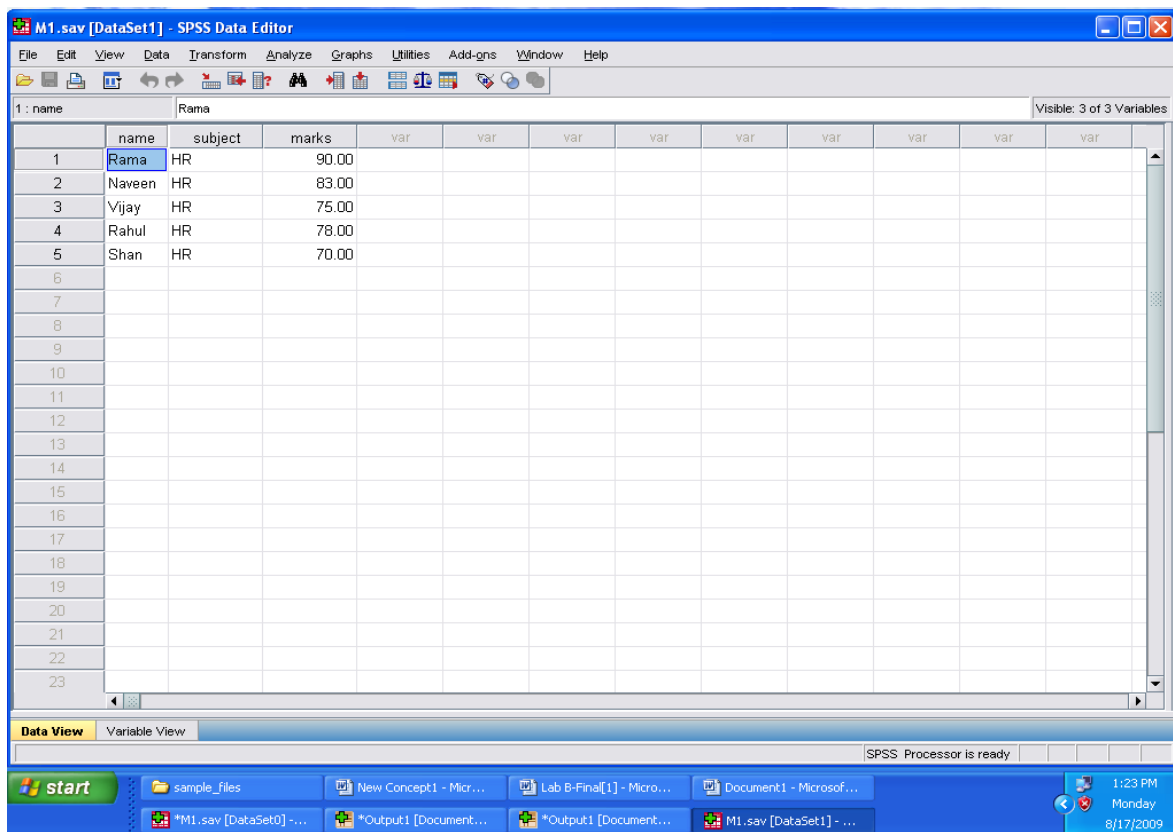
### PURPOSE:

To Merge the Files with the Same Variables and Different Cases

### PROCEDURE:

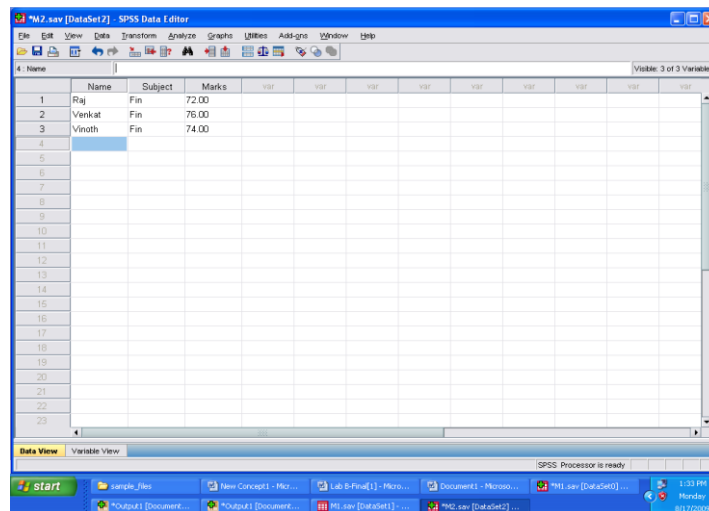
- Open one of the required data files.

### File 1



**File 2**

- From the menus choose:
- *Data* → *Merge Files* → *Add Cases...*
  
- Select the data file to merge with the open data file



Merged file:

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1	name	subject	marks	var	var	var	var	var	var	var	var	var
1	Rama	HR	90.00									
2	Naveen	HR	83.00									
3	Vijay	HR	75.00									
4	Rahul	HR	78.00									
5	Shan	HR	70.00									
6	Raj	Fin	72.00									
7	Venkat	Fin	76.00									
8	Vinoth	Fin	74.00									
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												

To Merge the Files with the Different Variables

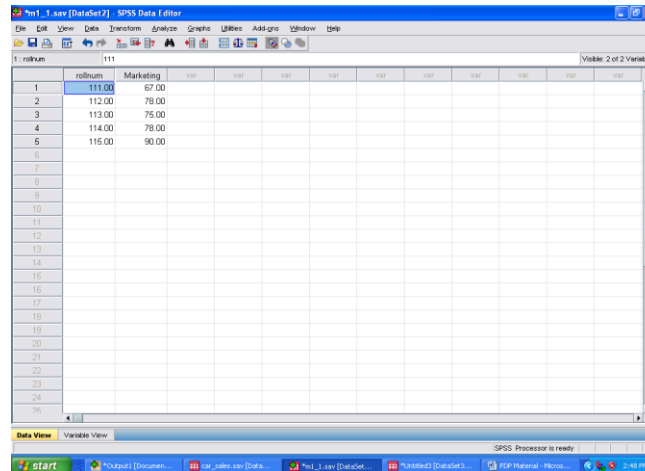
**PROCEDURE:**

- Open one of the required data files.

**File 1**

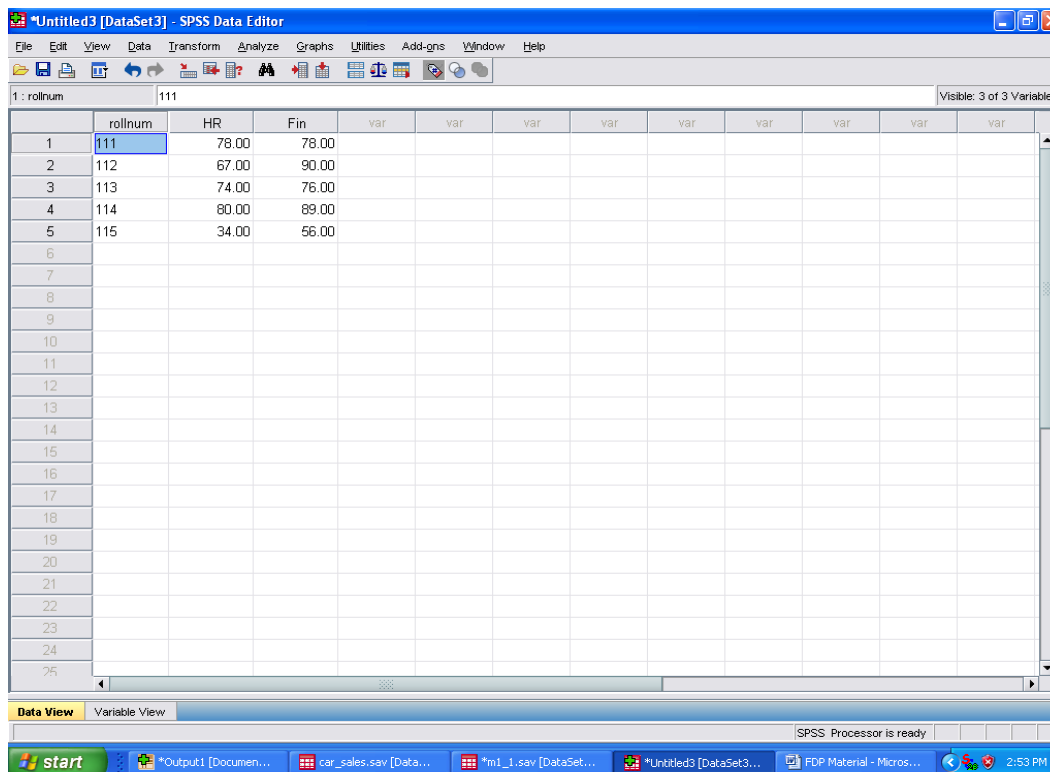
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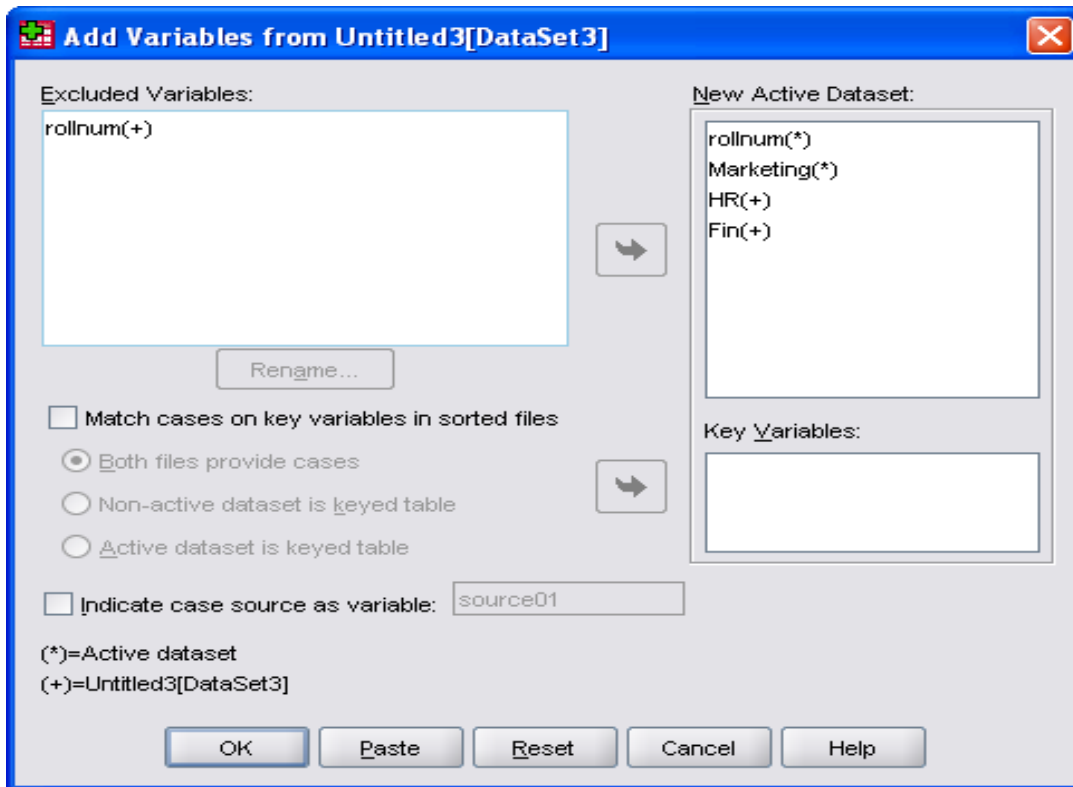
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**File 2**

- From the menus choose:
- *Data* → *Merge Files* → *Add Cases...*
- Select the data file to merge with the open data file





Select the required variables and press “ok”

Merged file:

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	rollnum	Marketing	HR	Fin	var	var	var	var	var	var	var	var
1	111.00	67.00	78.00	78.00								
2	112.00	78.00	67.00	90.00								
3	113.00	75.00	74.00	76.00								
4	114.00	78.00	80.00	89.00								
5	115.00	90.00	34.00	56.00								
6												
7												
8												
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23												
24												
25												

Thus the working data files are merged with the third data file.

## SPLIT FILE

### PURPOSE:

The primary aim of split function is to select and organize the variables in the required order.

### PROCEDURE:

- To Split a Data File for Analysis
- From the menu choose:



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- *Data* → *Split File...*
  
- Select Compare groups or Organize output by groups.

The screenshot shows the SPSS Data Editor window for a dataset named 'car\_sales.sav'. The window title is '\*car\_sales.sav [DataSet1] - SPSS Data Editor'. The menu bar includes File, Edit, View, Data, Transform, Analyze, Graphs, Utilities, Add-ons, Window, and Help. The toolbar contains various icons for file operations and data manipulation. The main area displays a data grid with 23 rows and 11 columns. The columns are labeled: manufact, model, sales, resale, type, price, engine\_s, horsepower, wheelbas, and wic. The first row is highlighted in blue. The status bar at the bottom indicates 'SPSS Processor is ready'. The Windows taskbar at the bottom shows the start button, several open applications, and the system clock showing 3:27 PM on Monday, 8/17/2009.

	manufact	model	sales	resale	type	price	engine_s	horsepow	wheelbas	wic
1	Mitsubishi	3000GT	0.110	20.940	0	25.450	3.0	161	97.2	
2	Dodge	Viper	0.916	58.470	0	69.725	8.0	450	96.2	
3	Mercedes-Benz	CL500	0.954	.	0	85.500	5.0	302	113.6	
4	Oldsmobile	Cutlass	1.112	11.240	0	18.145	3.1	150	107.0	
5	Porsche	Carrera Coupe	1.280	60.625	0	71.020	3.4	300	92.6	
6	Audi	A8	1.380	39.000	0	62.000	4.2	310	113.0	
7	Mercedes-Benz	SLK230	1.526	.	0	41.000	2.3	185	94.5	
8	Porsche	Carrera Cabriolet	1.866	67.550	0	74.970	3.4	300	92.6	
9	Plymouth	Prowler	1.872	.	0	43.000	3.5	253	113.3	
10	Mercedes-Benz	SL-Class	3.311	58.600	0	82.600	5.0	302	99.0	
11	Lexus	GS400	3.334	.	0	46.305	4.0	300	110.2	
12	Volvo	C70	3.493	.	0	45.500	2.3	236	104.9	
13	Volvo	V40	3.545	.	0	24.400	1.9	160	100.5	
14	Dodge	Avenger	4.734	12.545	0	19.045	2.5	163	103.7	
15	Saturn	SW	5.223	10.790	0	14.290	1.9	124	102.4	
16	Plymouth	Breeze	5.240	9.800	0	16.080	2.0	132	108.0	
17	Volkswagen	GTI	5.596	13.760	0	17.500	2.0	115	98.9	
18	Mitsubishi	Diamante	5.711	16.575	0	24.997	3.5	210	107.1	
19	Lexus	LS400	6.375	40.375	0	54.005	4.0	290	112.2	
20	Cadillac	Eldorado	6.536	25.725	0	39.665	4.6	275	108.0	
21	Chrysler	Sebring Coupe	7.854	12.360	0	19.840	2.5	163	103.7	
22	Mercedes-Benz	SLK	7.998	.	0	38.900	2.3	190	94.5	
23	Saturn	LW	8.472	.	0	18.835	2.2	137	106.5	

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	manufact	model	sales	resale	type	price	engine_s	horsepow	wheelbas	wit
1	Acura	Integra	16,919	16,360	0	21,500	1.8	140	101.2	
2	Acura	TL	39,384	19,875	0	28,400	3.2	225	108.1	
3	Acura	CL	14,114	18,225	0		3.2	225	106.9	
4	Acura	RL	8,588	29,725	0	42,000	3.5	210	114.6	
5	Audi	A4	20,397	22,255	0	23,990	1.8	150	102.6	
6	Audi	A6	18,780	23,555	0	33,950	2.8	200	108.7	
7	Audi	A8	1,380	39,000	0	62,000	4.2	310	113.0	
8	BMW	323i	19,747		0	26,990	2.5	170	107.3	
9	BMW	328i	9,231	28,675	0	33,400	2.8	193	107.3	
10	BMW	528i	17,527	36,125	0	38,900	2.8	193	111.4	
11	Buick	Century	91,561	12,475	0	21,975	3.1	175	109.0	
12	Buick	Regal	39,350	13,740	0	25,300	3.8	240	109.0	
13	Buick	Park Avenue	27,851	20,190	0	31,965	3.8	205	113.8	
14	Buick	LeSabre	83,257	13,360	0	27,885	3.8	205	112.2	
15	Cadillac	DeVille	63,729	22,525	0	39,895	4.6	275	115.3	
16	Cadillac	Seville	15,943	27,100	0	44,475	4.6	275	112.2	
17	Cadillac	Eldorado	6,536	25,725	0	39,665	4.6	275	108.0	
18	Cadillac	Catera	11,185	18,225	0	31,010	3.0	200	107.4	
19	Cadillac	Escalade	14,785		1	46,225	5.7	255	117.5	
20	Chevrolet	Cavalier	145,519	9,250	0	13,260	2.2	115	104.1	
21	Chevrolet	Malibu	135,126	11,225	0	16,535	3.1	170	107.0	
22	Chevrolet	Lumina	24,629	10,310	0	18,890	3.1	175	107.5	
23	Chevrolet	Monte Carlo	42,593	11,525	0	19,390	3.4	180	110.5	

The file is split into separate groups for analysis.

## SELECT CASES

### PURPOSE:

Select cases are used to select the required records from a database.

### PROCEDURE:

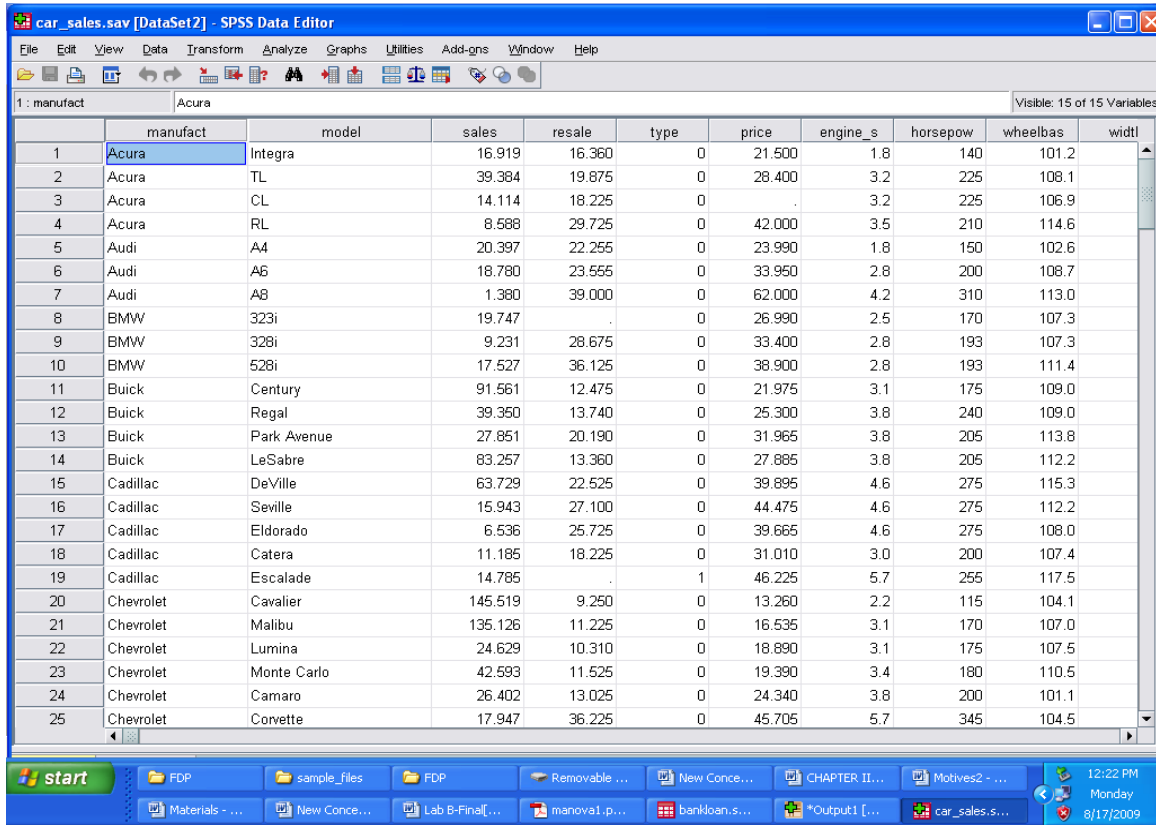
To Select Subsets of Cases

- From the menus choose:
  - *Data* → *Select Cases...*

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- Select any one of the data for selecting cases, say car sales.
- Car sales data dialogue box appears as below,

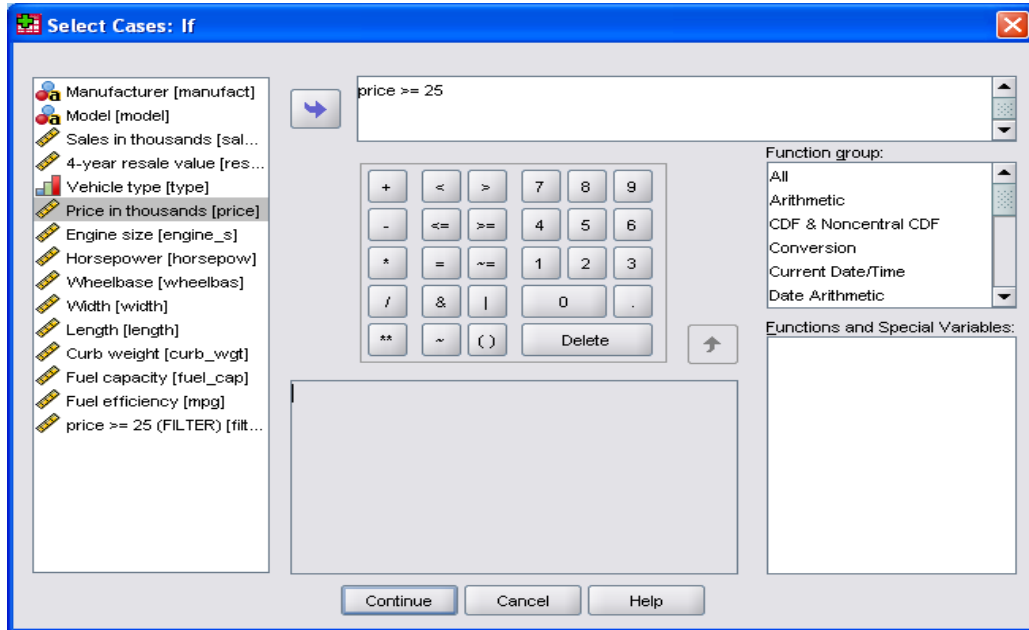


The screenshot shows the SPSS Data Editor window for a file named 'car\_sales.sav'. The data is organized into a table with 15 variables. The first variable is 'manufact' (manufacturer), and the second is 'Acura'. The table contains 25 rows of data, each representing a different car model. The columns are: 'manufact', 'model', 'sales', 'resale', 'type', 'price', 'engine\_s', 'horsepow', 'wheelbas', and 'width'. The data is as follows:

	manufact	model	sales	resale	type	price	engine_s	horsepow	wheelbas	width
1	Acura	Integra	16.919	16.360	0	21.500	1.8	140	101.2	
2	Acura	TL	39.384	19.875	0	28.400	3.2	225	108.1	
3	Acura	CL	14.114	18.225	0		3.2	225	106.9	
4	Acura	RL	8.588	29.725	0	42.000	3.5	210	114.6	
5	Audi	A4	20.397	22.255	0	23.990	1.8	150	102.6	
6	Audi	A6	18.780	23.555	0	33.950	2.8	200	108.7	
7	Audi	A8	1.380	39.000	0	62.000	4.2	310	113.0	
8	BMW	323i	19.747		0	26.990	2.5	170	107.3	
9	BMW	328i	9.231	28.675	0	33.400	2.8	193	107.3	
10	BMW	528i	17.527	36.125	0	38.900	2.8	193	111.4	
11	Buick	Century	91.561	12.475	0	21.975	3.1	175	109.0	
12	Buick	Regal	39.350	13.740	0	25.300	3.8	240	109.0	
13	Buick	Park Avenue	27.851	20.190	0	31.965	3.8	205	113.8	
14	Buick	LeSabre	83.257	13.360	0	27.885	3.8	205	112.2	
15	Cadillac	DeVille	63.729	22.525	0	39.895	4.6	275	115.3	
16	Cadillac	Seville	15.943	27.100	0	44.475	4.6	275	112.2	
17	Cadillac	Eldorado	6.536	25.725	0	39.865	4.6	275	108.0	
18	Cadillac	Catera	11.185	18.225	0	31.010	3.0	200	107.4	
19	Cadillac	Escalade	14.785		1	46.225	5.7	255	117.5	
20	Chevrolet	Cavalier	145.519	9.250	0	13.260	2.2	115	104.1	
21	Chevrolet	Malibu	135.126	11.225	0	16.535	3.1	170	107.0	
22	Chevrolet	Lumina	24.629	10.310	0	18.890	3.1	175	107.5	
23	Chevrolet	Monte Carlo	42.593	11.525	0	19.390	3.4	180	110.5	
24	Chevrolet	Camaro	26.402	13.025	0	24.340	3.8	200	101.1	
25	Chevrolet	Corvette	17.947	36.225	0	45.705	5.7	345	104.5	

- Specify the criteria for selecting cases.
- Select the cases for the price greater than & equal to 25.
- Click continues.

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\*car\_sales.sav [DataSet1] - SPSS Data Editor

File Edit View Data Transform Analyze Graphs Utilities Add-ons Window Help

Visible: 15 of 15 Variables

	manufact	model	sales	resale	type	price	engine_s	horsepow	wheelbas	width
1	Acura	Integra	16.919	16.360	0	21.500	1.8	140	101.2	
2	Acura	TL	39.384	19.875	0	28.400	3.2	225	108.1	
3	Acura	CL	14.114	18.225	0		3.2	225	106.9	
4	Acura	RL	8.588	29.725	0	42.000	3.5	210	114.6	
5	Audi	A4	20.397	22.255	0	23.990	1.8	150	102.6	
6	Audi	A6	18.780	23.555	0	33.950	2.8	200	108.7	
7	Audi	A8	1.380	39.000	0	62.000	4.2	310	113.0	
8	BMW	323i	19.747		0	26.990	2.5	170	107.3	
9	BMW	328i	9.231	28.675	0	33.400	2.8	193	107.3	
10	BMW	528i	17.527	36.125	0	38.900	2.8	193	111.4	
11	Buick	Century	91.561	12.475	0	21.975	3.1	175	109.0	
12	Buick	Regal	39.350	13.740	0	25.300	3.8	240	109.0	
13	Buick	Park Avenue	27.851	20.190	0	31.965	3.8	205	113.8	
14	Buick	LeSabre	83.257	13.360	0	27.885	3.8	205	112.2	
15	Cadillac	DeVille	63.729	22.525	0	39.895	4.6	275	115.3	
16	Cadillac	Seville	15.943	27.100	0	44.475	4.6	275	112.2	
17	Cadillac	Eldorado	6.536	25.725	0	39.665	4.6	275	108.0	
18	Cadillac	Catera	11.185	18.225	0	31.010	3.0	200	107.4	
19	Cadillac	Escalade	14.785		1	46.225	5.7	255	117.5	
20	Chevrolet	Cavalier	145.519	9.250	0	13.260	2.2	115	104.1	
21	Chevrolet	Malibu	135.126	11.225	0	16.535	3.1	170	107.0	
22	Chevrolet	Lumina	24.629	10.310	0	18.890	3.1	175	107.5	
23	Chevrolet	Monte Carlo	42.593	11.525	0	19.390	3.4	180	110.5	
24	Chevrolet	Camaro	26.402	13.025	0	24.340	3.8	200	101.1	
25	Chevrolet	Corvette	17.947	36.225	0	45.705	5.7	345	104.5	

start | FDP | sample\_files | FDP | New Conce... | CHAPTER II... | Motives2 - ... | Materials - ... | 12:15 PM Monday 8/17/2009

The cases in which price less than 25 are stroked out. Thus subgroup of cases based on criteria that include variables and complex expressions is selected.

## DATA Manipulation

### COMPUTE

#### PURPOSE:

The primary aim of compute is to perform calculations in the given data base.

For each of the following statements, please indicate your perception .

**(SA- Strongly Agree; 5 Agree:4 Neither Agree Nor Disagree:3 Disagree:2 Strongly Disagree:1**

#### Physical Atmosphere

- a. Parking facility provided at More outlet is adequate
- b. The products arrangements in More is convenient
- c. More outlets have sufficient number of counters
- d. The ambience of More is pleasant.

5	4	3	2	1

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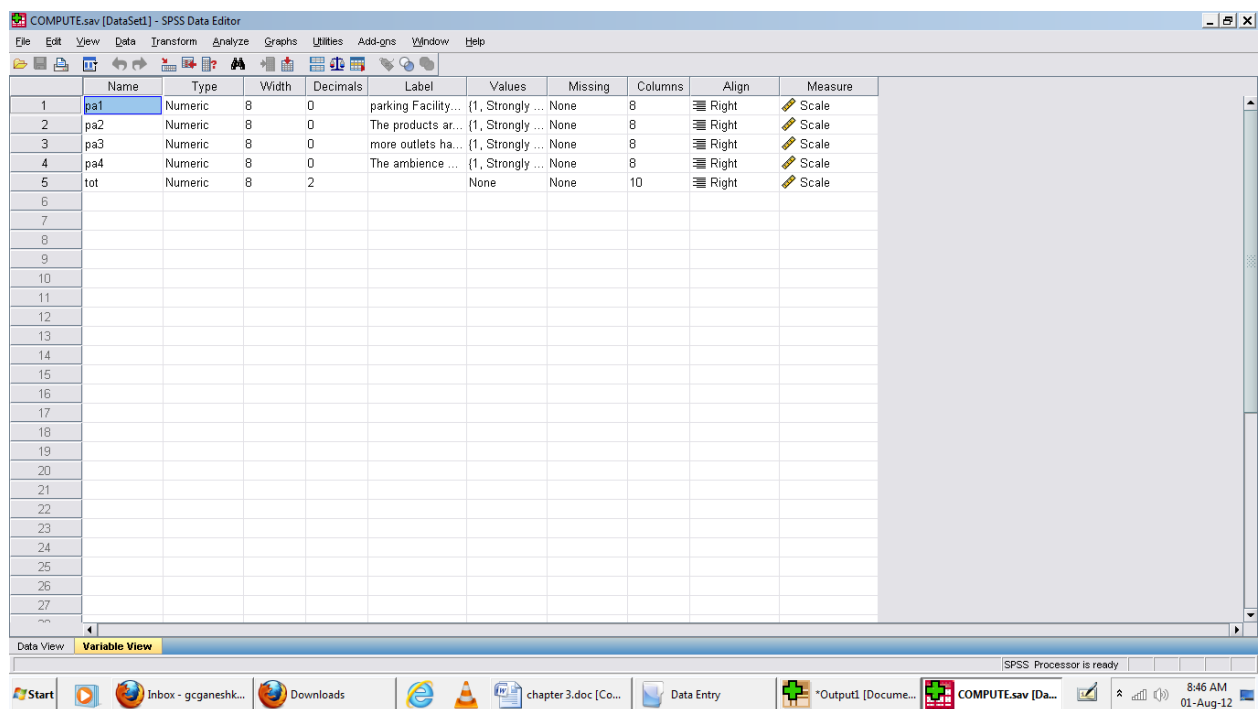
---

**PROCEDURE:**

Step 1: Open the required data base, say COMPUTE

Step 2: select the variables to be computed according to requirement.

Step 3: here in this example select the variables such as pa1,pa2, pa3, pa4



Step 4: From the menus choose:

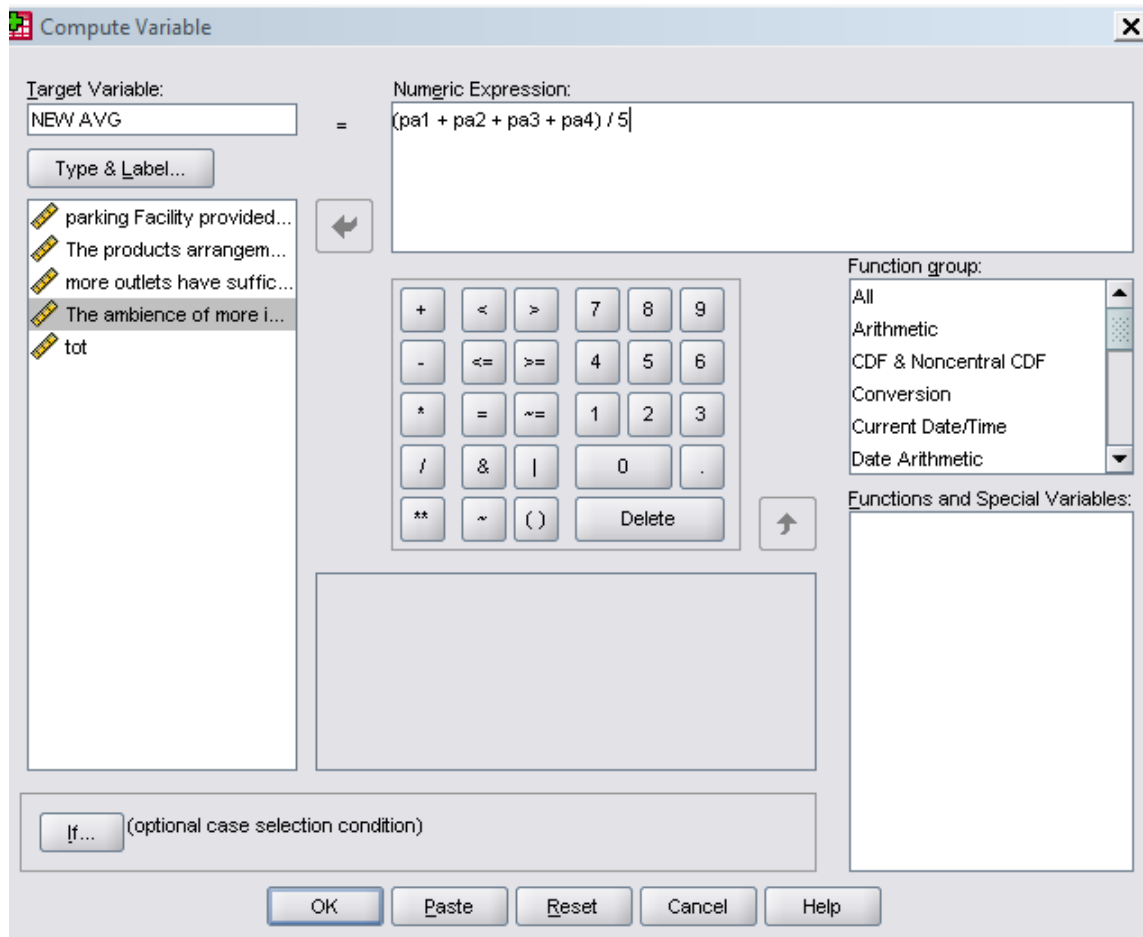
*Transform → Compute...*

- Select the condition to be performed in the dialog box which is shown below.

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- New variable is created and condition is performed
- In this example new variable named NEW.AVG is created and the selected variables are averaged.



The required calculation is performed in the database.

## **RECODING INTO SAME VARIABLES**

### **PURPOSE:**

The primary purpose of this function is to recode the categories.

### **PROCEDURE:**

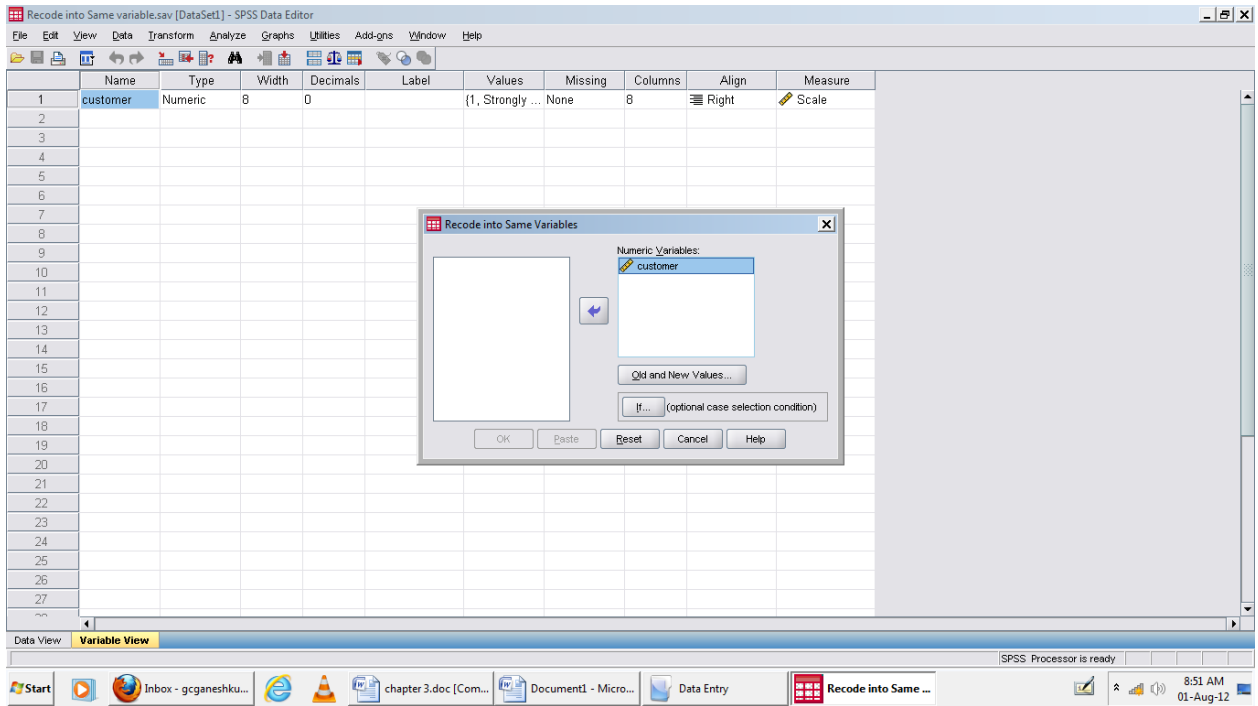
STEP 1: Open the required data base -Recode into Same variable.sav

- From the menus choose:
  - *Transform → Recode → Into Same Variables...*
- Select the variables you want to recode. If you select multiple variables, they must be the same type (numeric or string).
- Variable “customer “ is selected



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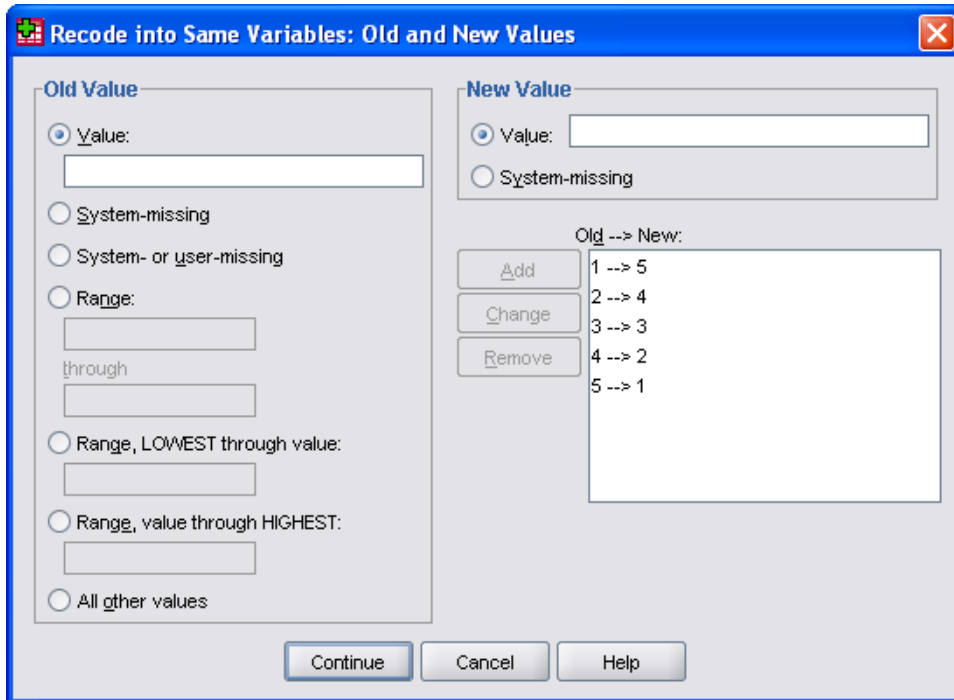
---



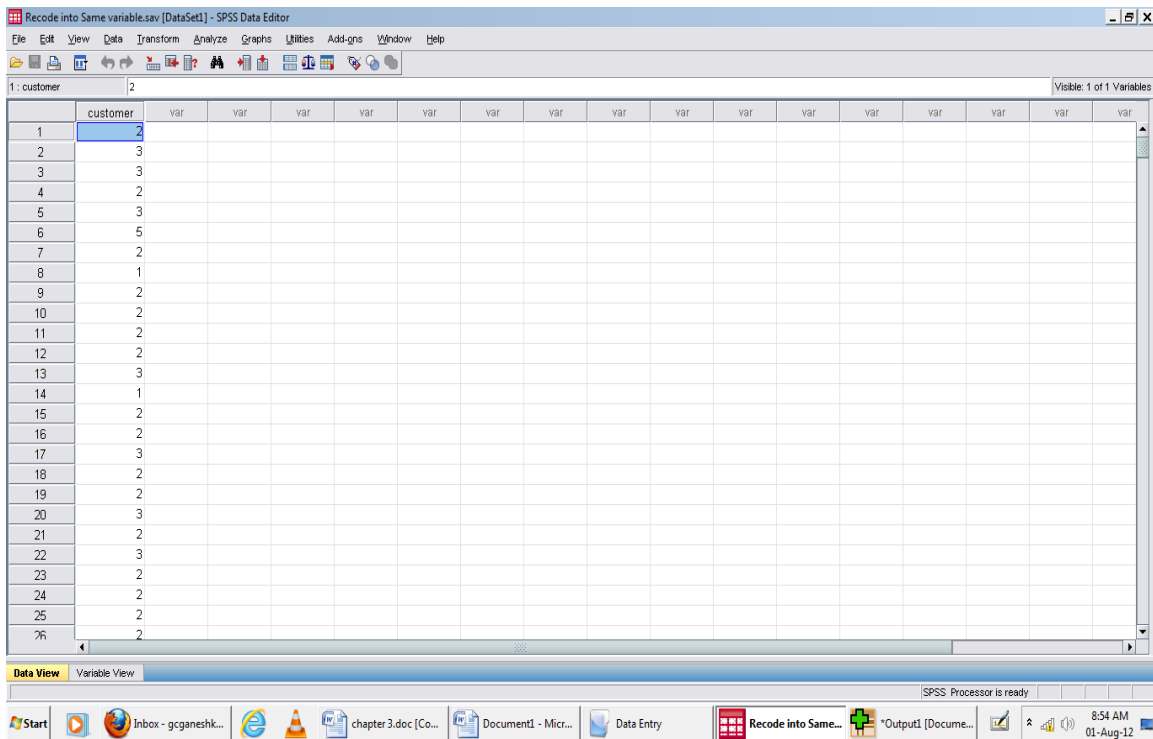
- Click Old and New Values and specify how to recode values.
  - Optionally, you can define a subset of cases to recode.

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- Then press ok

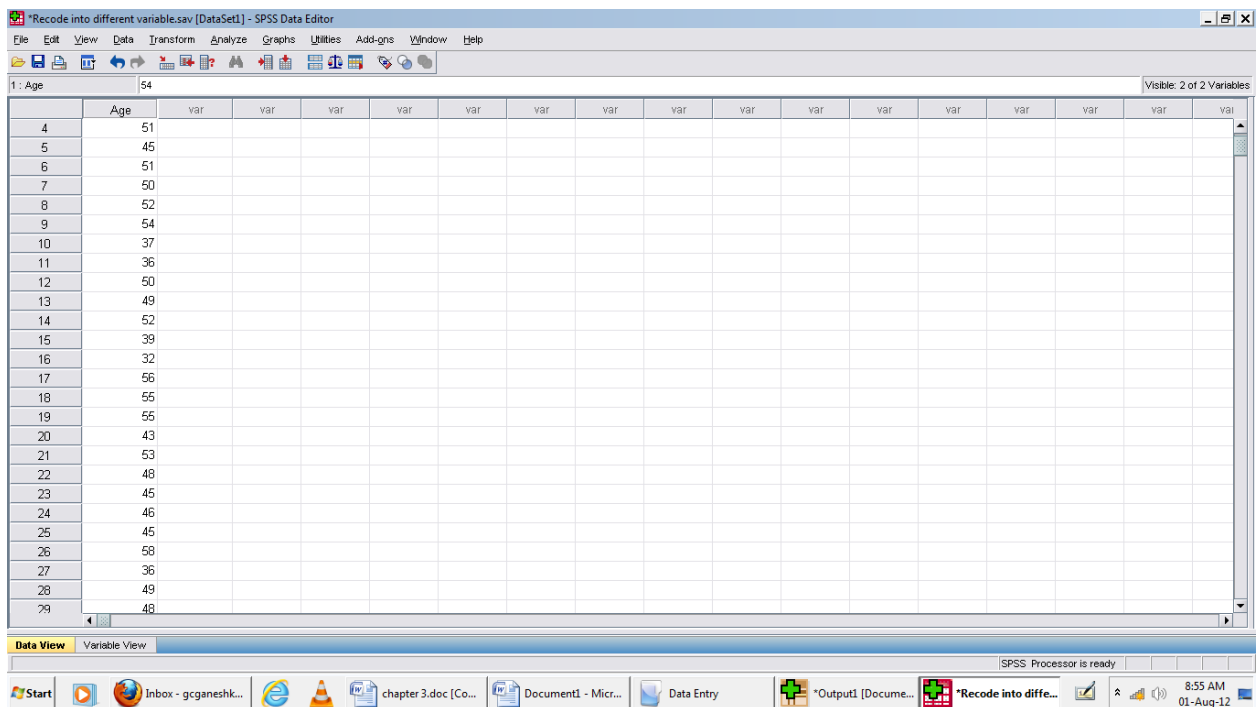


The code of the variables in the database is changed according to condition specified.

## RECODING INTO DIFFERENT VARIABLES

### PROCEDURE

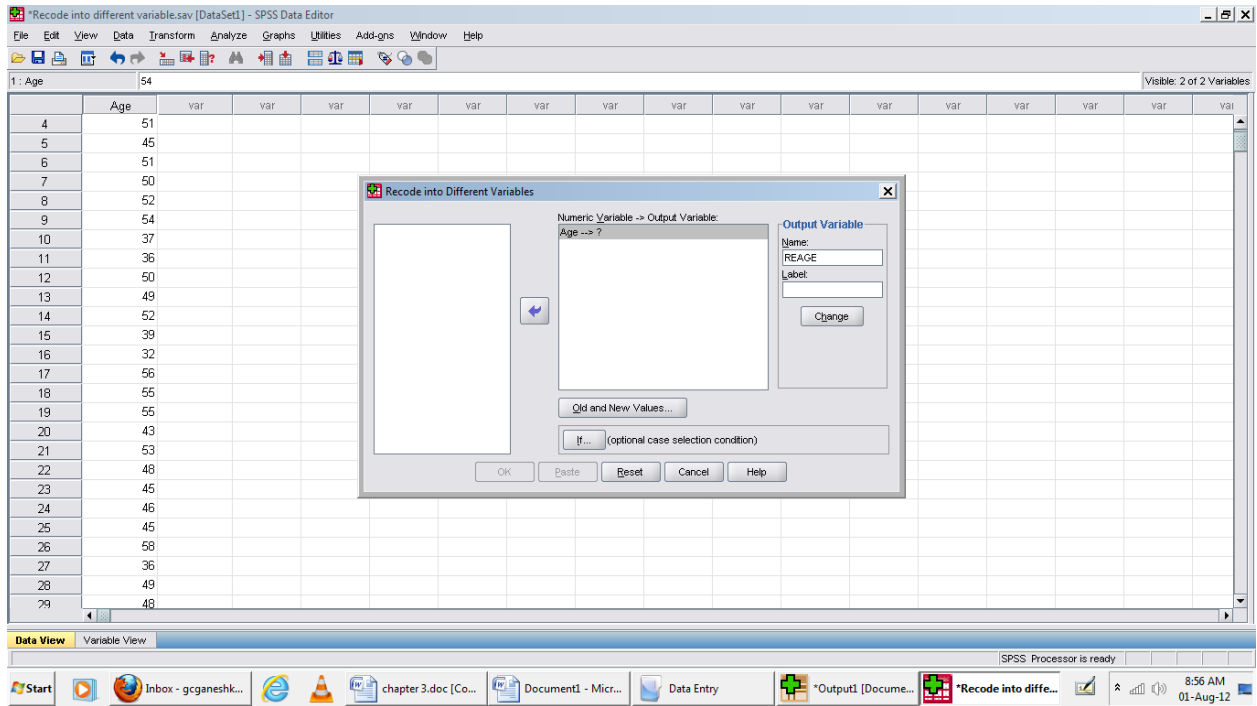
STEP 1: Open the required data base, say Recode into different variable.sav



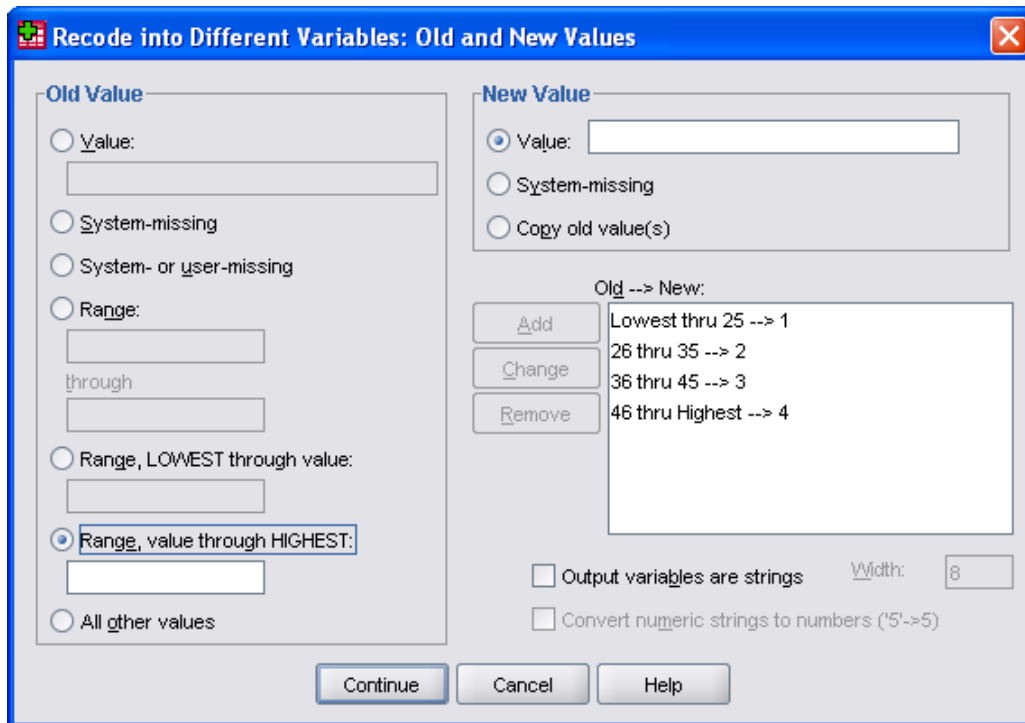
- From the menus choose:
- *Transform → Recode → Into Different Variables...*
- Select the variables you want to recode. If you select multiple variables, they must be the same type (numeric or string).
- Variable “age “ is selected
- New variable name is given as REAGE

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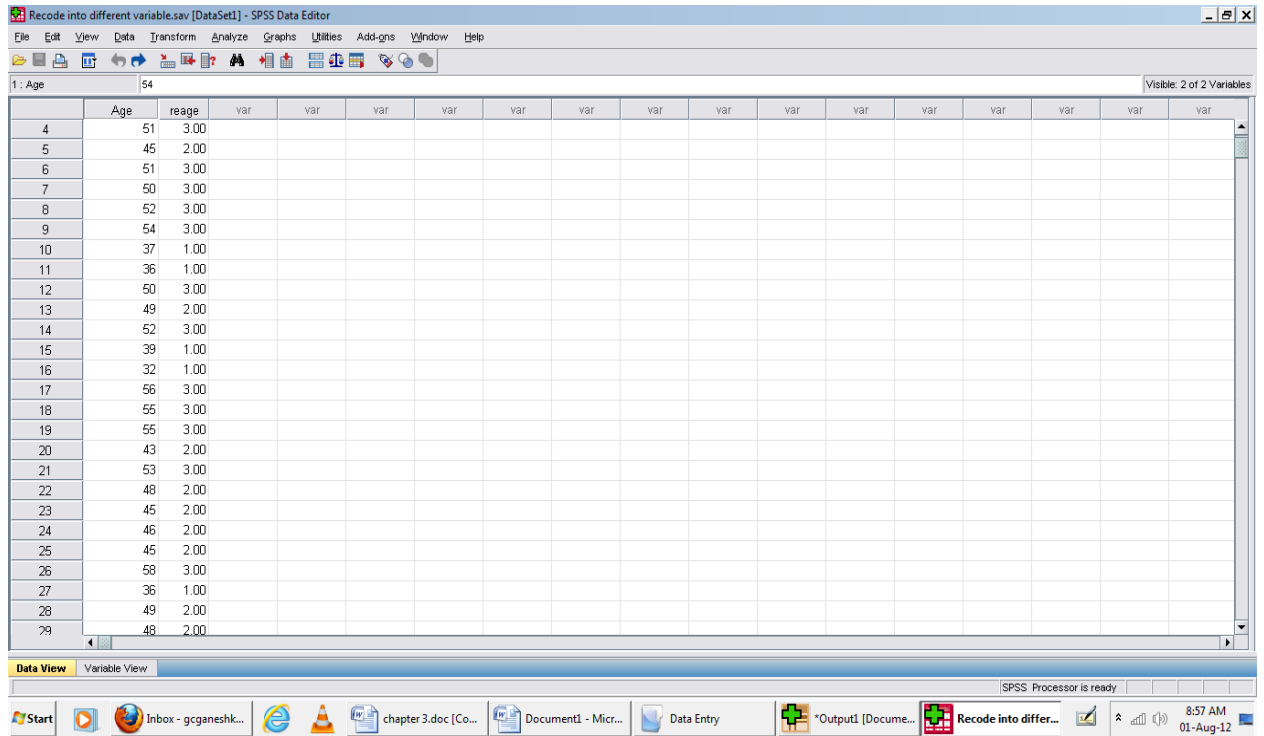
- Then press “Old and New Values button”
- Then enter the values as shown below.



The image shows the 'Recode into Different Variables: Old and New Values' dialog box in SPSS. The window title is 'Recode into Different Variables: Old and New Values'. It is divided into two main sections: 'Old Value' and 'New Value'.  
In the 'Old Value' section, there are several radio button options: 'Value:', 'System-missing', 'System- or user-missing', 'Range:', 'Range, LOWEST through value:', 'Range, value through HIGHEST:', and 'All other values'. The 'Range, value through HIGHEST:' option is selected. Below this, there are input fields for 'through' and 'value through HIGHEST:'.  
In the 'New Value' section, there are three radio button options: 'Value:', 'System-missing', and 'Copy old value(s)'. The 'Value:' option is selected, and there is an empty input field next to it.  
Below the 'New Value' section, there is a list box titled 'Old --> New:' containing the following entries:  
Lowest thru 25 --> 1  
26 thru 35 --> 2  
36 thru 45 --> 3  
46 thru Highest --> 4  
To the left of this list box are three buttons: 'Add', 'Change', and 'Remove'.  
At the bottom of the dialog, there are two checkboxes: 'Output variables are strings' (unchecked) and 'Convert numeric strings to numbers ('5'->5)' (unchecked). A 'Width:' field with the value '8' is also present.  
At the very bottom, there are three buttons: 'Continue', 'Cancel', and 'Help'.

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The screenshot shows the SPSS Data Editor interface. The title bar reads "Recode into different variable.sav [DataSet1] - SPSS Data Editor". The menu bar includes File, Edit, View, Data, Transform, Analyze, Graphs, Utilities, Add-ons, Window, and Help. The toolbar contains various icons for file operations and analysis. The main data grid shows 29 rows of data. The first column is labeled "Age" and contains values from 4 to 29. The second column is labeled "reage" and contains values from 51 to 48. The third column is labeled "var" and contains values from 3.00 to 2.00. The remaining columns are also labeled "var" and are currently empty. The status bar at the bottom indicates "SPSS Processor is ready" and shows the system tray with the time 8:57 AM on 01-Aug-12.

Age	reage	var	var	var	var	var	var	var	var	var	var	var	var	var	var	var	var
4	51	3.00															
5	45	2.00															
6	51	3.00															
7	50	3.00															
8	52	3.00															
9	54	3.00															
10	37	1.00															
11	36	1.00															
12	50	3.00															
13	49	2.00															
14	52	3.00															
15	39	1.00															
16	32	1.00															
17	56	3.00															
18	55	3.00															
19	55	3.00															
20	43	2.00															
21	53	3.00															
22	48	2.00															
23	45	2.00															
24	46	2.00															
25	45	2.00															
26	58	3.00															
27	36	1.00															
28	49	2.00															
29	48	2.00															

Thus the file is recoded using different variables

# UNIT II

**UNIT III** Non-parametric Tests in SPSS Chi-square test - Mann Whitney's test for independent samples – Wilcoxon matched pairs sample test– Friedman's test– Wilcoxon signed rank test – Kruskal Wallis test

## **CHI-SQUARE**

Chi-Square can be used for three purposes namely

1. As a test of independence
2. To test the Homogeneity
3. To test the goodness of fit

### **PURPOSE:**

Chi-square which is available in cross tab is used to test whether there is a significant association between two variables.

### **ASSUMPTION:**

- The two variables that are to be applied in chi-square analysis must be of type category.
- The total number of observation used in this test must be large i.e.,  $n \geq 30$ .



- Independence - The observations are always assumed to be independent of each other. This means chi-square cannot be used to test correlated data (like: matched pairs, panel data).
- It is frequency based test

**HYPOTHESIS:**

Null hypothesis: H<sub>0</sub>- There is no significant association between the two variables.

Alternate hypothesis: H<sub>1</sub>- There is significant association between the two variables.

**The two variables considered here are total income and total saving.**

**PROCEDURE:**

STEP 1: Open the database, say SAVINGS.

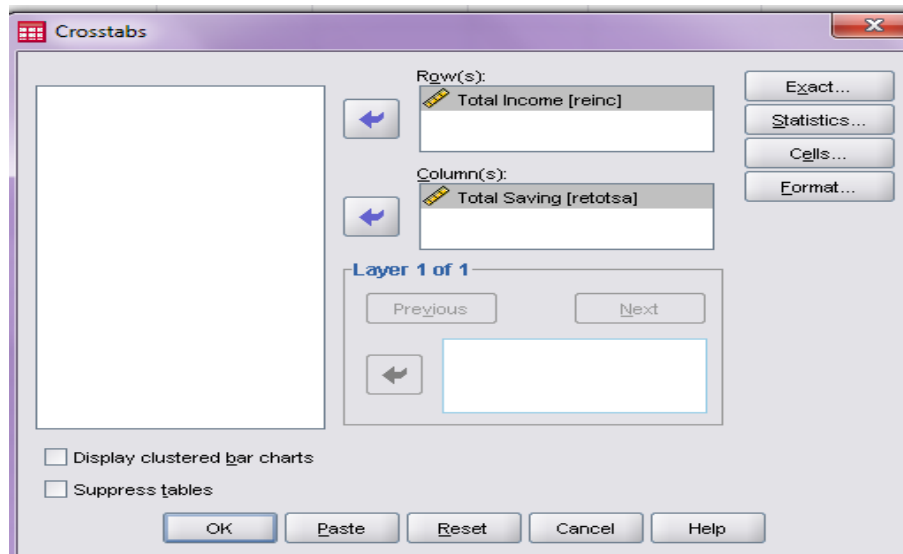
STEP 2: To run a cross tab analysis, from the menu choose:

Analyze----->Descriptive Statistics----->cross tabs

STEP 3: The cross tab dialog box appears as shown

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- select total income as the row variable
- select total saving as the column variable
- click statistics
- Select chi-square
- Click continue

STEP 4: Press ok in the cross tabs dialogue box table showing Cross Tab between total income and total saving would be generated.

**Total Income \* Total Saving Cross tabulation**

Count		Total Saving					Total
		upto 5000	5001-10000	10001-15000	15001-20000	20001 and above	
Total Income	upto 20000	67	42	13	2	0	124
	20001-30000	89	80	42	6	2	219

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	30001-40000	25	32	26	15	5	103
	40001-50000	8	21	10	11	4	54
	50001 and above	7	9	19	7	10	52
Total		196	184	110	41	21	552

Total Income * Total Saving Cross tabulation								
			Total Saving					Total
			upto 5000	5001-10000	10001-15000	15001-20000	20001 and above	
Total Income	upto 20000	Count	67	42	13	2	0	124
		Expected Count	44.0	41.3	24.7	9.2	4.7	124.0
		% within Total Saving	34.2%	22.8%	11.8%	4.9%	.0%	22.5%
	20001-30000	Count	89	80	42	6	2	219
		Expected Count	77.8	73.0	43.6	16.3	8.3	219.0
		% within Total Saving	45.4%	43.5%	38.2%	14.6%	9.5%	39.7%
	30001-40000	Count	25	32	26	15	5	103
		Expected Count	36.6	34.3	20.5	7.7	3.9	103.0
		% within Total Saving	12.8%	17.4%	23.6%	36.6%	23.8%	18.7%
	40001-50000	Count	8	21	10	11	4	54
		Expected Count	19.2	18.0	10.8	4.0	2.1	54.0
		% within Total Saving	4.1%	11.4%	9.1%	26.8%	19.0%	9.8%
	50001 and above	Count	7	9	19	7	10	52
		Expected Count	18.5	17.3	10.4	3.9	2.0	52.0
		% within Total Saving	3.6%	4.9%	17.3%	17.1%	47.6%	9.4%
Total		Count	196	184	110	41	21	552
		Expected Count	196.0	184.0	110.0	41.0	21.0	552.0

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Total Income * Total Saving Cross tabulation								
			Total Saving					Total
			upto 5000	5001-10000	10001-15000	15001-20000	20001 and above	
Total Income	upto 20000	Count	67	42	13	2	0	124
		Expected Count	44.0	41.3	24.7	9.2	4.7	124.0
		% within Total Saving	34.2%	22.8%	11.8%	4.9%	.0%	22.5%
	20001-30000	Count	89	80	42	6	2	219
		Expected Count	77.8	73.0	43.6	16.3	8.3	219.0
		% within Total Saving	45.4%	43.5%	38.2%	14.6%	9.5%	39.7%
	30001-40000	Count	25	32	26	15	5	103
		Expected Count	36.6	34.3	20.5	7.7	3.9	103.0
		% within Total Saving	12.8%	17.4%	23.6%	36.6%	23.8%	18.7%
	40001-50000	Count	8	21	10	11	4	54
		Expected Count	19.2	18.0	10.8	4.0	2.1	54.0
		% within Total Saving	4.1%	11.4%	9.1%	26.8%	19.0%	9.8%
	50001 and above	Count	7	9	19	7	10	52
		Expected Count	18.5	17.3	10.4	3.9	2.0	52.0
		% within Total Saving	3.6%	4.9%	17.3%	17.1%	47.6%	9.4%
	Total	Count	196	184	110	41	21	552
		Expected Count	196.0	184.0	110.0	41.0	21.0	552.0
		% within Total Saving	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

**Result Generated By SPSS**

Chi-Square Tests			
	Value	df	Sig. (2-sided)

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Pearson Chi-Square	1.287E2 <sup>a</sup>	16	.000
Likelihood Ratio	120.928	16	.000
Linear-by-Linear Association	100.919	1	.000
N of Valid Cases	552		

The calculated value is 1.287 E2 which means 128.7 and it significant at this level of significance 0.000 at degrees of freedom 16.

In SPSS, if the significant value is less than 0.05 then reject null hypothesis and accept alternate hypothesis. In the above obtained result the significant value is less than 0.05 so, reject null hypothesis.

Hence there is significant association between total income and total saving.

Calculated value (128.7) is greater than table value (39. 253) at degrees of freedom 16 in the 0.000 level of significance in the chi-square table. so we can reject the null hypothesis and accept the alternative hypothesis.

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P											
DF	0.995	0.975	0.20	0.10	0.05	0.025	0.02	0.01	0.005	0.002	0.001
1	0.0000393	0.000982	1.642	2.706	3.841	5.024	5.412	6.635	7.879	9.550	10.828
2	0.0100	0.0506	3.219	4.605	5.991	7.378	7.824	9.210	10.597	12.429	13.816
3	0.0717	0.216	4.642	6.251	7.815	9.348	9.837	11.345	12.838	14.796	16.266
4	0.207	0.484	5.989	7.779	9.488	11.143	11.668	13.277	14.860	16.924	18.467
5	0.412	0.831	7.289	9.236	11.070	12.833	13.388	15.086	16.750	18.907	20.515
6	0.676	1.237	8.558	10.645	12.592	14.449	15.033	16.812	18.548	20.791	22.458
7	0.989	1.690	9.803	12.017	14.067	16.013	16.622	18.475	20.278	22.601	24.322
8	1.344	2.180	11.030	13.362	15.507	17.535	18.168	20.090	21.955	24.352	26.124
9	1.735	2.700	12.242	14.684	16.919	19.023	19.679	21.666	23.589	26.056	27.877
10	2.156	3.247	13.442	15.987	18.307	20.483	21.161	23.209	25.188	27.722	29.588
11	2.603	3.816	14.631	17.275	19.675	21.920	22.618	24.725	26.757	29.354	31.264
12	3.074	4.404	15.812	18.549	21.026	23.337	24.054	26.217	28.300	30.957	32.909
13	3.565	5.009	16.985	19.812	22.362	24.736	25.472	27.688	29.819	32.535	34.528
14	4.075	5.629	18.151	21.064	23.685	26.119	26.873	29.141	31.319	34.091	36.123
15	4.601	6.262	19.311	22.307	24.996	27.488	28.259	30.578	32.801	35.628	37.697
16	5.142	6.908	20.465	23.542	26.296	28.845	29.633	32.000	34.267	37.146	39.252
17	5.697	7.564	21.615	24.769	27.587	30.191	30.995	33.409	35.718	38.648	40.790
18	6.265	8.231	22.760	25.989	28.869	31.526	32.346	34.805	37.156	40.136	42.312
19	6.844	8.907	23.900	27.204	30.144	32.852	33.687	36.191	38.582	41.610	43.820
20	7.434	9.591	25.038	28.412	31.410	34.170	35.020	37.566	39.997	43.072	45.315
21	8.034	10.283	26.171	29.615	32.671	35.479	36.343	38.932	41.401	44.522	46.797
22	8.643	10.982	27.301	30.813	33.924	36.781	37.659	40.289	42.796	45.962	48.268

# **Unit III**

**UNIT II** Parametric Tests in SPSS Compare means: One-sample t-test, Independent Samples t-test, Paired-samples t-test and One-way ANOVA, Two-way ANOVA - Correlation: Bi-variate, Partial and Multiple. Simple linear regression.

## **ONE SAMPLE T TEST**

### **PURPOSE:**

The One-Sample T Test compares the mean score of a sample to a known value. Usually, the known value is a population mean.

### **ASSUMPTION:**

- The variable that is considered in the one sample T test must be metric.
- The dependent variable is normally distributed.

### **HYPOTHESES:**

Null hypothesis H<sub>0</sub>: There is no significant difference between the sample mean and the population mean.

Alternate hypothesis H<sub>1</sub>: There is a significant difference between the sample mean and the population mean.

The test variable is Average monthly minutes and test value is 200.

### **PROCEDURE:**

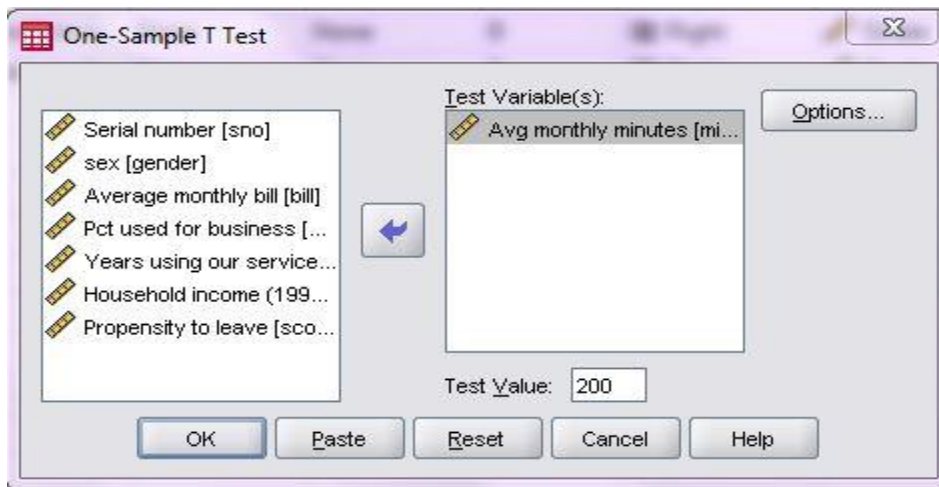
STEP 1: Open the database, say cellular.



STEP 2: To begin the one sample T-test

Analyze----->compare means----->one -sample T-test

STEP 3: A one sample T- test window appears as below



STEP 4:

- Select average monthly minutes as test variable
- Type 200 as test value
- click options
- type 95 as confidence level
- click continue

STEP 5: click ok in the one sample T-test dialogue box. Then the following tables would be generated

### **One-Sample Statistics**

	N	Mean	Std. Deviation	Std. Error Mean
Avg monthly minutes	250	162.1856	46.57060	2.94538

**One-Sample Test**

Test Value = 200						
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
Avg monthly minutes	-12.839	249	.000	-37.81438	-43.61543	-32.0133

Here the test value is considered as 200, the mean value obtained through one sample statistics is 162.1856 and the difference between the means is 37.81. Based on the result generated by SPSS, the significant value is 0.00 and it is less than 0.05 so reject null hypothesis. Hence there is significant difference between the two means i.e. population means and sample mean.

## **INDEPENDENT SAMPLE T- TEST**

### **PURPOSE:**

The Independent Samples T Test compares the mean scores of two groups on a given variable.

### **HYPOTHESES:**

Null hypothesis H<sub>0</sub>: The means of the two groups are not significantly different.

Alternate hypothesis H<sub>1</sub>: The means of the two groups are significantly different.

### **ASSUMPTIONS:**

1. Independent sample t-test assumes that the dependent variable is normally distributed.
2. Independent sample t-test assumes that the variance of the two groups is the same as the dependent variable.
3. Independent sample t-test assumes that the two samples are independent of each other.
4. Samples for independent sample t-test are drawn from the population at random.
5. In independent sample t-test, all observations must be independent of each other.
6. In independent sample t-test, dependent variables must be measured on an interval or ratio scale.

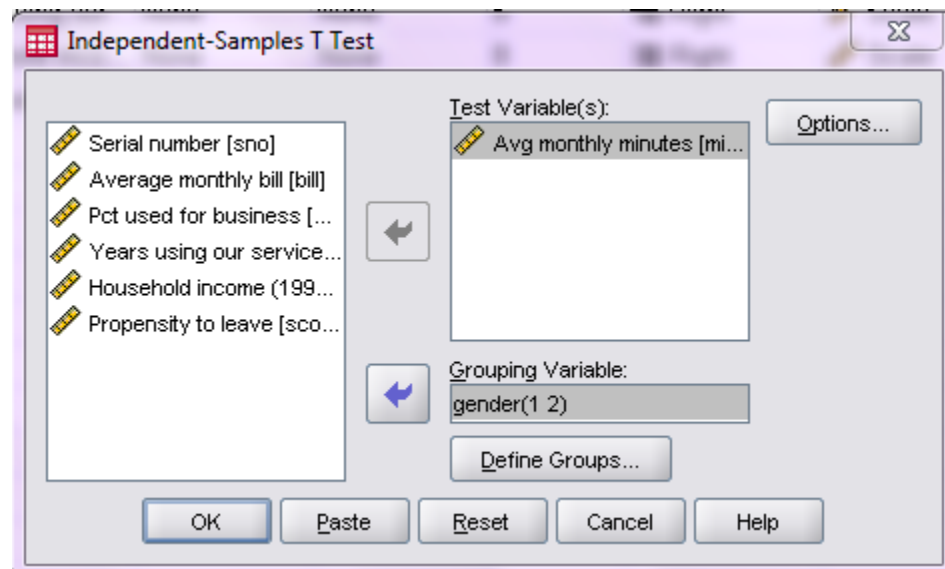
### **PROCEDURE:**

STEP 1: Open the database, say AVERAGE MONTHLY MINUTES.

STEP 2: to begin the independent sample t-test

Analyze----> compare means----->independent sample t-test

STEP 3: Independent sample t-test dialogue box appears



STEP 4:

- select average monthly minutes as the test variable
- select gender as the grouping variable
- click define groups
- Type one as the group one value and two as the group two value
- click continue

STEP 5: click ok in the independent-sample T-test dialogue box.

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**Group Statistics**

	Sex	N	Mean	Std. Deviation	Std. Error Mean
Avg monthly minutes	Female	139	1.6077E2	51.83109	4.39626
	Male	111	1.6396E2	39.15930	3.71684

**Independent Samples Test**

		Levene's Test for Equality of Variances			t-test for Equality of Means					
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Avg monthly minutes	Equal variances assumed	7.022	.009	-.536	248	.592	-3.18239	5.93657	-14.87491	8.51012
	Equal variances not assumed			-.553	247.285	.581	-3.18239	5.75690	-14.52121	8.15642

Levene's Test for Equality of Variances (Homogeneity) result shows that significant value that is 0.009 which means both groups are homogeneous group so t-test for equal variance not assumed considered.

Here the mean value of average monthly minutes of female is 160.77 and that of male is 163.96. the difference between the two is 3.18 which is insignificant. Based on the result generated by SPSS, the significant value is .581 and it is greater than 0.05 so accept null hypothesis. Hence there is no significant difference between the two means i.e. the average monthly minutes spoken by male and female.

## **PAIRED 'T' TEST**

### **PURPOSE:**

Paired sample t-test is a statistical technique that is used to compare two population means in the case of two samples that are correlated

### **ASSUMPTIONS:**

- The paired t-test assumes that the differences between means are normally distributed.
- Interval scale or ordinal scale with many alternatives.
- Normal Distribution(s)
- No skew.

**HYPOTHESIS:**

Null hypothesis Ho: There is no significance difference between the means.

Alternate hypothesis H1: There is a significance difference between the means.

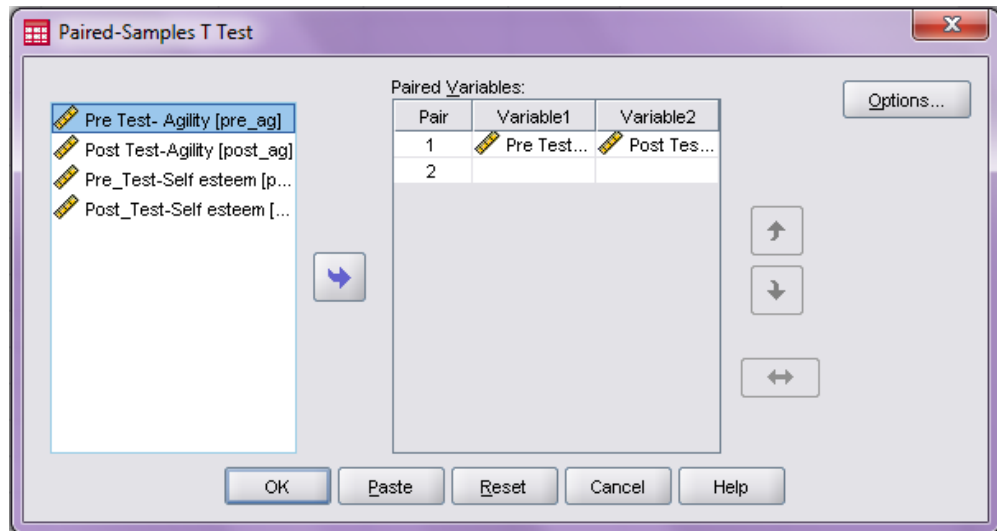
**PROCEDURE:**

STEP 1: Open the database, say AGILITY.

STEP 2: to begin the analysis

Analyze----->compared means-----> paired sample t-test

STEP 3: a paired sample t-test window appears as below



STEP 4:

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- Select pre treatment and post treatment scores of agility as the first set of paired variables
- Select pre treatment and post treatment scores of self esteem as the second set of paired variables

STEP 5: click OK in the paired t- test dialogue box

**Paired Samples Statistics**

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre Test- Agility	12.3792	120	.68525	.06255
	Post Test-Agility	11.8350	120	.81516	.07441

**Paired Samples Correlations**

		N	Correlation	Sig.
Pair 1	Pre Test- Agility & Post Test- Agility	120	.839	.000

**Paired Samples Test**

		Paired Differences				t	df	Sig. (2-tailed)
		Mean	Std. Devia tion	Std. Error Mean	95% Confidence Interval of the Difference			



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					Lower	Upper			
Pair	Pre Test-	.54417	.4434	.04048	.46402	.62431	13.444	119	.000
1	Agility - Post								
	Test-Agility								

The Pre test score of agility is 12.3792 and the Post Test score of Agility is 11.8350 and the difference between their mean is .5442. Based on the result generated by SPSS, the significant value is .000 and it is lesser than 0.05 so reject null hypothesis. Hence there is a significance difference between the pretest and post test scores of agility.

### ONE WAY-ANOVA

**PURPOSE:**

One way ANOVA is a statistical technique that is used to compare the means of more than two groups

**ASSUMPTION:**

- The variables must be normally distributed
- Samples are independent.
- Variances of populations are equal.
- The sample is a simple random sample (SRS).

**HYPOTHESIS:**

Null hypothesis H<sub>0</sub>- There is no significant difference between the variables.

Alternate hypothesis H<sub>1</sub>-There is significant difference between the variables.

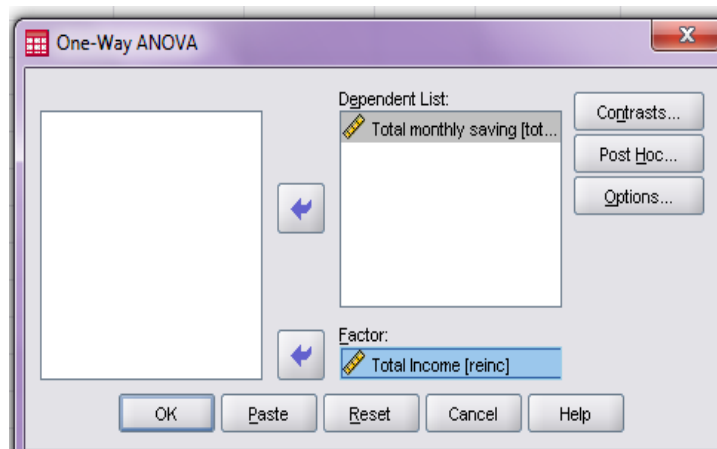
**PROCEDURE:**

STEP 1: Open the database, say INCOME LEVEL.

STEP 2: to test the equality of variance

Analyze-----> compare means--->one-way ANOVA

STEP 3: A one-way ANOVA dialogue box appears as follows



STEP 4:

- select total monthly saving as the dependent variable
- select total income as the factor variable
- Click post hoc -----> Select Duncan.

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- Click Continue.
- Click Options----->Select Mean Plot
- Click Continue.
- Click Ok.

STEP 5: Click ok in the one-way ANOVA dialogue box.

<b>ANOVA</b>					
Total monthly saving					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.624E9	4	9.059E8	34.849	.000
Within Groups	1.422E10	547	2.600E7		
Total	1.784E10	551			

**Post Hoc:**

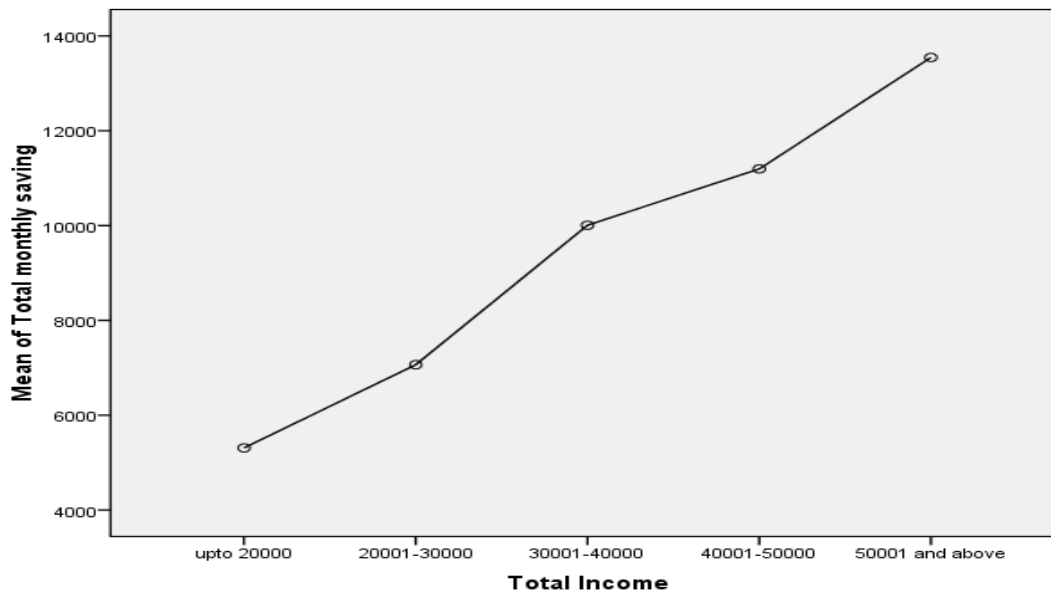
<b>Total monthly saving</b>					
Duncan					
Subset for alpha = 0.05					
Total Income	N	1	2	3	4

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upto 20000	124	5310.48			
20001-30000	219		7064.87		
30001-40000	103			1.00E4	
40001-50000	54			1.12E4	
50001 and above	52				1.35E4
Means for groups in homogeneous subsets are displayed.					

**MEAN PLOT:**



Based on the result generated by SPSS, the significant value is 0.000 and it is lower than 0.05 so reject null hypothesis .Hence there is a significance difference in the saving of respondents with respect to their income level.

By using Duncan method the saving of respondents is separated into two groups based on their income level.

In the mean plot when the saving level is low when income earned by them is lower while the saving level is high when the income earned by them is higher.

## **FACTORIAL ANOVA**

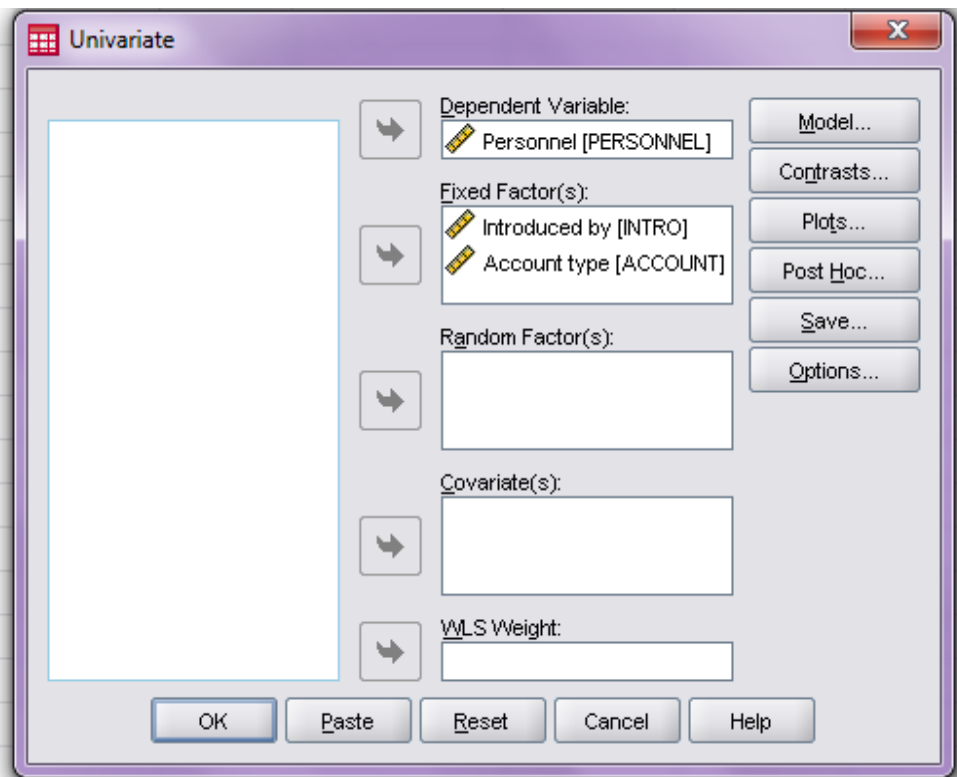
### **PROCEDURE:**

STEP1: Open the database, say Cust percep.

STEP2: To run a cross tab analysis, from the menu choose:

Analyze----->General Linear Model----->univariate

STEP3: The univariate dialog box appears as



### **Tests of Between-Subjects Effects**

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Dependent Variable:Personnel					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2.507 <sup>a</sup>	7	.358	3.756	.001
Intercept	505.062	1	505.062	5.297E3	.000
INTRO	.912	2	.456	4.782	.009
ACCOUNT	.138	2	.069	.722	.487
INTRO * ACCOUNT	.377	3	.126	1.318	.270
Error	16.877	177	.095		
Total	1555.000	185			
Corrected Total	19.384	184			
a. R Squared = .129 (Adjusted R Squared = .095)					

<b>ANOVA</b>					
Personnel	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.697	2	.848	8.730	.000

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Within Groups	17.687	182	.097		
Total	19.384	184			

ANOVA					
Personnel					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.183	2	.091	.867	.422
Within Groups	19.201	182	.105		
Total	19.384	184			

**ANCOVA**

**PURPOSE:**

The main purpose of ancova is test equality of group means after adjusting for the effect of a continuous variate.

**ASSUMPTIONS:**

- The covariate variable is to be unaffected by the treatment
- Parallelism.

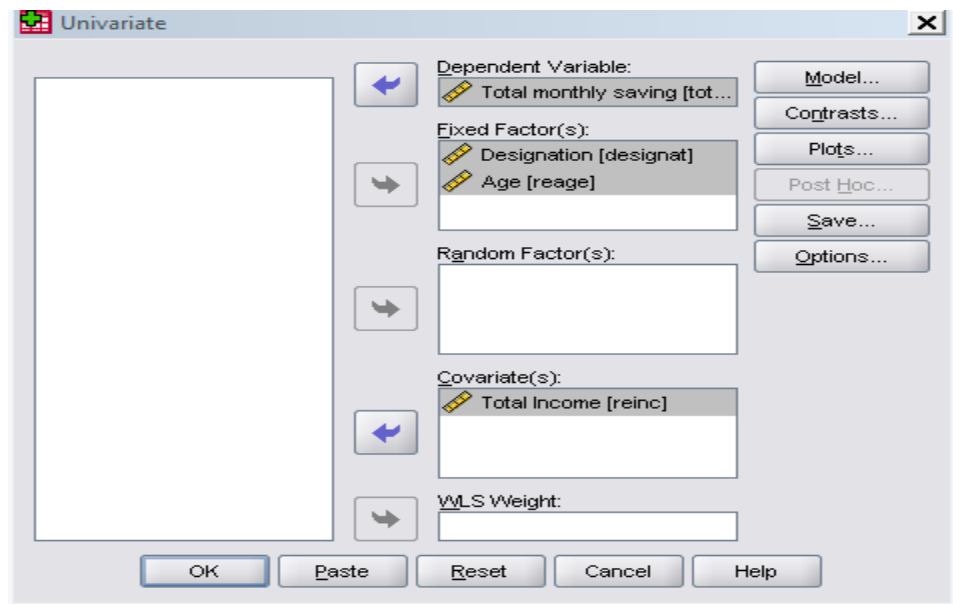
**PROCEDURE:**

STEP1: Open the database, say MERGED.

STEP2: To run a cross tab analysis, from the menu choose:

Analyze----->General Linear Model----->univariate

STEP3: The univariate dialog box appears as





STEP: 4 Select monthly saving as dependent variable.

STEP: 5 Select age, designation as factor variable.

STEP: 6 IN ANCOVA can select more than one category variable.

**ANOVA TABLE FOR TOTAL MONTHLY SAVING**

	F	Sig.
Age	7.645	0.001
Designation	7.865	0.000

From the above anova table it is clear that the average monthly saving of people holding different designation varies significantly. The table also indicates that the saving size of people changes significantly for different age category of people.

**ANCOVA FOR AGE AND DESIGNATION**

Source	F	Sig.
Corrected Model	11.151	0.000
Intercept	18.353	0.000
TOTALIN	94.940	0.000
DESIGNAT	0.398	0.810
REAGE	0.280	0.756
DESIGNAT * REAGE	1.628	0.125

The above analysis of covariance table indicates that total income has effect on saving size of people but designation and age have no effect on saving once the effect of total income on saving is controlled. In the previous analysis it was stated that age and designation have effect on saving but that is due to income of the people because the income increases with designation. Hence, the designation and age do not have independent effect on the size of saving of people.

## MANOVA

### **PURPOSE:**

MANOVA estimates the effects of one or more independent variables on a bundle of dependent variables. As opposed to T test and ANOVA which examines equality of means of single dependent variable across groups, MANOVA tests the equality of means on multiple dependent variables across groups.

### **ASSUMPTIONS:**

- **Independent Random Sampling:** MANOVA normally assumes that the observations are independent of one another. The sample is completely random.
- **Level and Measurement of the Variables:** MANOVA assumes that the independent variables are categorical in nature and the dependent variables are continues variables. MANOVA also assumes that homogeneity is present between the variables that are taken for covariates.

- **Linearity of dependent variable:** In MANOVA, the dependent variables can be correlated to each other, or may be independent of each other. Study shows that in MANOVA, a moderately correlated dependent variable is preferred. In MANOVA, if the dependent variables are independent of each other, then we have to sacrifice the degrees of freedom and it will decrease the power of the analysis.
- **Multivariate Normality:** MANOVA is very sensitive with outliers and missing value. Thus, it is assumed that multivariate normality is present in the data.
- **Multivariate Homogeneity of Variance:** Like test analysis of variance, MANOVA also assumes that the variance between groups is equal.

#### **HYPOTHESIS:**

Null hypothesis **H<sub>0</sub>**: There is no significant difference between demographic variables and values of various soaps.

Alternate hypothesis **H<sub>1</sub>**: There is a significant difference between demographic variables and values of various soaps.

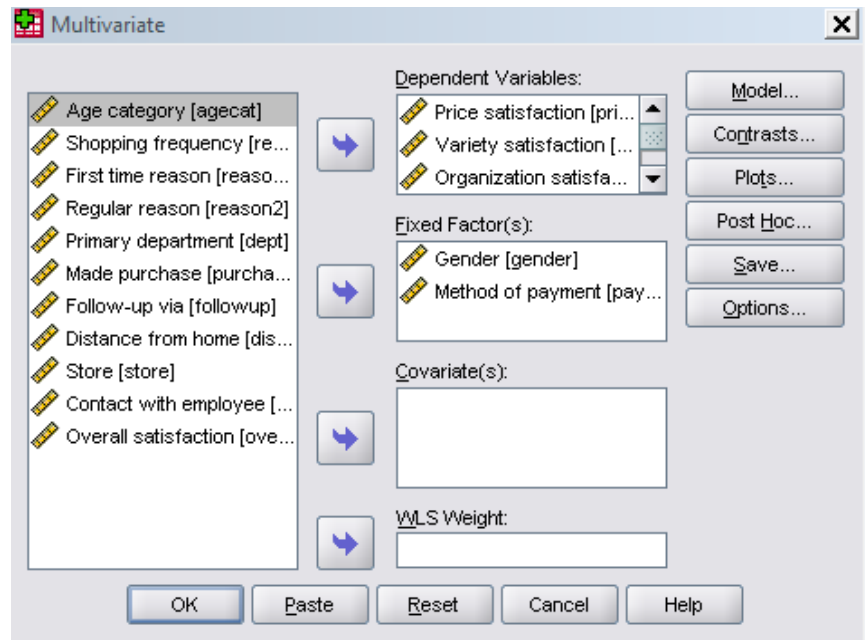
#### **PROCEDURE:**

STEP1: Open the database, say SATISFY.

STEP2: To run a cross tab analysis, from the menu choose:

Analyze----->General Linear Model----->multivariate

STEP3: The MANOVA dialog box appears as shown



STEP: 4 Select values of various soaps as dependent variable.

STEP: 5 Select family income as factor.

### Shopping Satisfaction versus mode of payment and gender

Multivariate Tests						
Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.878	8.162E2 <sup>a</sup>	5.000	568.000	.000
	Wilks' Lambda	.122	8.162E2 <sup>a</sup>	5.000	568.000	.000
	Hotelling's Trace	7.185	8.162E2 <sup>a</sup>	5.000	568.000	.000
	Roy's Largest Root	7.185	8.162E2 <sup>a</sup>	5.000	568.000	.000
Gender	Pillai's Trace	.014	1.600 <sup>a</sup>	5.000	568.000	.158
	Wilks' Lambda	.986	1.600 <sup>a</sup>	5.000	568.000	.158

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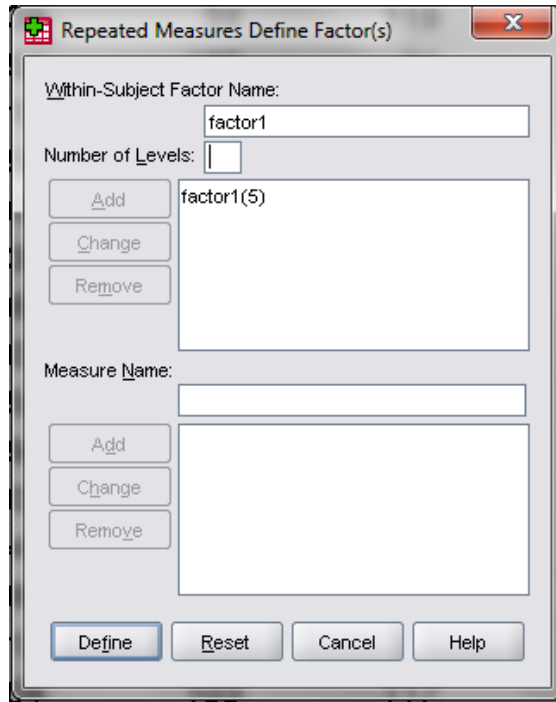
	Hotelling's Trace	.014	1.600 <sup>a</sup>	5.000	568.000	.158
	Roy's Largest Root	.014	1.600 <sup>a</sup>	5.000	568.000	.158
Payment	Pillai's Trace	.040	1.147	20.000	2.284E3	.293
	Wilks' Lambda	.961	1.148	20.000	1.885E3	.292
	Hotelling's Trace	.041	1.148	20.000	2.266E3	.292
	Roy's Largest Root	.024	2.789 <sup>b</sup>	5.000	571.000	.017
gender * payment	Pillai's Trace	.044	1.281	20.000	2.284E3	.180
	Wilks' Lambda	.956	1.284	20.000	1.885E3	.179
	Hotelling's Trace	.045	1.286	20.000	2.266E3	.177
	Roy's Largest Root	.030	3.416 <sup>b</sup>	5.000	571.000	.005

From the above table we can see that the value of MANOVA is greater than .05 therefore **Null Hypotheses is accepted**. Thus there is a no significant difference between shopping Satisfaction versus mode of payment and gender.

### Repeated measures :

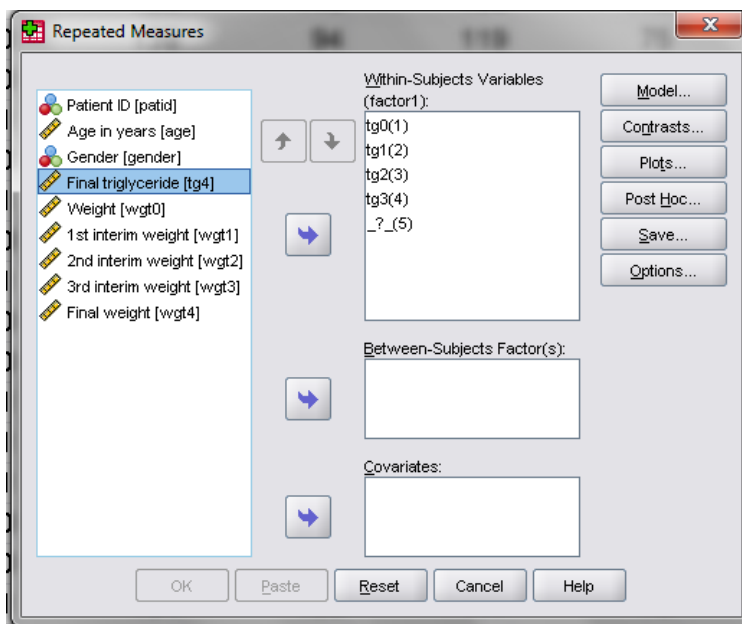
#### Procedure

- Step 1 : open the database “Diet Study.sav” .
- Step 2 : click analyze and select “General Linear Models” → “Repeated Measures” .



Step 3 : enter the number of levels and then click on “Define”

Step 4 : Add the factors one by one to the “within-subject Variables”



Step 5 : click on “plots” and add the “factor1” to the horizontal axis and then click “add” to add it to the plots and click on continue to proceed.

Step 6 : click on options and add “factor1” to the “Display means for” coloum , select the Descriptive Statistics and Homogeneity tests and click continue.

Step 7 : click “OK ” to generate the output.

**OUTPUT :**

<b>Descriptive Statistics</b>			
	Mean	Std. Deviation	N
Triglyceride	138.44	29.040	16
1st interim triglyceride	124.56	25.126	16
2nd interim triglyceride	124.38	21.854	16
3rd interim triglyceride	118.81	33.255	16
Final triglyceride	124.37	29.412	16

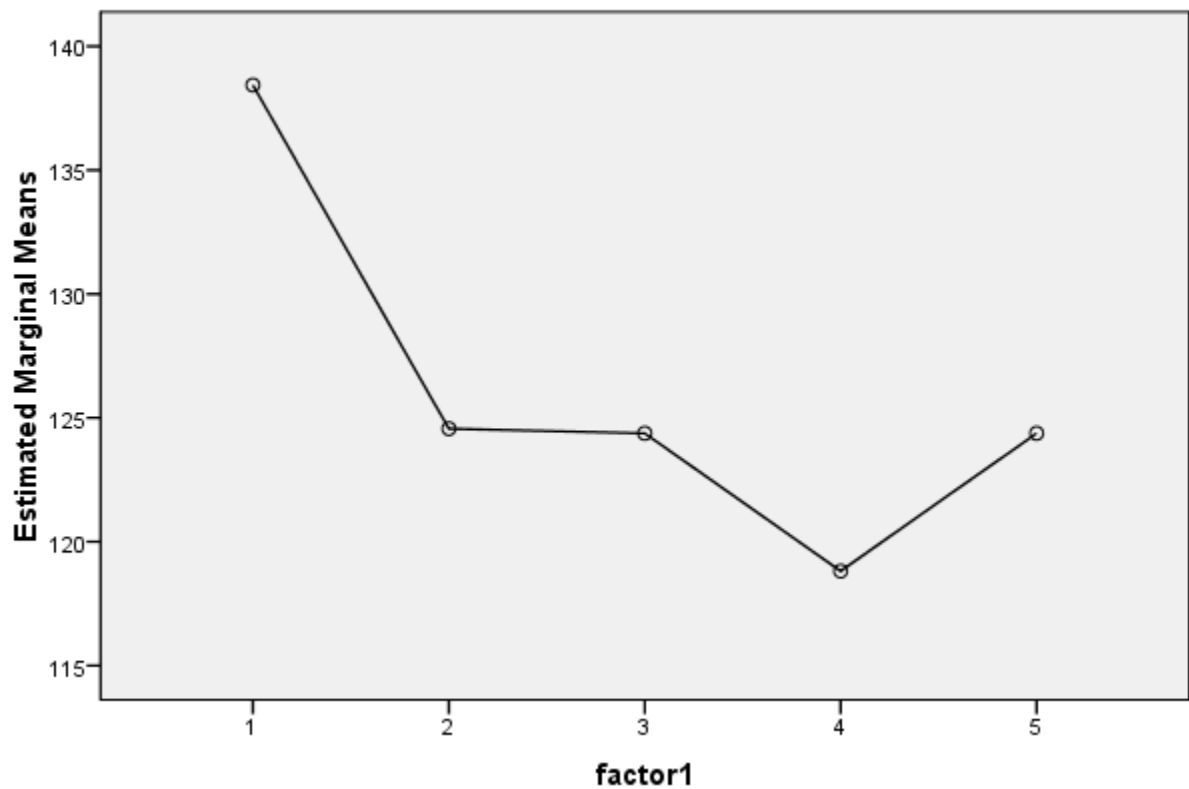
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Multivariate Tests <sup>b</sup>						
Effect		Value	F	Hypothesis df	Error df	Sig.
factor1	Pillai's Trace	.201	.756 <sup>a</sup>	4.000	12.000	.573
	Wilks' Lambda	.799	.756 <sup>a</sup>	4.000	12.000	.573
	Hotelling's Trace	.252	.756 <sup>a</sup>	4.000	12.000	.573
	Roy's Largest Root	.252	.756 <sup>a</sup>	4.000	12.000	.573
a. Exact statistic						
b. Design: Intercept						
Within Subjects Design: factor1						



**Estimated Marginal Means of MEASURE\_1**



**- 6**

**CORRELATION**

**PURPOSE:**

A correlation is a single number that describes the direction and the degree of relationship between two variables.

**ASSUMPTION:**

- The variables must be normally distributed.
- The variables must be linear.

**HYPOTHESIS:**

Null hypothesis Ho: there is no significant relationship between the variables.

Alternate hypothesis H1: there is a significant relationship between the variables.

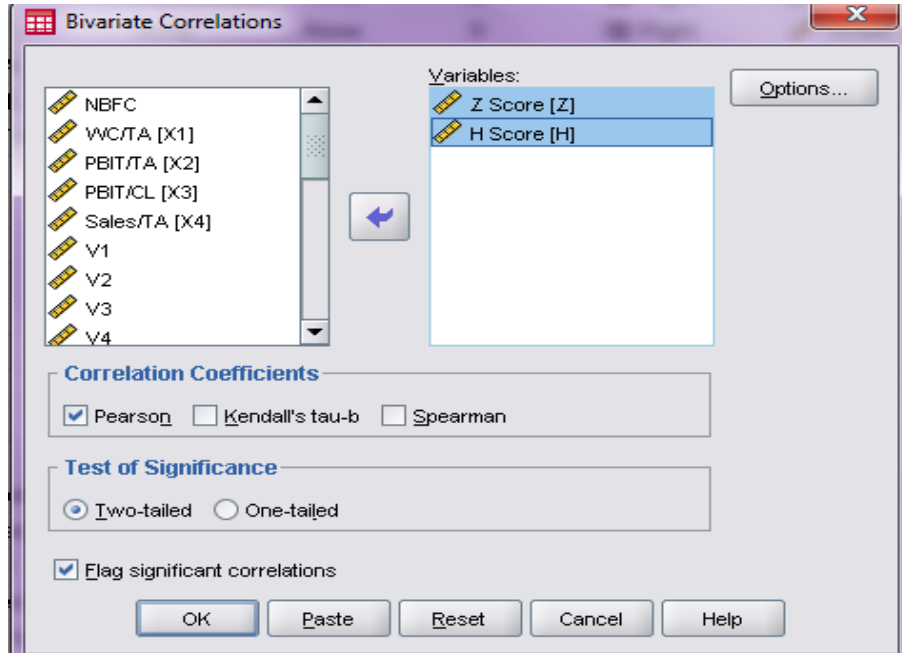
**PROCEDURE:**

STEP1: Open the database, say Narayanan.

STEP2: To run the correlation analysis:

Analyze----->correlate-----> Bivariate

STEP3: The Bivariate correlation dialog box appears



STEP: 4 select the Z Score (Z), H Score (H) as variables

STEP: 5 select Pearson correlation coefficients.

STEP: 6 click ok,

<b>Correlations</b>			
		Z Score	H Score
Z Score	Pearson Correlation	1	.811**
	Sig. (2-tailed)		.000
	N	124	124
H Score	Pearson Correlation	.811**	1

	Sig. (2-tailed)	.000	
	N	124	124
**. Correlation is significant at the 0.01 level (2-tailed).			

The correlation between Z Score and H Score is  $r = 0.811$  and significant values is 0.000. This indicates that Z Score and H Score are not independent to each other. Here the value of  $r$  is 0.811 so it is considered to be a strong correlation.

### PARTIAL CORRELATION

**PURPOSE:**

Partial Correlation is the measure of association between two variables, while controlling or adjusting the effect of one or more additional variables. Partial Correlation can be used in many cases, like whether or not the sale value of a particular commodity is strongly related to the expenditure on advertising when the effect of price is controlled. If the partial correlation becomes zero, then it can be inferred that the correlation that was computed before is false.

Correlations			
		Age in years	Income after the program
Age in years	Pearson Correlation	1	.297**

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	Sig. (2-tailed)		.000
	N	1000	1000
Income after the program	Pearson Correlation	.297**	1
	Sig. (2-tailed)	.000	
	N	1000	1000
	**. Correlation is significant at the 0.01 level (2-tailed).		

<b>Correlations</b>				
		Age in years	Income after the program	Income before the program
Age in years	Pearson Correlation	1	.297**	.526**
	Sig. (2-tailed)		.000	.000
Income after the program	Pearson Correlation	.297**	1	.589**
	Sig. (2-tailed)	.000		.000
Income before the program	Pearson Correlation	.526**	.589**	1
	Sig. (2-tailed)	.000	.000	
	N	1000	1000	1000
**. Correlation is significant at the 0.01 level (2-tailed).				

**PROCEDURE:**

STEP1: Open the database, say PARTIAL CORRELATION

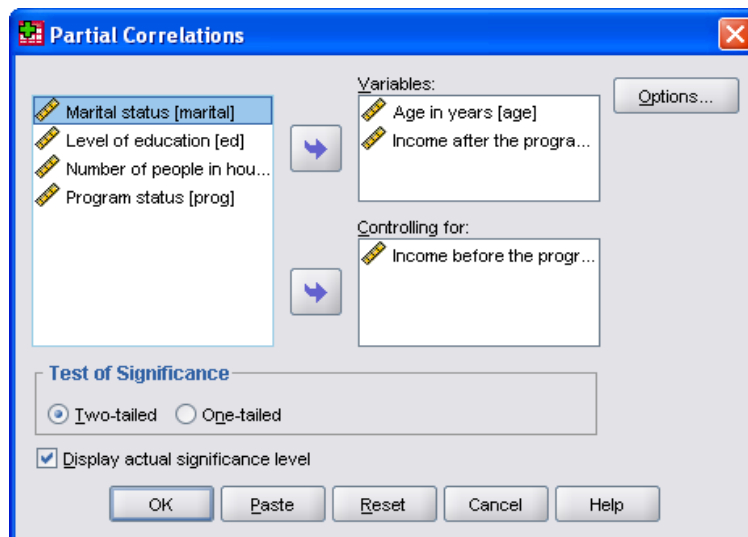
STEP2: To conduct the partial correlation;

Analyze----->Correlate----->Partial

STEP3: Select the variables age and income after the program under variables.

STEP4: Select income before the program as the variable whose effect is to be controlled.

STEP5: Click OK.



Correlations		
	Control Variables	Age in years Income after the program

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Income before the program	Age in years	Correlation	1.000	-.019
		Significance (2-tailed)	.	.551
		Df	0	997
	Income after the program	Correlation	-.019	1.000
		Significance (2-tailed)	.551	.
		Df	997	0

The relationship between the age and income after the program, controlling for the income before the program is done using the partial correlation and the correlation value is -0.019 and level of significant value is 0.551 which is greater than 0.05 so there is no significant relationship between age and income after the program.

<b>Correlations</b>				
		GOLD PRICE	GDP in Billions	Savings in % of GDP
GOLD PRICE	Pearson Correlation	1	.959**	.639*
	Sig. (2-tailed)		.000	.025
	N	12	12	12

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GDP in Billions	Pearson Correlation	.959**	1	.766**
	Sig. (2-tailed)	.000		.004
	N	12	12	12
Savings in % of GDP	Pearson Correlation	.639*	.766**	1
	Sig. (2-tailed)	.025	.004	
	N	12	12	12
**. Correlation is significant at the 0.01 level (2-tailed).				
*. Correlation is significant at the 0.05 level (2-tailed).				

Correlations				
Control Variables			GOLD PRICE	Savings in % of GDP
GDP in Billions	GOLD PRICE	Correlation	1.000	-.519
		Significance (2-tailed)	.	.102
		Df	0	9
	Savings in % of GDP	Correlation	-.519	1.000
		Significance (2-tailed)	.102	.
		Df	9	0



## **REGRESSION**

### **PURPOSE:**

The general purpose of regressions is to learn more about the relationship between one independent and one dependent variable.

### **ASSUMPTION:**

- The variables must be linear.
- The variables must be normally distributed.

### **HYPOTHESIS:**

Null hypothesis Ho: There is no significant relationship between the variables.

Alternate hypothesis H1: There is a significant relationship between the variables.

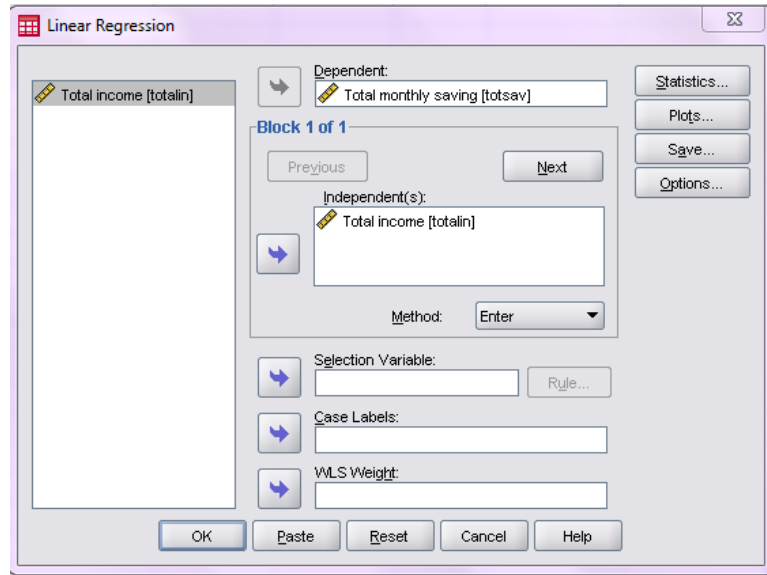
### **PROCEDURE:**

STEP 1: Open the database; say Family Income and Total Monthly savings.

STEP 2: To run a linear regression analysis

*Analyze → Regression → Linear.*

STEP 3: Linear regression dialog box appears as below.



- Select Total monthly saving as a dependent variable
- Select Total income as a independent variable
- Click plots
- Select histogram and normal probability plot
- Clicks Continue.
- Click save in the linear regression dialogue box
- Select standardize in the predicted value group
- Click Continue.

<b>Model Summary<sup>b</sup></b>				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.404 <sup>a</sup>	.163	.162	5210.879

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Model Summary <sup>b</sup>				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.404 <sup>a</sup>	.163	.162	5210.879
a. Predictors: (Constant), Total income				
b. Dependent Variable: Total monthly saving				

ANOVA <sup>b</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.909E9	1	2.909E9	107.138	.000 <sup>a</sup>
	Residual	1.493E10	550	2.715E7		
	Total	1.784E10	551			

Residuals Statistics <sup>a</sup>					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	4974.83	29091.34	8234.37	2297.768	552
Residual	-2.409E4	1.833E4	.000	5206.148	552

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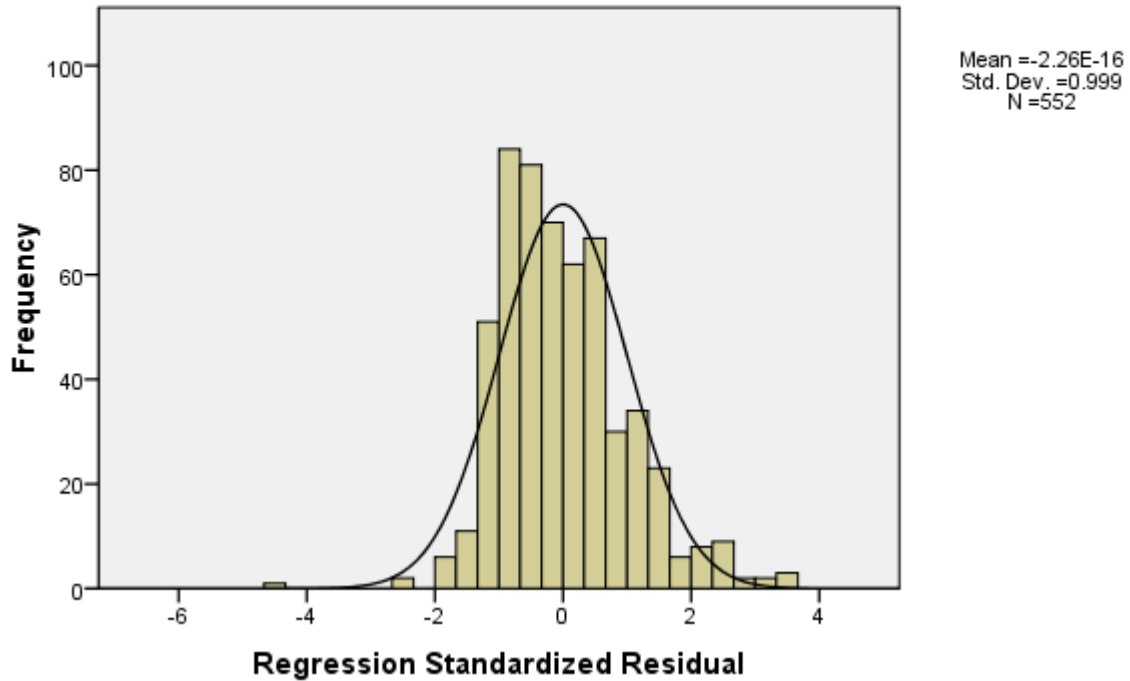
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Std. Predicted Value	-1.419	9.077	.000	1.000	552
Std. Residual	-4.623	3.518	.000	.999	552
a. Dependent Variable: Total monthly saving					

<b>Coefficients<sup>a</sup></b>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3281.033	527.447		6.221	.000
	Total income	.161	.016	.404	10.351	.000
a. Dependent Variable: Total monthly saving						

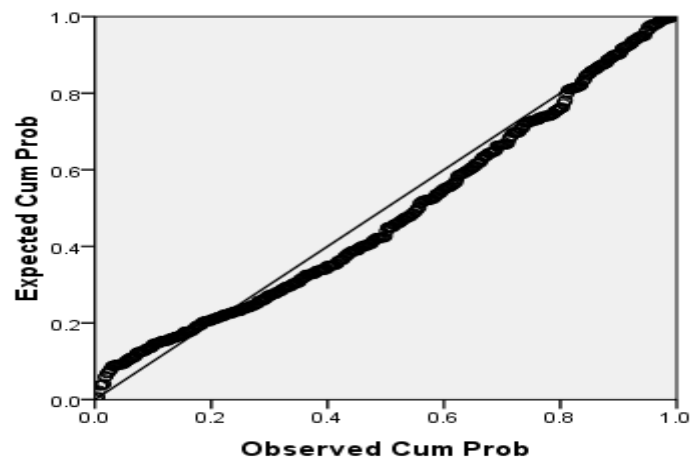
### Histogram

Dependent Variable: Total monthly saving



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

Dependent Variable: Total monthly saving



**The common regression equation is  $y=a + bx$**

The effect of Total income on total monthly saving is given by the regression equation,

total monthly saving = 3281.03 + (0.161) Total income.

Y is the total monthly saving and A is a constant value.

X Total income on.

B is the coefficient for the variable x.

'a' is constant value which is the contribution made by all other factors for determining the propensity to leave.

## **MULTIPLE REGRESSIONS**

### **PURPOSE:**

The general purpose of regressions is to learn more about the relationship between one dependent and more than one independent variable.

### **ASSUMPTION:**

- The variables must be linear.
- The variables must be normally distributed.

### **HYPOTHESIS:**

Null hypothesis  $H_0$ : There is no significant relationship between the variables.

Alternate hypothesis  $H_1$ : There is a significant relationship between the variables.

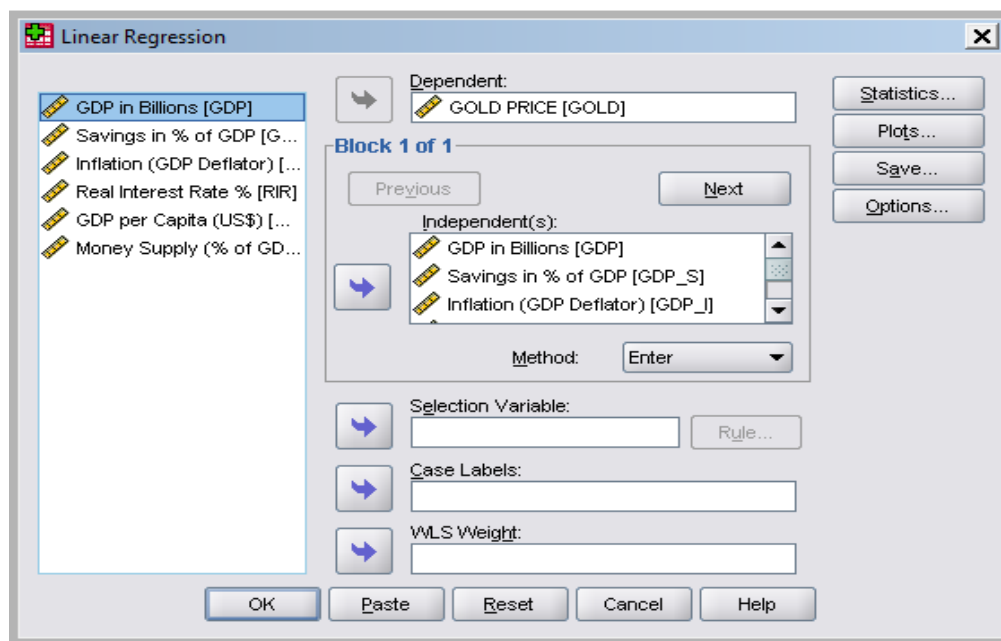
### **PROCEDURE:**

STEP 1: Open the database, say GOLD.

STEP 2: To run a linear regression analysis

*Analyze → Regression → Linear.*

STEP 3: Linear regression dialog box appears as below.



- Select gold price as a dependent variable
- Select GDP in Billions, Savings in percentage of GDP, Inflation, Real Interest Rate, GDP per Capita and Money Supply as a independent variable
- Clicks Continue.

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.999 <sup>a</sup>	.999	.998	336.22947

R is the correlation, its value is 0.999 and R square is degree of determination, its value is 0.999. The degree of determination shows the extent to which GDP in Billions, Savings in percentage of GDP, Inflation, Real Interest Rate, GDP per Capita and Money Supply influences the gold price. Here the gold price is determined to an extent of 99.9% by GDP in Billions, Savings in percentage of GDP, Inflation, Real Interest Rate, GDP per Capita and Money Supply.

ANOVA <sup>b</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.040E8	6	8.400E7	743.036	.000 <sup>a</sup>
	Residual	565251.275	5	113050.255		
	Total	5.046E8	11			



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ANOVA table shows that the significant value is less than 0.01, which means dependent variable that is good price is significantly predicted by independent variables namely GDP in Billions, Savings in percentage of GDP, Inflation, Real Interest Rate, GDP per Capita and Money Supply at 99 % of confidence level.

<b>Coefficients<sup>a</sup></b>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	9912.561	6296.821		1.574	.176
	GDP in Billions	11.616	1.727	.832	6.726	.001
	Savings in % of GDP	-387.496	86.602	-.235	-4.474	.007
	Inflation (GDP Deflator)	-112.438	197.335	-.041	-.570	.593
	Real Interest Rate %	-239.964	204.224	-.072	-1.175	.293
	GDP per Capita	11.810	.902	.482	13.092	.000
	Money Supply (% of GDP)	-82.850	62.963	-.081	-1.316	.245
a. Dependent Variable: GOLD PRICE						

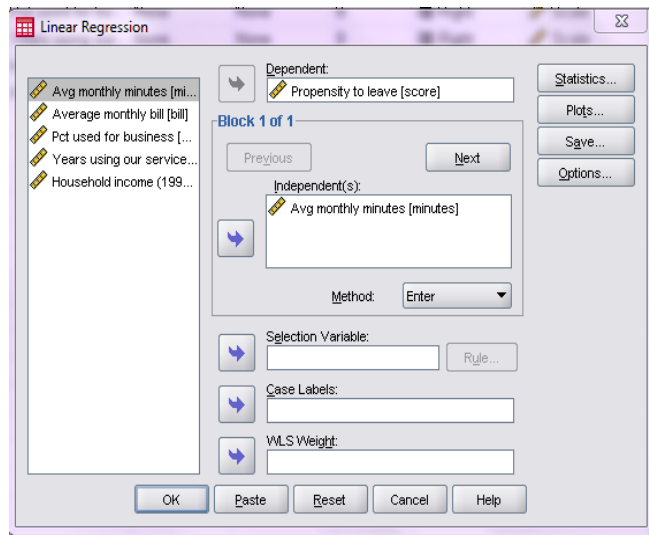
**The common regression equation is  $y=a + bx$**

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The effect of GDP in Billions, Savings in percentage of GDP, Inflation, Real Interest Rate, GDP per Capita and Money Supply on gold price is given by the regression equation,

$$\text{Gold Price} = 9912.561 + 11.616(\text{GDP in Billions}) - 387.496 (\text{Savings in percentage of GDP}) + 11.810 (\text{GDP per Capita})$$



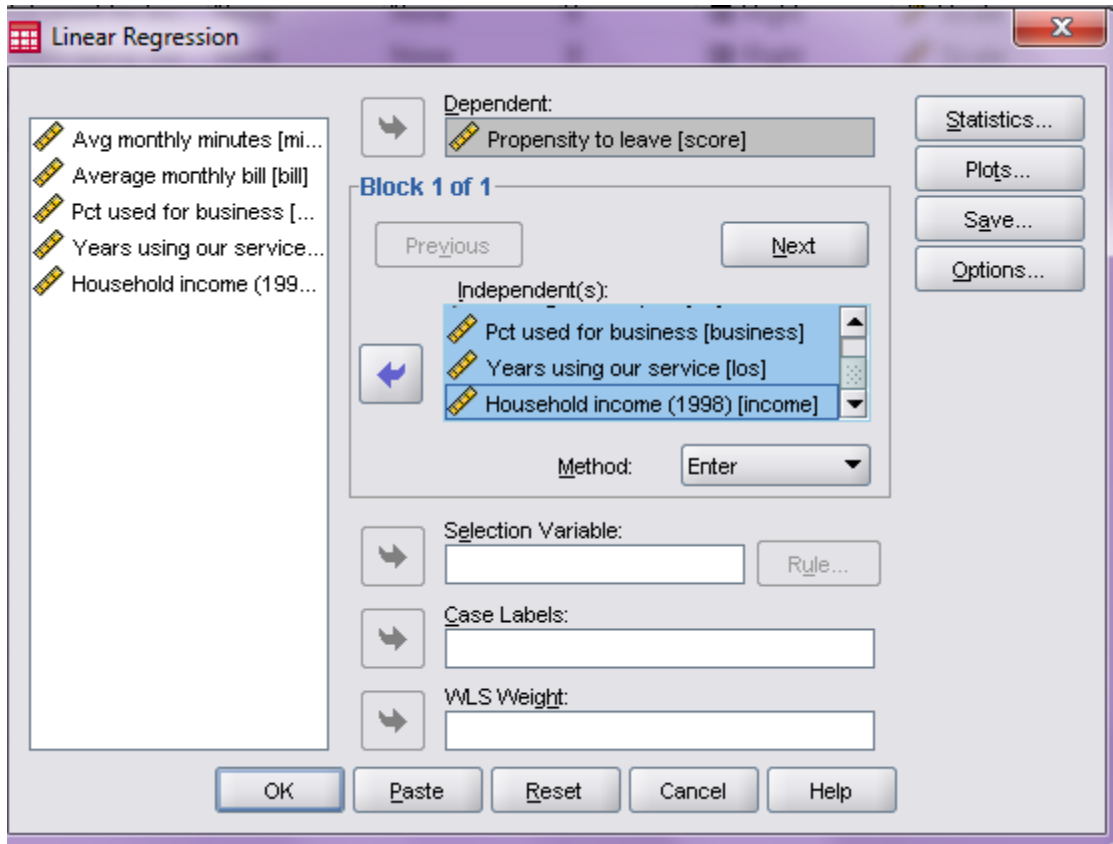
<b>Model Summary</b>				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.608 <sup>a</sup>	.369	.367	10.60350
a. Predictors: (Constant), Avg monthly minutes				

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ANOVA <sup>b</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	16322.916	1	16322.916	145.177	.000 <sup>a</sup>
	Residual	27883.691	248	112.434		
	Total	44206.607	249			

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	13.343	2.434		5.481	.000
	Avg monthly minutes	.174	.014	.608	12.049	.000
a. Dependent Variable: Propensity to leave						



<b>Model Summary<sup>b</sup></b>				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.623 <sup>a</sup>	.388	.375	10.53014

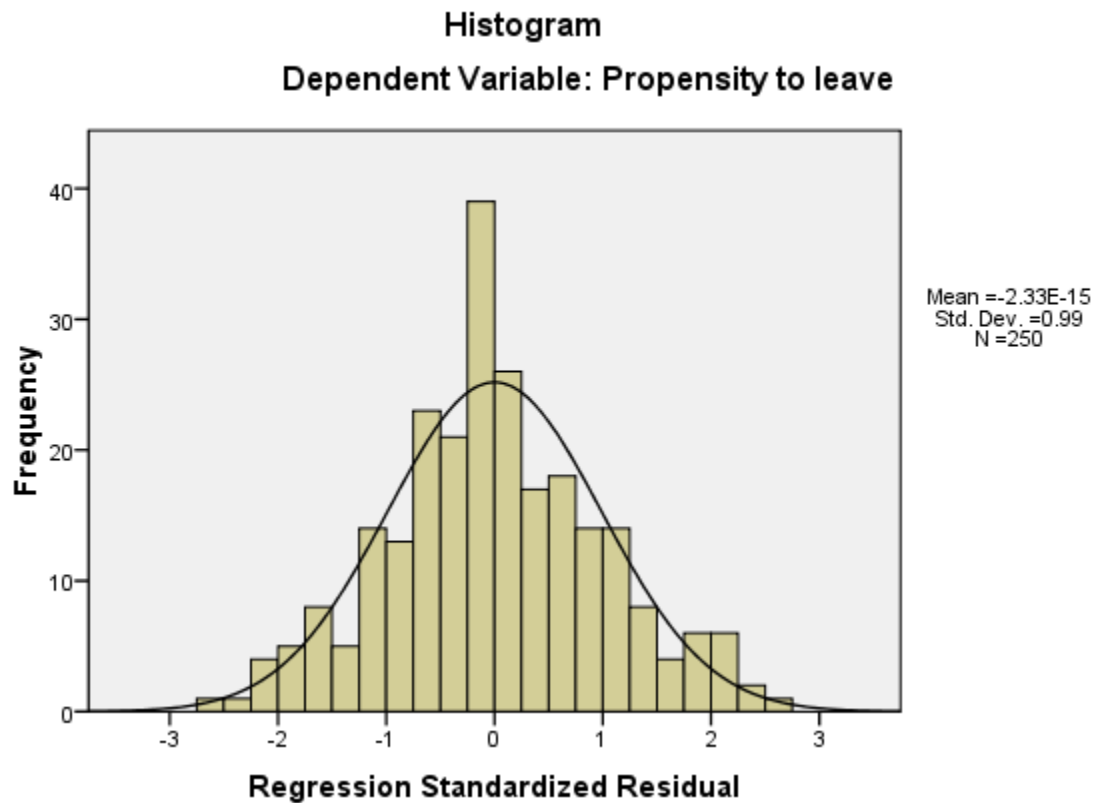
<b>ANOVA<sup>b</sup></b>					
Model	Sum of Squares	df	Mean Square	F	Sig.

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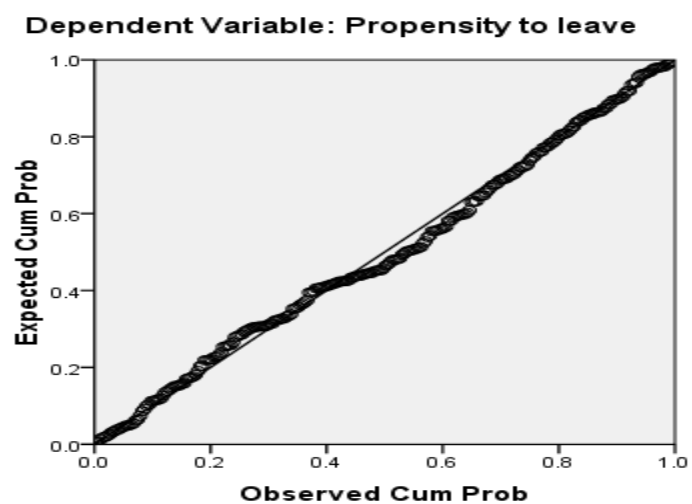
1	Regression	17150.933	5	3430.187	30.935	.000 <sup>a</sup>
	Residual	27055.674	244	110.884		
	Total	44206.607	249			

<b>Coefficients<sup>a</sup></b>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	15.467	4.476		3.455	.001
	Avg monthly minutes	.175	.017	.611	10.151	.000
	Average monthly bill	.054	.042	.081	1.284	.200
	Pct used for business	-.120	.088	-.082	-1.372	.171
	Years using our service	-2.375	1.210	-.108	-1.962	.051
	Household income (1998)	.074	.065	.062	1.151	.251
a. Dependent Variable: Propensity to leave						

<b>Residuals Statistics<sup>a</sup></b>					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	21.4919	68.8849	41.5395	8.29935	250
Residual	-2.65226E 1	27.97231	.00000	10.42388	250
Std. Predicted Value	-2.416	3.295	.000	1.000	250
Std. Residual	-2.519	2.656	.000	.990	250
a. Dependent Variable: Propensity to leave					



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



## **CLUSTER ANALYSIS**

### **PURPOSE:**

Cluster analysis is a technique that is used to classify objects or cases into relative groups called clusters. In Cluster Analysis, there is no prior information about the group or cluster membership for any of the objects.

### **ASSUMPTIONS:**

- Representative ness of sample.
- No multi collinearity.

### **PROCEDURE:**

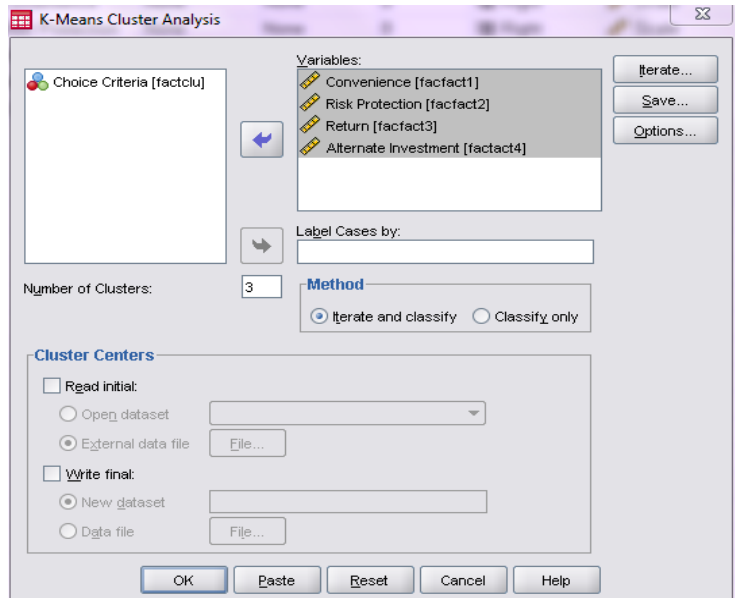
STEP1: Open the database, say cluster-criteria.

STEP2: To run a cross tab analysis, from the menu choose:

Analyze----->Classify----->K-means cluster

STEP3: The K-means cluster analysis dialog box appears as shown.





STEP: 4 Select Convenience, Risk Protection, Return and Alternate Investment as variables.

STEP: 5 Click save-----> Select cluster membership

STEP: 6 Click Options-----> Select ANOVA Table.

STEP: 7 Click Ok.

The investors can be classified into three categories based on choice criteria. The investors are classified into three segments because the difference between the coefficients is significant only on three cases on the hierarchical cluster. For the purpose of classification of investors K-Means cluster is used.

### FINAL CLUSTER CENTERS

	Cluster		
	1	2	3

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Convenience	3.86	3.60	2.80
Risk Protection	4.06	4.02	2.76
Return	3.73	2.95	2.91
Liquidity	3.59	2.69	2.81

ANOVA						
	Cluster		Error		F	Sig.
	Mean Square	Df	Mean Square	df		
Convenience	51.041	2	.238	549	214.172	.000
Risk Protection	87.004	2	.245	549	355.066	.000
Return	43.523	2	.216	549	201.316	.000
Liquidity	48.977	2	.232	549	211.487	.000

Table-shows the mean values for the three clusters which reflect the attributes of each cluster. For instance, the mean value of the convenience and risk protection for the first-cluster are 3.86 and 4.06 respectively. This means that the first cluster people are more apprehensive about risk. It is also noted from the table that no particular factor is heavily loaded on any particular cluster segment. The rank of the clusters on every factor is also given in the table. The description of all three clusters along with the label is given above.

Number of Cases in each Cluster		
Cluster	1	238.000

	2	172.000
	3	142.000
Valid		552.000
Missing		.000

### **Rational Investors**

The first cluster has high mean value in all the factors which are used to evaluate an investment instruments. This cluster is ranked first in all the four factors. The average score of this cluster is 3.81. This means that people under this segment strongly agree with all the requirements needed for any good investment instrument. Since this segment considers all the criteria before taking investment decision, this group can be designated as Rational Investors.

### **Normal Investor**

The second cluster can be designated as Normal Cluster because it has secured II rank in the mean values of factors like convenience, risk protection and return criteria and III rank in liquidity criteria. This segment of people agrees with convenience and risk protection because their mean score is more than three in those criteria. More particularly, this segment looks for more risk protection and less liquidity. This segment of people is the most suited for small saving instruments, because small saving instruments are long term in nature and the much less needed liquidity is missing and these schemes are offered by Government which gives much needed risk protection. The

average mean score of this people is 3.32 which means that they are just above normal in any requirements they look from any investments.

### **Irrational Investor**

The mean values of all the four criteria in this segment is less than three and the average of all the criteria is also less than three. This means that this segment of people do not consider any factor much seriously before taking any investment decision. Any rational investor considers at least some factors before choosing any investment avenue. But this segment of people does not consider any factor which means that they are not rational. In the Liquidity factor, this segment has secured II rank. The normal investors are not giving big consideration to the liquidity factor because liquidity criteria will not add any value to the investment.

The final cluster centers table shows that the three clusters differ in mean value of all the four criteria. The analysis of variance (Table-12) indicates that the difference exists among the three clusters in the mean values are significantly different. The significant value for all the four criteria is 0.000. This means that all the four factors have significant contribution on dividing people into three segments based on choice criteria.

Table-13 indicates that there are around 238 investors out of 552 investors in cluster I which is the rational investor group and 172 out of 552 investors are in normal investor group. This means that around 43 percent of investors are rational investors and 31 percent of investors are normal investors. Both rational and normal investors give high

importance to risk protection which means around 74 percent of investors will not go to equity market, where there is high risk component involved due to market fluctuation. As long as there is a risk component in capital market, the major chunk of investor will not participate in that market. This leads to the conclusion that even in future money flow into the capital market will not increase.

**AWARENESS CLUSTER**

<b>Final Cluster Centers</b>			
	Cluster		
	1	2	3
NSC	5	3	3
PPF	5	3	3
POMIS	5	3	2
KVP	4	3	2
POTD	4	3	1
POSA	4	3	1
PORD	4	3	1

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ANOVA						
	Cluster		Error		F	Sig.
	Mean Square	df	Mean Square	df		
Level awareness in NSC	79.905	2	1.022	549	78.187	.000
Level awareness in PPF	85.360	2	1.075	549	79.385	.000
POMIS	210.539	2	.813	549	258.904	.000
KVP	154.798	2	.754	549	205.399	.000
POTD	253.922	2	.360	549	706.191	.000
POSA	258.438	2	.461	549	560.532	.000
PORD	251.625	2	.497	549	505.865	.000

Number of Cases in each Cluster		
Cluster		
	1	43.000
	2	238.000
	3	271.000
Valid		552.000

Number of Cases in each Cluster		
Cluster	1	43.000
	2	238.000
	3	271.000
Valid		552.000
Missing		.000

### **DISCRIMINANT ANALYSIS**

#### **PURPOSE**

To find out the variable which significantly influences the segmentation. Otherwise to find out the variable which is the reason for such segmentation.

There should be only one dependent variable and it should be category. There can be any number of independent variable and that should be metric.

#### **PROCEDURE**

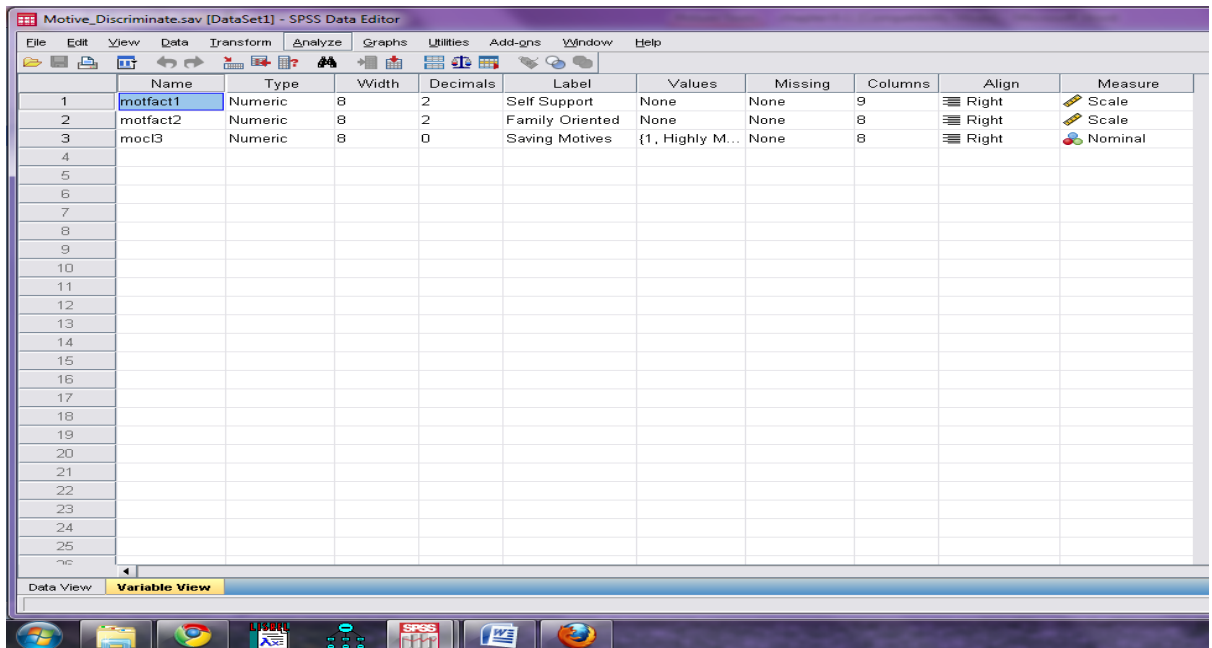
STEP1: Open the database, say Motives Discriminate.

STEP2: To run a cross tab analysis, from the menu choose:

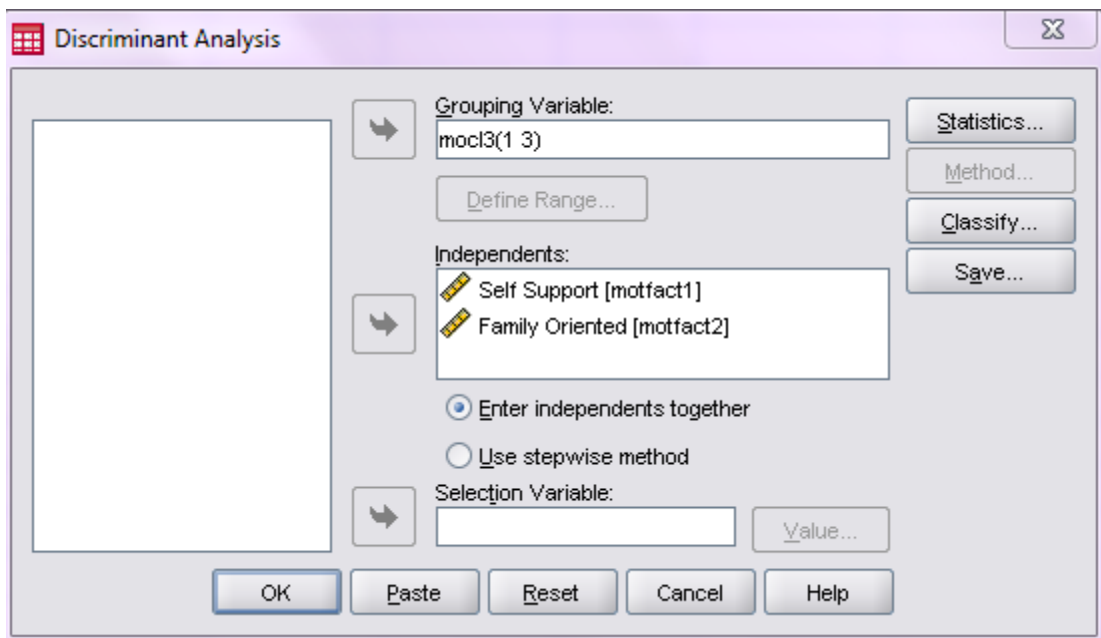
Analyze----->Classify----->Discriminate

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STEP3: The Discriminate analysis dialog box appears as shown



### Testing suitability of segmentation

The investors are classified into three clusters based on the level of motives they have for savings. The three identified clusters are highly motivated clusters, self centered clusters and least motivated clusters. Around 37 percent of investors are treated as highly



motivated people and 25 percent of investors are least motivated people and 38 percent of the investors are self centered people. The next primary question is whether the identified clusters are genuine and each cluster differs from the other significantly and both motives play a role in separating investors into three segments. For this purpose, reliability of the cluster classification and its stability across the samples have to be verified. Several authors have recommended the use of discriminant analysis for cross validation (Field and Schoenfeldt 1975; Rogers and Linden 1973).

#### **TESTS OF EQUALITY OF GROUP MEANS**

	Wilks' Lambda	F	df1	df2	Sig.
Self Support	0.607	177.428	2	549	0.000
Family Oriented	0.358	492.222	2	549	0.000

Wilks' lambda is the ratio of the within-groups sum of squares to the total sum of squares. Wilks' lambda is very small for family orientation which means that there is a strong group difference among the three motive segmentation in a family orientated motive. The mean values of family oriented motive are significantly different among the three segments. Wilks' Lambda for self support motive is comparatively high because there is no much difference between the first segment and the third segment in the mean values of self support motive. The F statistic is a ratio of 'between-groups variability' to the 'within-groups variability'. The value of F ratio with respect to degrees of freedom is very significant which is indicated in the significance value. The low value of significance indicates that there exists a significant difference in motivational levels

among the three groups. The above two facts explain that the present segmentation is right and there exists a significant group difference.

**EIGEN VALUES**

Function	Eigen value	% of Variance	Cumulative %	Canonical Correlation
1	1.809	75.9	75.9	0.802
2	0.573	24.1	100.0	0.604

The Eigen value is the ratio of ‘between-groups sum of squares’ and ‘within-groups sum of squares’. The largest Eigen value corresponds to the maximum spread of the groups’ means. Small Eigen accounts for very little of the total dispersion. The Eigen for first discriminant function is very high when compared to second function. For the three clusters, two discriminant functions can be formed and there will be two canonical correlations. The canonical correlation is a tool used to measure the association between discriminant functions and the two motives. The canonical correlation between the first function and the two motives is very high which is 0.8, but canonical correlation for the second function is only 0.6. The Wilks Lambda table indicates that both canonical correlations are significant.

**WILKS' LAMBDA**

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1 through 2	0.226	814.879	4	0.000

2	0.636	248.443	1	0.000
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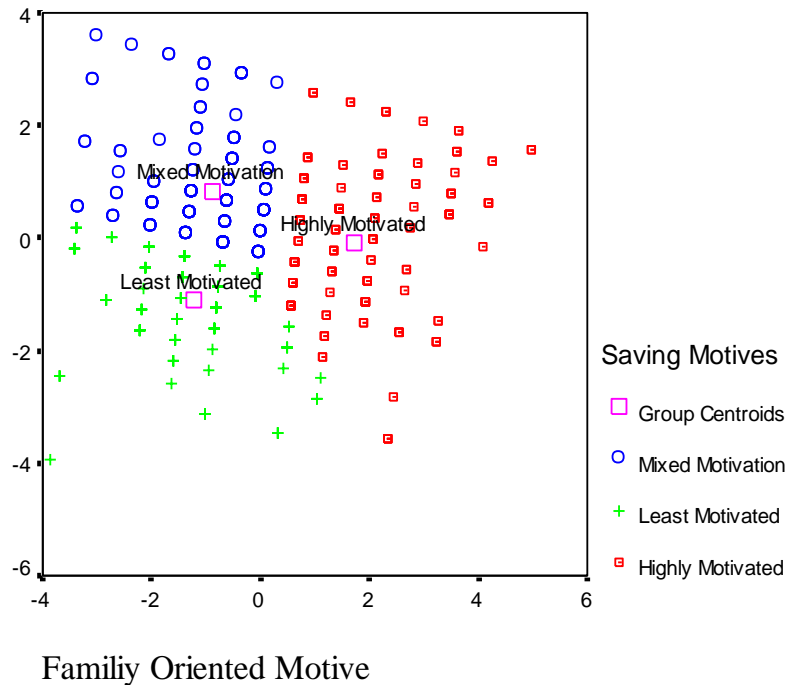
Wilks' lambda for the first function is 0.226 which indicates that the group means are different in the first function which is the function of family oriented motive and Wilks lambda for second function is 0.636 which also indicates that group means are different but not to the extent of the first function. The second function is the function of self support motive where the group difference is less. A chi-square transformation of Wilks' lambda is used along with the degrees of freedom to determine the degree of significance. The significance value is small for the first function which is 0.000. It indicates that group means differ very much significantly in the first function which is represented by family oriented motive. The Chi-square value for the second function is 248.443 which is significant by 0.000 level.

**STRUCTURE MATRIX**

	Function	
	1	2
Family Oriented	0.994*	-0.112
Self Support	0.244	0.970*

The structure matrix indicates that two functions can be formed for the three clusters. These two domain functions can be used separately, to describe the characteristics of population. The two domain functions are  $Z_1 = 0.994 * \text{Family oriented motive}$ ,  $Z_2 = 0.970 * \text{Self Support motive}$ .

**GROUP CENTROIDS FOR MOTIVE CLUSTERS**



The above group centroids diagram shows that all the three clusters are distinctive clusters having different group centroids and different mean values. The cluster members are aligned separately from other group members.

**EXTENT OF CORRECT CLASSIFICATION**

		Saving Motives	Predicted Group Membership			Total
			Highly Motivated	Least Motivated	Self centered	

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Original	Count	Highly Motivated	203	0	3	206
		Least Motivated	3	134	0	137
		Self centered	0	0	209	209
	%	Highly Motivated	98.5	0.0	1.5	100.0
		Least Motivated	2.2	97.8	0.0	100.0
		Self centered	0.0	0.0	100.0	100.0

98.9% of original grouped cases are correctly classified.

The extent of correct classification table measures the degree of success of the classification on the basis of motives. The number and percentage of cases correctly classified and misclassified are displayed in the table. Here, 203 cases or 98.5 percent of highly motivated segments are correctly classified and only 3 cases are included into self centered segment. In the least motivated segment 134 cases accounting for 97.8 percent are correctly classified. In self centered, it is 100 percent correctly classified. From this, it can be clearly inferred that the segmentation of investors based on motive is correct by more than 98.9 percent.

### **FACTORS INFLUENCING EFFICIENCY OF BANKS**

In the earlier section, it was seen that the banks are divided into three segments such as highly efficient, above average and below average based on their technical

efficiency. Now, it is necessary to check whether such classification is right and all the 8 determinants such as Age of the bank, Number of branches, Business per employee, Cost of funds, Capital adequacy ratio, Non-performing assets, Deposits and Number of employees have influence in making such classification. For this purpose discriminant analysis is used. All the 60 commercial banks in India are considered for the analysis. The category of banks is considered as a dependent variables and all others are taken as independent variables for the purpose of discriminant analysis.

**STRUCTURE MATRIX**

	Function	
	1	2
Business Per Employee	.850*	-0.085
COF	-.596*	0.497
Age	-.180*	-0.093
No of employees	-.113*	0.092
Deposit	-.108*	0.026
NPA	0.150	.410*
No of Branches	-0.152	.190*
CRAR	0.080	-.093*

As there are three categories, two linear equations can be formed. The structure matrix table (Table 9) contains co-efficient for the variables. The two domain functions can be written by using co-efficients in the structure matrix table. The functions are

$$Z_1 = 0.850 X_1 - 0.596 X_2 - 0.180 X_3 - 0.133 X_4 - 0.108X_5 \text{ and}$$

$$Z_2 = 0.410 Y_1 + 0.190Y_2 - 0.093Y_3$$

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Where X1 = Business per employee, X2 = Cost of funds, X3 = Age of the bank, X4 = Number of employees, X5 = Deposits, Y1 = Non-performing assets, Y2= Number of branches, Y3 = Capital adequacy ratio. The first function is the function of Business per employee (0.850) and Cost of funds (-0.596).

**EIGEN VALUES**

Function	Eigen value	% of Variance	Cumulative %	Canonical Correlation
1	2.450 <sup>a</sup>	88.7	88.7	0.843
2	0.312 <sup>a</sup>	11.3	100.0	0.488

The eigen value for the first function is very high when compared to the second function (Table 10). The first function describes 88.7 percent of variance among banks. The eigen value for the second function is very less and it describes only the remaining 11.3 percent of variance. To understand more about discriminant function, canonical correlation is used. The canonical correlation measures the association between the discriminant functions and the 8 determinants. The canonical correlation between the first function and 8 determinants are very high but canonical correlation for the second function is only 0.488 but that itself is significant enough to describe the existence of relationship. As already stated, the first function describes about 88.7 percent of the variance in efficiency among banks. This means that these three segments differ significantly in Business per employee and Cost of funds.

**WILKS LAMBDA**

Test of	Wilks'	Chi-	df	Sig.

Function(s)	Lambda	square		
1 through 2	0.221	80.802	16	0.000
2	0.762	14.543	7	0.042

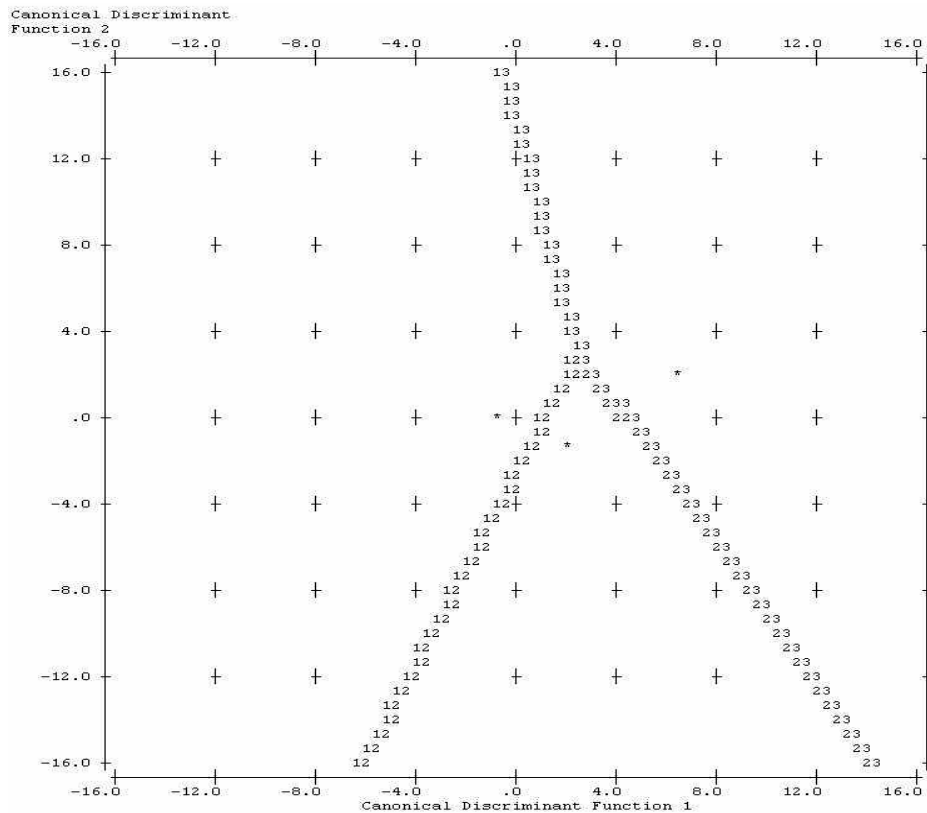
Table 11 contains Wilks' lambda, the chi-square, its degrees of freedom and its significance level. The small values of Wilks' lambda indicate strong group differences among mean values of 8 determinants. The significance value of 0.000 indicates that the group differences are significant

### **TERRITORIAL MAP**



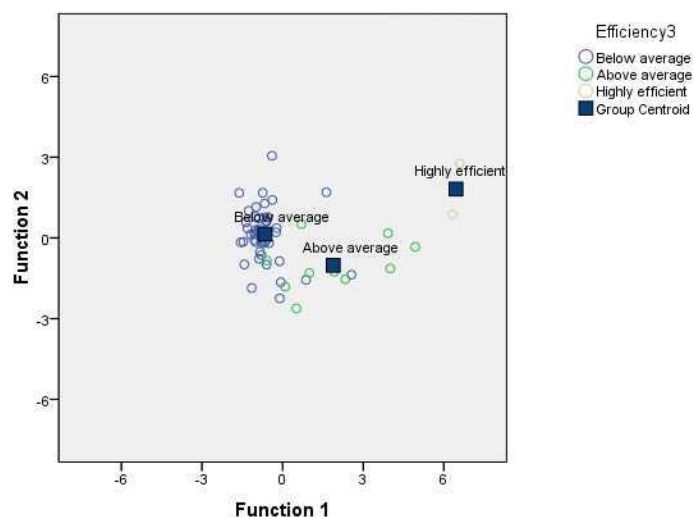
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From the territorial map (Figure 1) it is clear that function one distinguishes between segments one (below average) and two (above average) and also two (above average) and three (highly efficient). Hence, function one explains 88.7 percent of variance among banks. The discriminant function two distinguishes between first group and third group only.

**CANONICAL DISCRIMINANT FUNCTIONS**



The discriminant diagram (Figure 2) shows that three segments are different groups having clear demarcation and the segments differ mainly on function one. Hence, it can be inferred that the characteristics of three segments are different with respect to their determinants.

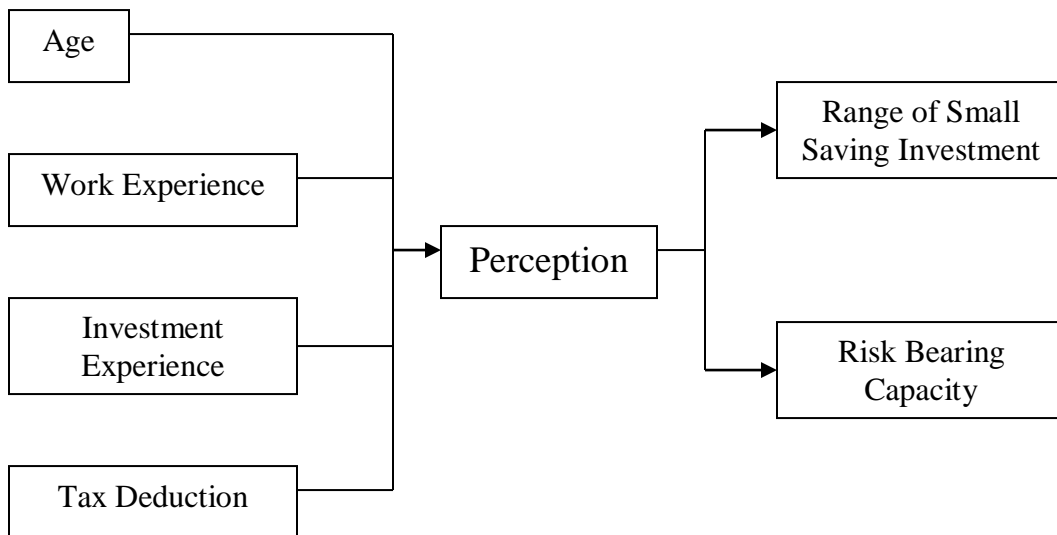
### **STEP WISE DISCRIMINANT ANALYSIS**

Step wise discriminant analysis is used to find out the most significantly influencing variable. In the procedure, instead of Enter independents together, Use stepwise method should be selected.

By using correspondence analysis and analysis of variance, it is stated that age, experience and tax payment have influence on determining perception of an individual. Now it is necessary to find out which is the most significantly influencing variable on perception from the age, experience and tax payment. For this purpose step wise discriminant function can be used. Age, experience and tax payment are the independent variable and perception cluster is the dependent variable.

### **Perception towards Small Saving**

**PERCEPTION TOWARDS SMALL SAVING**



As there are three clusters in perception two discriminant functions can be developed to study the level of perception of investors.

**STRUCTURE MATRIX**

	Function	
	1	2
Experience	0.908*	-0.419
Tax Deduction	0.791*	0.539
Age	0.634*	-0.332

Though two functions can be formed, one function is a redundant function here because the entire three variables are highly loaded in the first function itself. The discriminant function which can be formed from the above structure matrix is  $Z_1 = 0.908 * \text{Experience} + 0.791 * \text{Tax deduction} + 0.634 * \text{Age}$ .

#### VARIABLES IN THE ANALYSIS

Step		Tolerance	F to Remove
1	Experience	1.000	4.219

Though all the three are important variables, it is necessary to know, which is the most important discriminating variable that decides the level of perception of individual. This can be identified by using stepwise discriminant analysis. The discriminant analysis shows that experience is the only important discriminating factor.

#### VARIABLES NOT IN THE ANALYSIS

Step		Tolerance	Min. Tolerance	F to Enter	Wilks' Lambda
0	Age	1.000	1.000	2.088	0.991
	Experience	1.000	1.000	4.219	0.983
	Tax Deduction	1.000	1.000	3.393	0.986
1	Age	0.494	0.494	0.004	0.983
	Tax Deduction	0.759	0.759	1.646	0.976

To begin with, all the three variables will not be included for the analysis and in the first step, experience is taken for analysis and other two are not included for the

analysis. The analysis is over with the first step itself. This means that experience is the only discriminating variable.

- 7

## FACTOR ANALYSIS

### **PURPOSE:**

Factor analysis is a technique that is used to reduce a large number of variables into fewer numbers of factors. Factor analysis extracts maximum common variance from all variables and puts them into a common score.

### **ASSUMPTION:**

- Factor analyses assume that there is no outlier in data.
- In factor analysis, the case must be greater than the factor.
- Factor analysis is an interdependency technique. There should not be perfect multicollinearity between the variables.
- Factor analysis is also based on linearity ASSUMPTION. Non-linear variables can also be used.
- Interval data are assumed for factor analysis.

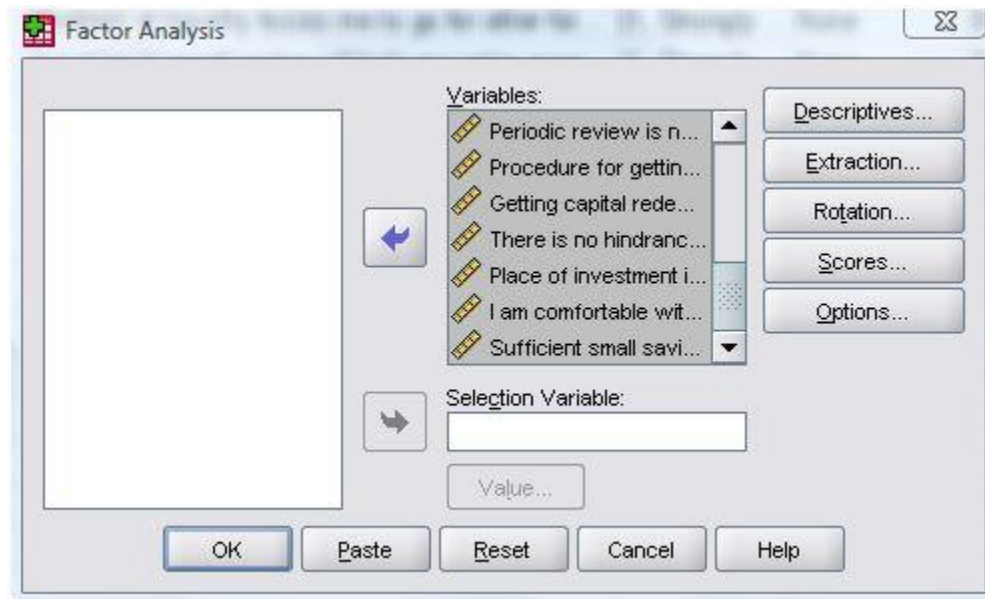
### **PROCEDURE:**

STEP1: Open the database, say factor data.

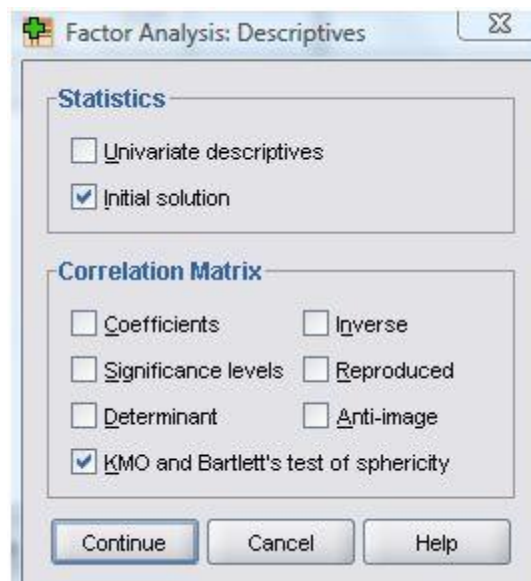
STEP2: To run a principal components factor analysis,

Analyze---->data reduction---->Factor

STEP3: The factor analysis dialogue box appears



STEP: 4 select the variables that are to be factored.



STEP: 5 click descriptive-----> select KMO AND BARTLETT'S TEST.

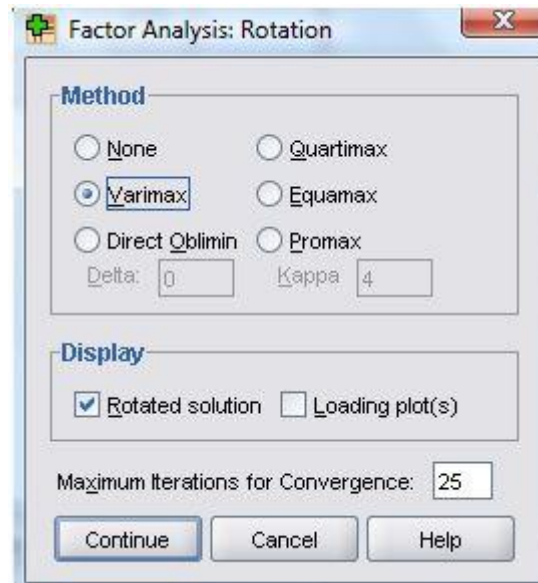
STEP: 6 Click Continue.

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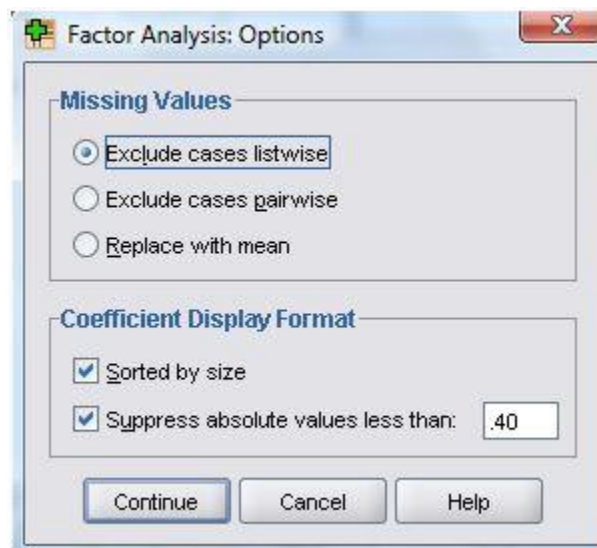
---

STEP:7 Click extraction-----> If required select no of factor.

STEP: 8 Click Continue.



STEP: 9 Click rotations-----> select varimax rotation.



STEP: 9 Click options-----> select Sorted by size varimax and Suppress absolute value less than .40

STEP: 10 Click Continue.

STEP: 11 Click Ok.

The investors use several criteria to evaluate an investment instrument. Here, for the purpose of study 19 commonly used criteria were taken. The criteria were presented in the form of statements with five point Likert scale to collect opinion from investors. The factor analysis has been used to reduce the data collected on 19 variables into smaller number of manageable variables by exploring common dimensions existing among the variables.

### KMO AND BARTLETT'S TEST

<b>KMO and Bartlett's Test</b>		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.873
Bartlett's Test of Sphericity	Chi-Square	3.783E3
	df	171
	Sig.	.000

High value of KMO ( $0.873 > .05$ ) of indicates that a factor analysis is useful for the present data. The significant value for Bartlett's test of Sphericity is 0.000 and is less than .05 which indicates that there exist significant relationships among the variables (Table-1). The resultant value of KMO test and Bartlett's test indicate that the present data is useful for factor analysis.

### Total Variance Explained



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	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.147	32.352	32.352	6.147	32.352	32.352	4.326	22.771	22.771
2	1.859	9.784	42.137	1.859	9.784	42.137	2.218	11.676	34.447
3	1.398	7.356	49.492	1.398	7.356	49.492	2.075	10.920	45.367
4	1.158	6.093	55.585	1.158	6.093	55.585	1.941	10.218	55.585
5	.943	4.966	60.550						
6	.906	4.769	65.319						
7	.894	4.706	70.025						
8	.791	4.164	74.189						
9	.678	3.570	77.759						
10	.584	3.075	80.834						
11	.567	2.982	83.816						
12	.490	2.578	86.394						
13	.483	2.544	88.938						
14	.455	2.394	91.332						
15	.442	2.329	93.661						

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16	.352	1.854	95.515						
17	.320	1.686	97.201						
18	.278	1.462	98.663						
19	.254	1.337	100.000						

Extraction Method: Principal Component Analysis.

The next step in the process is to decide about the number of factors to be derived. The rule of thumb is applied to choose the number of factors for which 'Eigen values' with greater than unity is taken by using Principal Component Analysis method. The Component matrix so formed is further rotated orthogonally using Varimax rotation algorithm which is the standard rotation method (Kaiser, 1958). All the statements are loaded on the four factors.

**Rotated Component Matrix**

	Component			
	1	2	3	4
There is no hindrance in getting information about small saving schemes	.782			
Sufficient small saving schemes are available to meet my requirement	.767			
Place of investment in small savings is conveniently located	.762			
I am comfortable with service provided by agents and post offices	.761			
Procedure for getting regular return is simple in postal schemes	.751			
Getting capital redemption is easy in postal saving	.678			
Small savings involves less procedure while making investment	.542			
Periodic review is not necessary in small saving	.532			
I am investing in small saving because it has protection from Govt		.754		

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I am investing in small saving because there is no risk		.735		
I put money in Small Savings instruments only to save tax		.646		
I am getting good return from small saving instruments			.733	
I prefer small savings because of sentimental value attached to the nations			.659	
Consistency of return is more important than earning more than market return		.404	.576	
Investing in small saving will help me retire more secure way			.517	
When the equity market is uncertain, I go for small saving schemes				.663
Problem of liquidity forces me to go for other form of Investment				.650
If there is any capital loss in any other investment then I will switch over to Small saving securities				.640
I prefer long term investment over short term investment				.574

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

A Rotation converged in 6 iterations.

The total variance accounted for, by all the four factors with Eigen value greater than 1 is 55.58 percent and the remaining variance is explained by other variables. Among the four factors, the first factor accounts for around 22 percent of variance which is the prime criteria considered by any investor while evaluating an investment instrument

**The statements are converted into 4 factors using factor analysis.**

**The following 8 statements are converted into a single factor. (12-19)**

- Sufficient small saving schemes are available to meet my requirement
- There is no hindrance in getting information about small saving schemes

- Place of investment in small savings is conveniently located
- I am comfortable with service provided by agents and post offices
- Procedure for getting regular return is simple in postal schemes
- Getting capital redemption is easy in postal saving
- Small savings involves less procedure while making investment
- Periodic review is not necessary in small saving

**The following 3 statements are converted into a single factor. (1, 4, 5)**

- I am investing in small saving because it has protection from Govt
- I am investing in small saving because there is no risk
- I put money in Small Savings instruments only to save tax.

**The following 4 statements are converted into a single factor. (2, 3, 8, 11)**

- I am getting good return from small saving instrument
- I prefer small savings because of sentimental value attached to the nations
- Consistency of return is more important than earning more than market return
- Investing in small saving will help me retire more secure way

**The following 4 statements are converted into a single factor. (6, 7, 9, 10)**

- When the equity market is uncertain, I go for small saving schemes
- Problem of liquidity forces me to go for other form of Investment
- If there is any capital loss in any other investment then I will switch over to  
Small saving securities
- I prefer long term investment over short term investment

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The four factor components are christened as Convenience, Risk protection, Return and Liquidity based on the statements loaded under each factor. The descriptions of these four factors with labels and factor loadings for various statements included as variables are given in the tables 4,5,6 and 7. Table 3 gives particulars about number of people who are interested (have agreed upon) and not interested (have disagreed upon) for every investment criteria.

**FACTORS AND VARIANCE EXPLAINED**

S. No	Criteria	% Preferred	Mean Value	% Variance Explained
1	Convenience	61%	3.5	22.771
2	Risk Protection	67%	3.7	11.676
3	Return	44%	3.2	10.920
4	Liquidity	29%	3.1	10.218

**Narayanan**

Depending upon the relationship among the variables, the variables can be grouped. For the purpose of grouping Factor analysis is performed. As KMO (Kaiser-Meyer-Olkin Measure of Sampling Adequacy) value is 0.694 and significant value in Bartlett's test is 0.00, Factor analysis can be performed for the taken variables.

<b>MO and Bartlett's Test</b>	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.694

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Bartlett's Test of Sphericity	Approx. Chi-Square	1.219E3
	Df	36
	Sig.	.000

**Total Variance Explained**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
	1	3.446	38.289	38.289	3.446	38.289	38.289	3.124	34.714
2	2.555	28.394	66.682	2.555	28.394	66.682	2.709	30.102	64.817
3	1.073	11.920	78.602	1.073	11.920	78.602	1.241	13.785	78.602
4	.876	9.733	88.335						
5	.547	6.078	94.414						
6	.222	2.465	96.878						
7	.182	2.025	98.904						
8	.097	1.073	99.977						
9	.002	.023	100.000						

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The factor analysis result shows that the nine Fulmer variables can be grouped into three variables. If the nine variables are reduced into three then the total variance explained is 78 percent which is very significant. This means that the nine variables can be reduced into two variables.

<b>Component Matrix<sup>a</sup></b>			
	Component		
	1	2	3
Debt / Total Assets	-.866		
Working Capital / Total Debt	.813		
Log EBIT / Interest	.805	.514	
Sales / Total Assets	.775		
Log Tangible Total Assets	-.635	.417	
Retained Earnings / Total Assets		.933	
Current liabilities / Total Assets		-.928	
Net Income before Taxes (EBIT) / Equity			.642
Cash Flow / Total Debt	.517		.624

<b>Rotated Component Matrix<sup>a</sup></b>	
	Component

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	1	2	3
Log EBIT / Interest	.924		
Working Capital / Total Debt	.901		
Sales / Total Assets	.895		
Current liabilities / Total Assets		-.925	
Retained Earnings / Total Assets		.922	
Log Tangible Total Assets		.675	
Debt / Total Assets	-.597	.674	
Cash Flow / Total Debt			.735
Net Income before Taxes (EBIT) / Equity			.640

The rotated component matrix shows that variables V9, V8 and V2 can be grouped into first factor and variables V6, V1 and V7 and V5 can be grouped into second factor and V4 and V3 can be put under third factor. The multidimensional scaling has also given the same result. As the variables within the group are related, the number of variables can be eliminated by taking one from one group. From the group one V9 can be taken which is



EBIT/ Interest. V9 is very important variable because repaying capacity is mainly depends upon interest coverage ratio (EBIT/Interest). In the group two V6 can be retained which is calculated by Current Liabilities/ Total Assets. From the third group V4 (Cash Flow/ Total Debt) can be taken. V9 and V4 are positive because rise in those ratios will have positive impact on solvency whereas V6 is negative because increase in current liabilities will have negative impact on solvency of the firm. The regression analysis is performed to find new eq

## **CORRESPONDENCE**

### **PURPOSE:**

Correspondence analysis is a statistical technique that factors the categorical variable and shows the dimensions or association of the categorical variable to each other.

### **ASSUMPTION:**

**Category assumption:** In correspondence analysis, it is assumed that the discrete data has many categories.

**Negative values:** In correspondence analysis, negative value is not considered.

**Continuous data:** In correspondence analysis, discrete data is used. If we are using continuous data, then the data must be categorized into range.

### **HYPOTHESIS:**

Null hypothesis H<sub>0</sub>- There is no significant association between two category variables.

Alternate hypothesis H1- There is significant association between two category variables.

**PROCEDURE:**

STEP 1: Open the database, say REINC-RETOTSA.

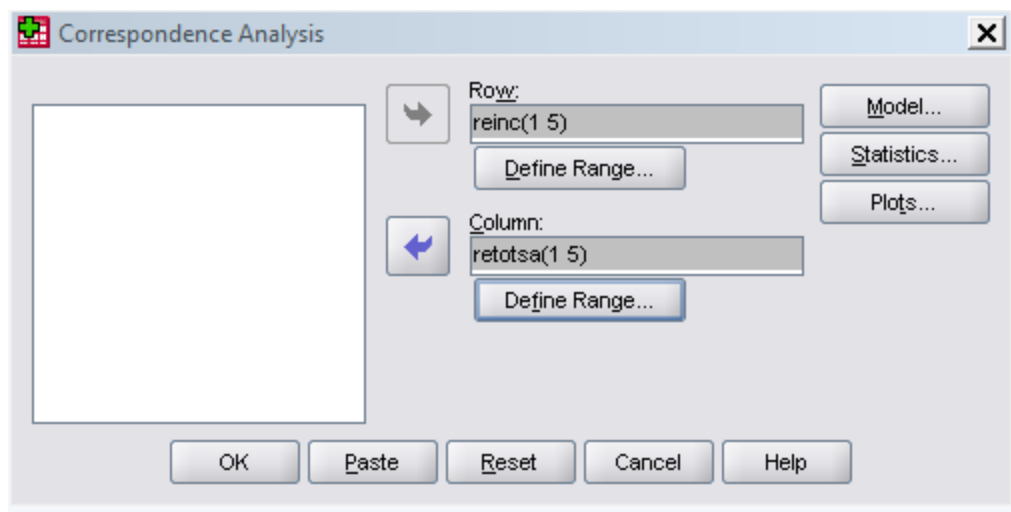
STEP 2: To run a cross tab analysis, from the menu choose:

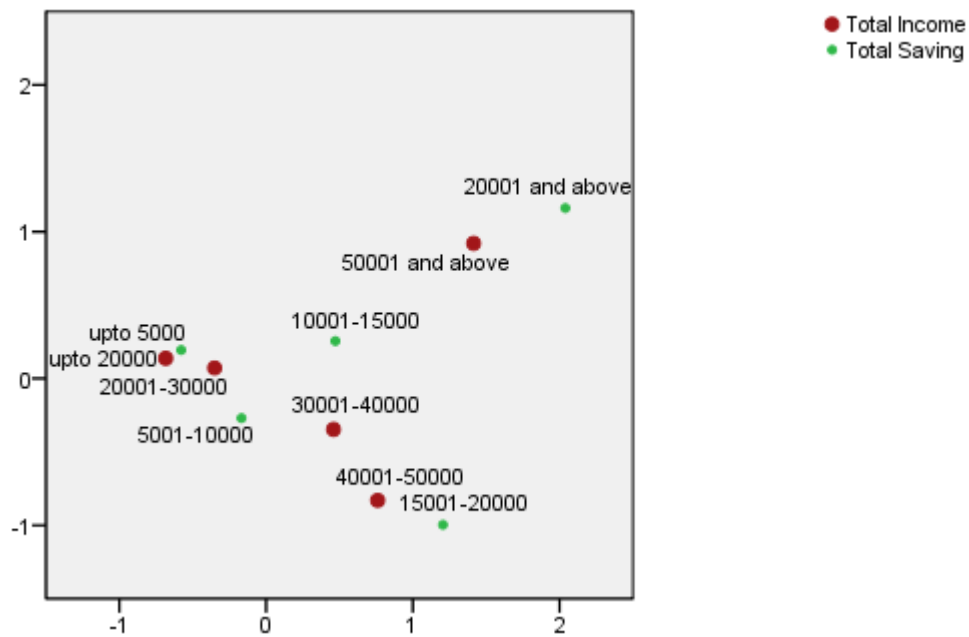
Analyze----->Data reduction----->correspondence analysis

STEP 3: The correspondence analysis dialog box appears as below

STEP 4: Select reinc as the row value and define its range depending upon the number of categories that it has.

STEP 5: select retotsa as the column value and define its range depending upon the number of categories that it has.





The correspondence diagram illustrates that people who have higher level of income group and their respective saving is high. people who have low level of income group and their respective saving is low

## OPTIMAL SCALING

### PROCEDURE:

STEP 1: Open the database, say MERGED.

STEP 2: To run a cross tab analysis, from the menu choose:

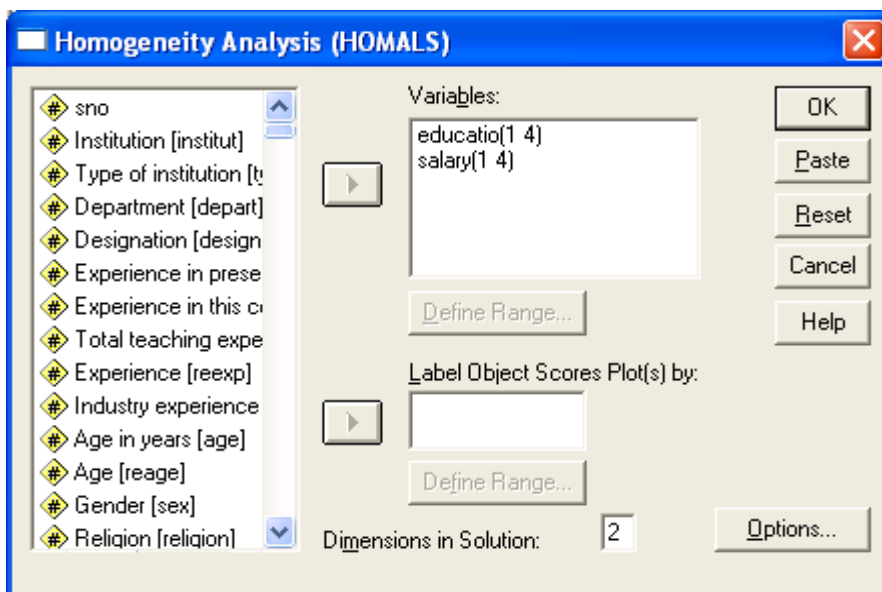
Analyze----->Data reduction----->optimal scaling

STEP 3: Click define

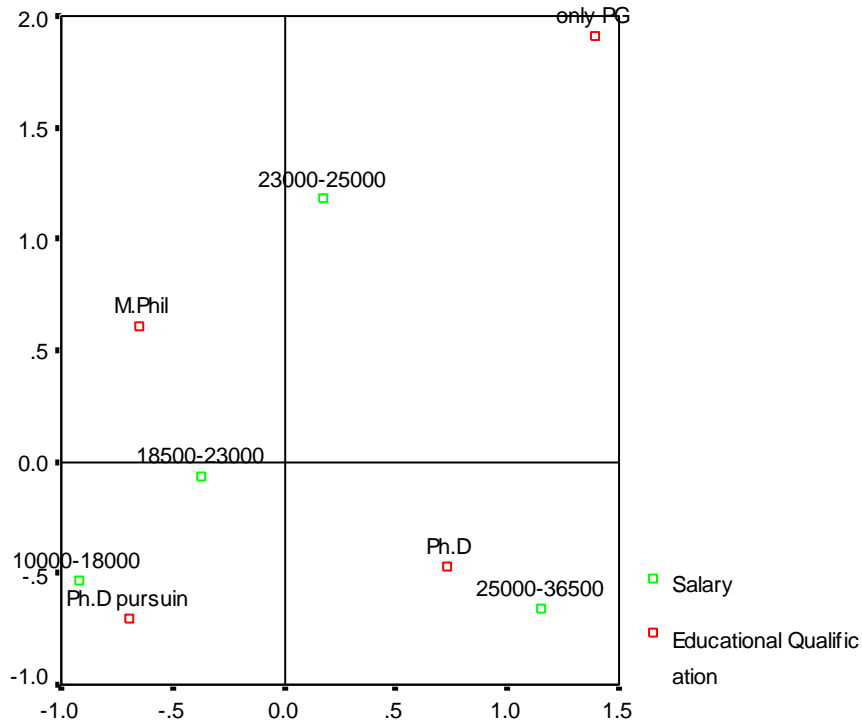
STEP 4: The optimal scaling dialog box appears as below

STEP 5: Select education and salary as the variables and define their range based on the number of category that each variable has.

STEP 5: Click ok.



**Optimal scaling:**



In the above optimal scaling diagram the educational qualifications and salary are grouped. It shows the relation between the various educational qualifications and the salary that is earned by people having that educational qualification.

## **MULTI DIMENSIONAL SCALING**

**PURPOSE:**

In general, the goal of the analysis is to detect meaningful underlying dimensions that allow the researcher to explain observed similarities or dissimilarities (distances) between the investigated objects.

**PROCEDURE:**

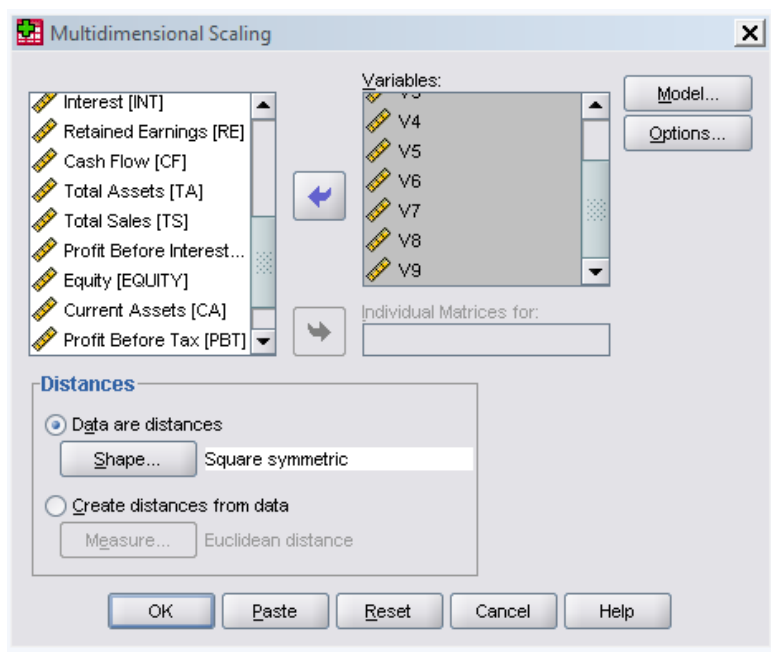
STEP 1: Open the database, say Narayanan.

STEP 2: To run a cross tab analysis, from the menu choose:

Analyze----->scale----->multi dimensional scaling

STEP 3: The multi dimensional scaling dialog box appears as below

STEP 4: select the various saving forms as the variables.



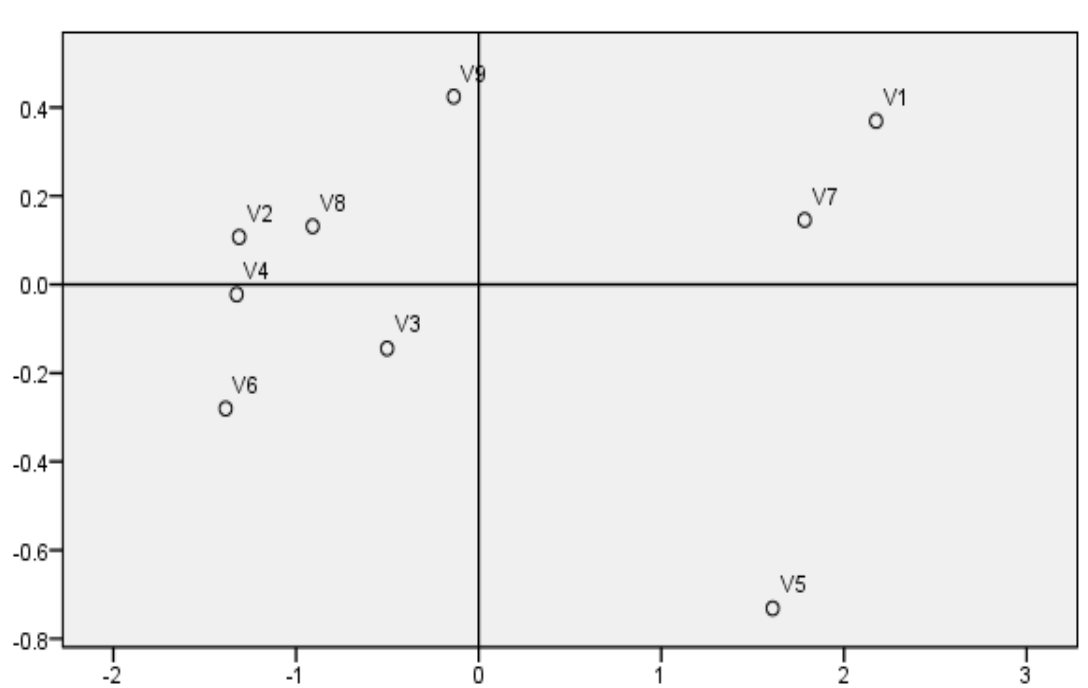
STEP 5: click create distance from data

STEP 6: click measure and fix range 0 to 1 in standardize option and continue

STEP 7: click options and select group plot then continue

STEP 7: click ok.

MULTIDIMENSIONAL SCALING DIAGRAM FOR CRITERIA



Multidimensional scaling diagram shows association among different instruments based on factors considered while choosing different instruments. From the diagram it is clear that v6 and v3, v1 and v7 are similar instruments preferred for similar reasons.

## **CHI-SQUARE**

### **URPOSE:**

The main purpose of using a chi-square test for homogeneity

### **ASSUMPTION:**

- The two variables that are to be applied in chi-square analysis must be of type category.
- The total number of observation used in this test must be large i.e.,  $n \geq 30$ .
- Independence - The observations are always assumed to be independent of each other. This means chi-square cannot be used to test correlated data (like: matched pairs, panel data).

### **HYPOTHESIS:**

Null hypothesis:  $H_0$ - There is no significant association between the two variables.

Alternate hypothesis:  $H_1$ - There is significant association between the two variables.

### **PROCEDURE:**

STEP 1: Open the database, say Alice Current.

STEP 2: To begin the analysis from the menus choose

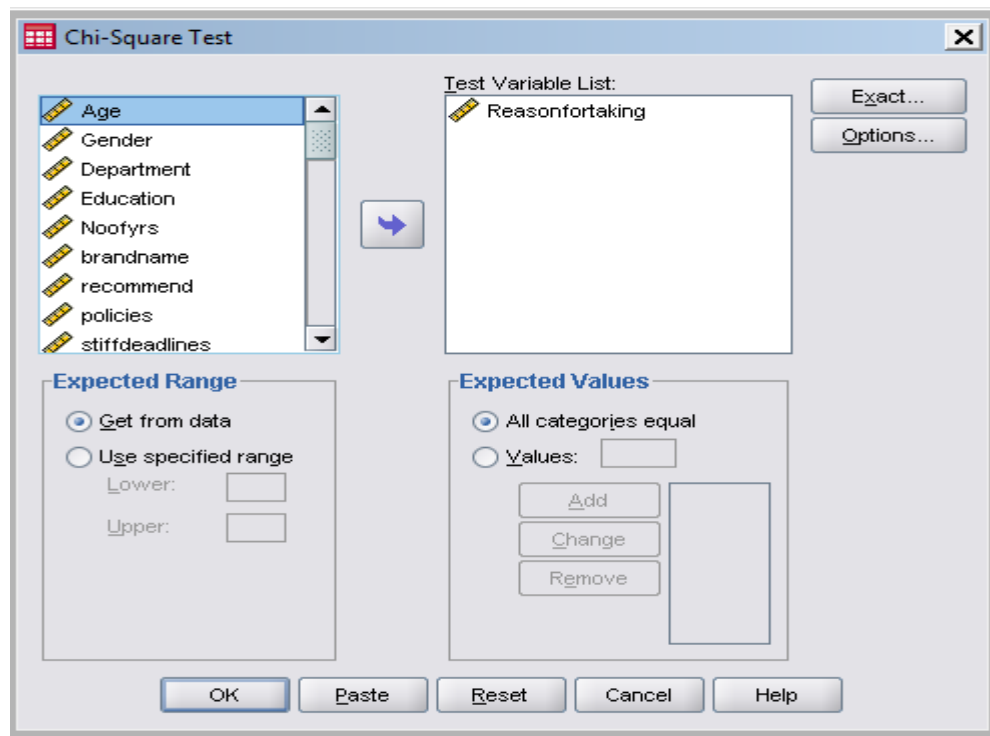
Analyze → Nonparametric Tests → Chi-Square



STEP 3: The chi-square test dialog box appears

STEP 4: Select level of education as test variable

STEP 5: Click ok



<b>Reason for taking</b>			
	Observed N	Expected N	Residual
Pay benefits	7	16.7	-9.7
Designation	5	16.7	-11.7

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Brand Image	3	16.7	-13.7
Career Development	66	16.7	49.3
Job profile	14	16.7	-2.7
Others	5	16.7	-11.7
Total	100		

**Test Statistics**

	Reason for taking
Chi-Square	179.600a
df	5
Asymp. Sig.	.000

Null hypothesis is all reason are equally important for taking a job in a particular company, In test statistics table significant value is less than 0.01 hence null hypothesis is rejected so all reason are not equally important for taking a job in a particular company. From the above table it is clear that career development is important criteria to taking a job in a particular company.

## **KOLMOGROV – SMIRNOV TEST**

### **PURPOSE:**

The Kolmogorov-Smirnov test is used to decide if a sample comes from a population with a specific distribution.

### **HYPOTHESIS:**

Null hypothesis  $H_0$ : The data follow a specified distribution

Alternate hypothesis  $H_1$ : The data do not follow a specified distribution

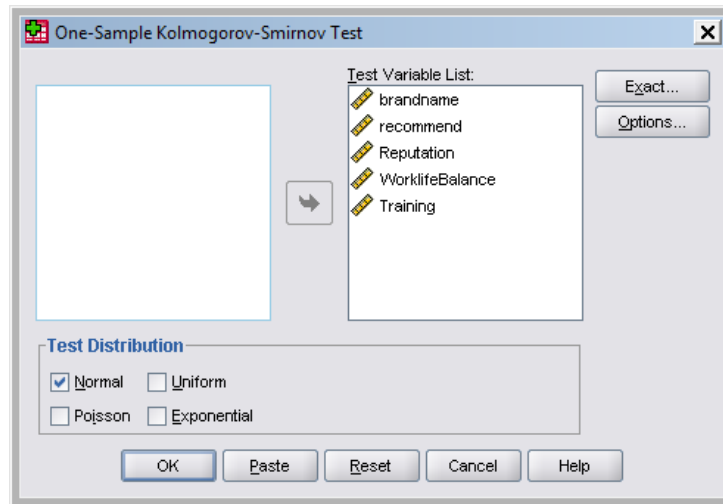
### **PROCEDURE:**

STEP 1: Open the database, say KS.

STEP 2. To begin the K-S, from the menu choose,

*Analyze → Nonparametric Tests → 1-Sample K-S...*

STEP 3: The Kolmogrov-Smirnov test window appears as follows.



- Select the test variable.
- Select Normal as the test distribution.
- Click continues.

STEP 4. Click Ok in the Kolmogorov-Smirnov test dialog box.

**One-Sample Kolmogorov-Smirnov Test**

		Brand name	recommen d	Reputatio n	Work life Balance	Trainin g
N		100	100	100	100	100
Normal Parameters <sup>a</sup>	Mean	3.61	3.53	7.14	17.90	13.35
	Std. Deviation	.863	.969	1.621	2.630	2.672
Most Extreme Differences	Absolute	.244	.256	.162	.125	.112
	Positive	.190	.184	.148	.125	.112

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	Negative	-.244	-.256	-.162	-.088	-.107
Kolmogorov-Smirnov Z		2.443	2.562	1.622	1.249	1.121
Asymp. Sig. (2-tailed)		.000	.000	.010	.088	.162

Kolmogorov-Smirnov test, if the significance value is greater than 0.05 means the test distribution is normal. In the above table work life balance and Training are normal distribution because significant value is greater than 0.05. The distribution of Brand name, recommend and Reputation are not normal distributed because significant value is less than 0.05 hence for these variables we may use nonparametric techniques should be employed to further analyze this variable.

**OTHER NON-PARAMETRIC TEST**

S.no	Non-Parametric tools	Parametric tools
1	Man-Whitney U test	Independent Sample t-test
2	Kruskal –wallis H	ANOVA
3	Wilcoxon	Paired t-test
4	Friedman	Repeated measures ANOVA

## RELIABILITY

### PURPOSE:

Reliability is consistency of a measurement items. A measurement items are high reliability if it produces consistent results under consistent conditions.

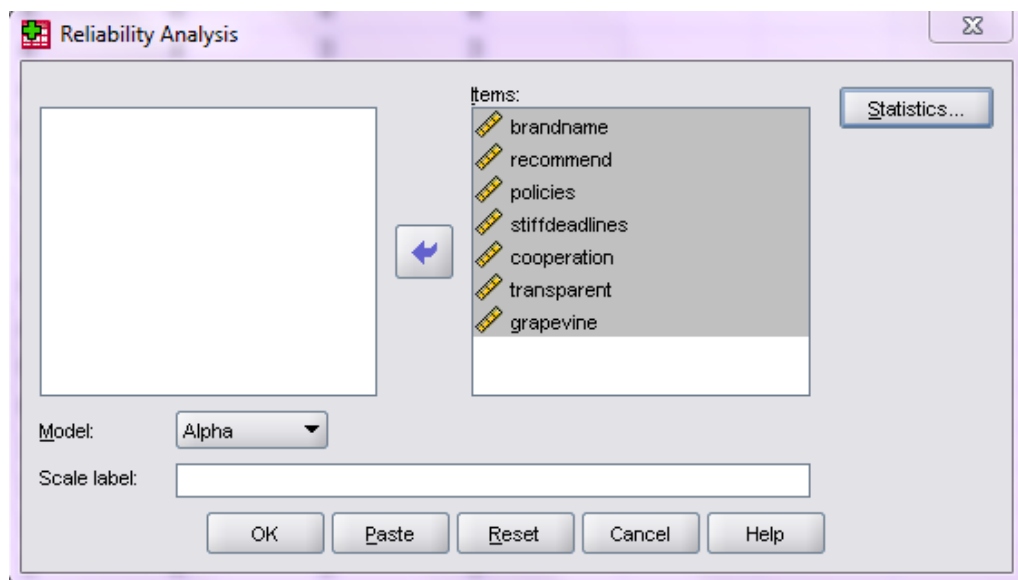
### PROCEDURE:

STEP 1: Open the database, say Alice Current.

STEP 2: To begin the analysis from the menus choose

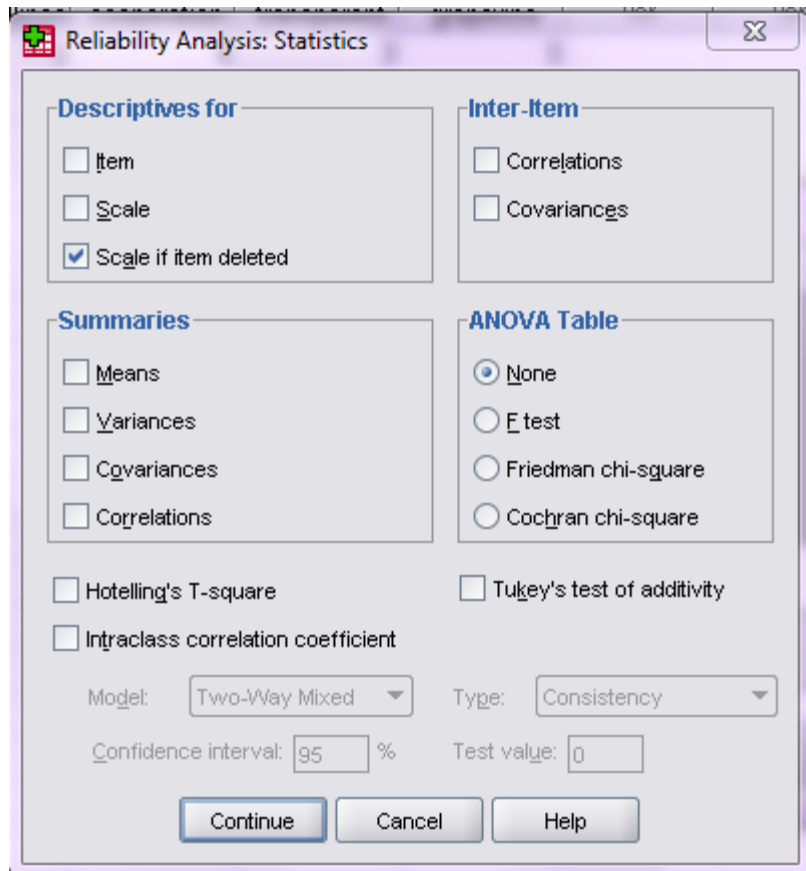
Analyze → scale → Reliability analysis

STEP 3: The reliability analysis dialog box appears



STEP 4: Select measurement variables as items

STEP 5: Select statistics and in descriptive select scale if item deleted



STEP 6: Continue

Before item removed

<b>Reliability Statistics</b>	
Cronbach's	
Alpha	N of Items
.516	7

<b>Item-Total Statistics</b>				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
brandname	21.43	8.672	.293	.461
recommend	21.51	8.212	.316	.448
policies	21.39	8.745	.203	.499
stiffdeadlines	21.83	9.456	.041	.577
cooperation	20.95	8.937	.283	.467
transparent	21.40	8.404	.393	.425
grapevine	21.73	8.199	.310	.450

**After item removed**

<b>Reliability Statistics</b>	
Cronbach's Alpha	N of Items
.577	6

<b>Item-Total Statistics</b>
------------------------------



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---

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
brandname	18.22	6.961	.384	.502
recommend	18.30	6.354	.443	.469
policies	18.18	8.270	.037	.656
cooperation	17.74	7.366	.340	.523
transparent	18.19	6.883	.451	.478
grapevine	18.52	6.899	.309	.535

<b>Reliability Statistics</b>	
Cronbach's Alpha	N of Items
.656	5

<b>Item-Total Statistics</b>				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
brandname	14.57	5.702	.442	.588
recommend	14.65	5.119	.505	.553

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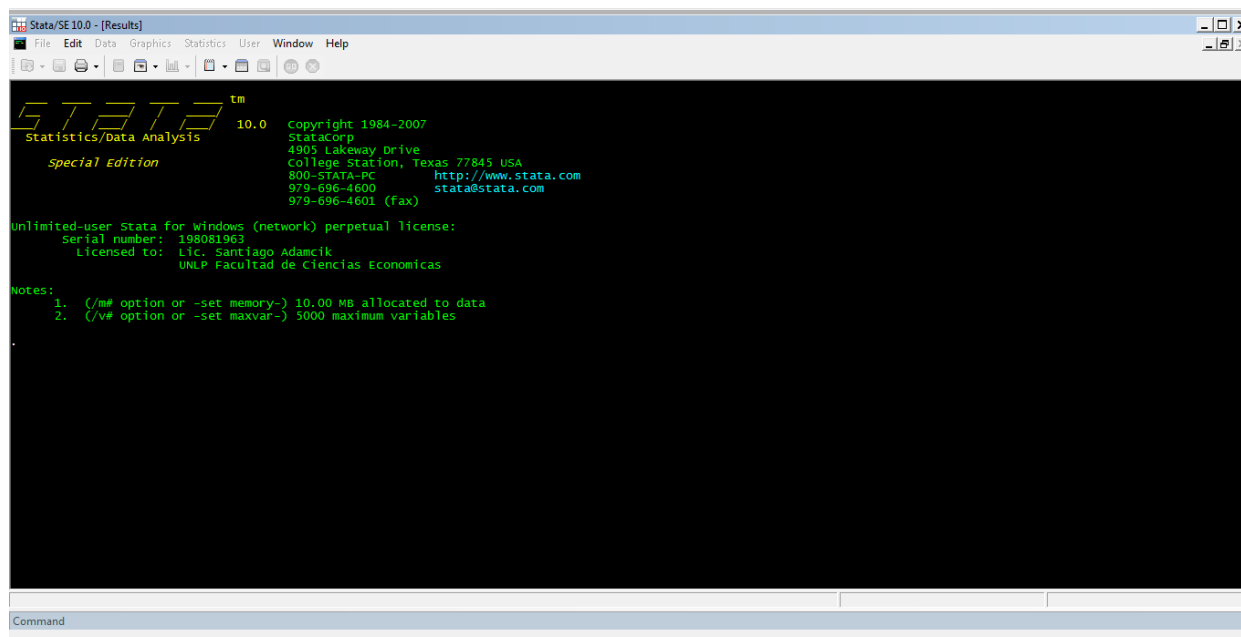
---

cooperation	14.09	6.103	.393	.611
transparent	14.54	5.766	.475	.576
grapevine	14.87	6.054	.259	.679

## CANNONICAL CORRELATION USING STATA

Simple regression can be used when we have one dependent variable and one independent variable and multiple regression can be used when we have one dependent variable and more than one independent variable. If we have more than one dependent variable and more than one independent variable then we can use canonical correlation

1-Click the data in tool bar then data editor



```
Stata/SE 10.0 - [Results]
File Edit Data Graphics Statistics User Window Help
[Icons]
-----
STATA™ 10.0 Copyright 1984-2007
Statistics/Data Analysis StataCorp
Special Edition 4905 Lakeway Drive
College Station, Texas 77845 USA
800-STATA-PC http://www.stata.com
979-696-4600 stata@stata.com
979-696-4601 (fax)

unlimited-user Stata for windows (network) perpetual license:
Serial number: 198081963
Licensed to: Lic. Santiago Adamcik
UNLP Facultad de Ciencias Economicas

Notes:
1. (/m# option or -set memory-) 10.00 MB allocated to data
2. (/v# option or -set maxvar-) 5000 maximum variables

Command
```

2-Copy and paste the data in data editor and click preserve option

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Data Editor

Preserve | Restore | Sort | << | >> | Hide | Delete...

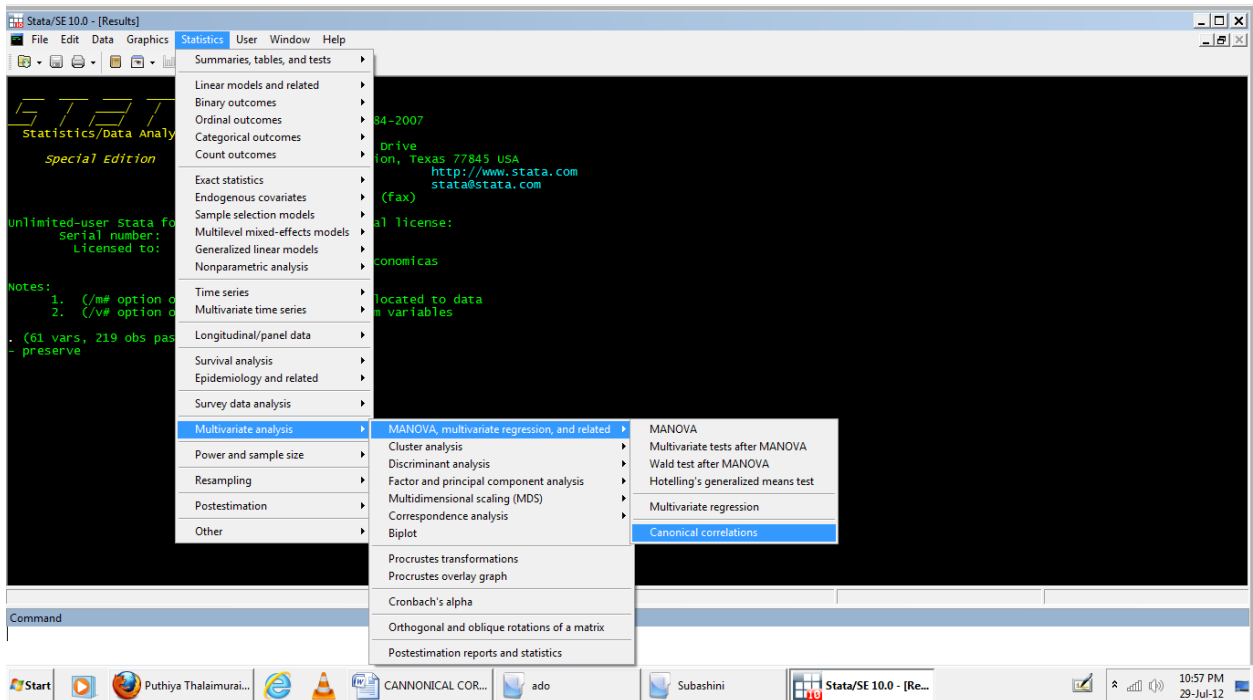
var1[1] = 1

	var1	var2	var3	var4	var5	var6	var7	var8	var9	var10	var11	var12	var13	var14	var15	var16	var17	v
1	1	3	1	3	2	1	0	2	2	1	3	3	18	2	4	1	3	
2	2	3	1	3	2	1	0	2	2	2	3	3	78	4	4	1	2	
3	3	3	1	3	2	1	0	2	2	2	3	3	18	3	5	2	4	
4	4	3	1	3	2	1	0	2	2	2	3	3	18	2	5	1	4	
5	5	3	1	4	2	1	0	2	2	2	4	3	48	1	5	1	1	
6	6	3	1	4	2	1	0	2	2	1	2	3	48	1	4	1	2	
7	7	3	1	4	2	1	0	2	2	1	2	3	68	2	6	3	1	
8	8	3	1	4	2	1	0	2	2	2	3	3	48	2	4	1	3	
9	9	3	1	4	2	1	0	2	2	2	3	3	18	2	5	2	2	
10	10	3	1	4	2	1	0	2	2	2	3	3	5810	3	5	1	4	
11	11	3	1	4	2	1	0	2	2	2	3	3	58	3	4	1	2	
12	12	3	1	4	2	1	0	2	2	1	2	3	48	2	5	1	3	
13	13	3	1	4	2	1	0	2	2	2	3	3	78	2	4	3	3	
14	14	3	1	4	2	1	0	2	2	2	3	3	68	4	4	1	1	
15	15	3	1	4	2	1	0	2	2	2	3	3	48	2	4	1	4	
16	16	3	1	4	2	1	0	2	2	2	3	3	48	3	4	1	1	
17	17	3	1	4	2	1	0	2	2	2	3	3	78	2	4	2	4	
18	18	3	1	4	2	1	0	2	2	2	1	3	48	3	4	2	4	
19	19	3	1	3	2	1	0	3	4	2	3	3	68	2	5	1	2	
20	20	3	1	3	2	1	0	3	4	2	3	3	58	1	4	3	3	
21	21	3	1	3	2	1	0	3	4	1	2	3	18	4	4	3	1	
22	22	3	1	3	2	1	0	3	4	1	2	3	18	2	4	1	1	
23	23	3	1	3	2	1	0	3	4	1	2	3	28	4	4	1	1	
24	24	3	1	3	2	1	0	3	4	2	3	3	78	3	4	3	1	
25	25	3	1	3	2	1	0	3	4	2	3	3	68	1	6	1	4	
26	26	3	1	3	2	1	0	3	4	2	3	3	58	3	4	1	1	
27	27	3	1	3	2	1	0	3	4	2	3	3	258	2	4	1	1	
28	28	3	1	3	2	1	0	3	4	2	3	3	568	1	6	2	2	
29	29	3	1	3	2	1	0	3	4	2	3	3	568	2	4	2	4	
30	30	3	1	3	2	1	0	3	4	2	3	3	56810	4	4	1	3	
31	31	3	1	3	2	1	0	3	4	2	4	3	458	2	4	3	1	
32	32	3	1	3	2	1	1	2	4	2	2	3	458	2	6	3	3	

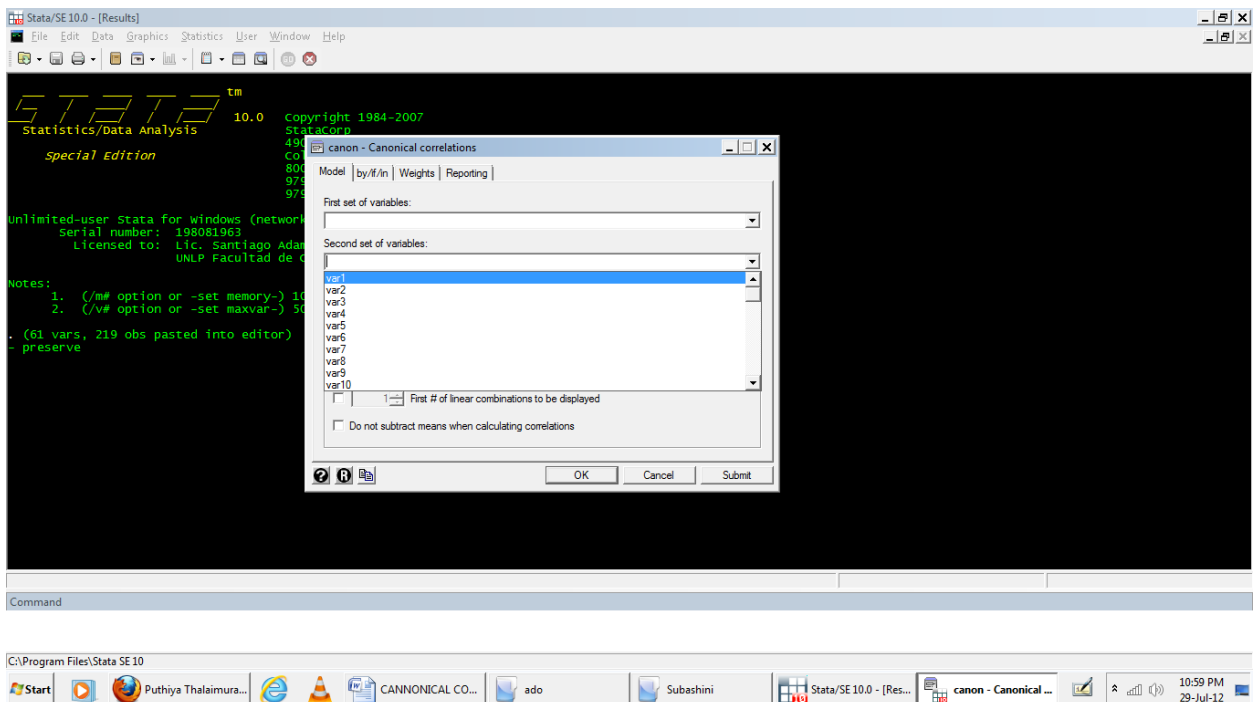
3- Now click statistics → multivariate analysis -> Manova, regression related -> canonical correlation

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4-enter variables in first set of variable and second set variable and finally click ok



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Final analysis out put of canonical correlation in STATA

```

Stata/SE 10.0 - [Results]
File Edit Data Graphics Statistics User Window Help
. - preserve
  canon (var8 var9 var10) (var11 var12)
Linear combinations for canonical correlations          Number of obs =    219
-----

```

		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
u1	var8	.4524282	.1952937	2.32	0.021	.0675228	.8373336
	var9	-.2293853	.0650235	-3.53	0.001	-.3575404	-.1012301
	var10	.557922	.0448128	12.45	0.000	.4696002	.6462438
v1	var11	.6526404	.0685622	9.52	0.000	.5175109	.78777
	var12	-.9744297	.1324145	-7.36	0.000	-1.235406	-.7134532
u2	var8	1.239166	1.172844	1.06	0.292	-1.072398	3.550731
	var9	.6175915	.390501	1.58	0.115	-.1520492	1.387232
	var10	.0714868	.269125	0.27	0.791	-.4589332	.6019067
v2	var11	.5715219	.4117528	1.39	0.167	-.2400041	1.383048
	var12	1.362921	.7952205	1.71	0.088	-.2043835	2.930225

```

(Standard errors estimated conditionally)
Canonical correlations:
  0.6524  0.1419

-----
Tests of significance of all canonical correlations
-----

```

	Statistic	df1	df2	F	Prob>F
wilks' lambda	.562756	6	428	23.7562	0.0000 e
Pillai's trace	.445816	6	430	20.5575	0.0000 a
Lawley-Hotelling trace	.761738	6	426	27.0417	0.0000 a
Roy's largest root	.741187	3	215	53.1184	0.0000 u

```

e = exact, a = approximate, u = upper bound on F
Command

```

### **STRUCTURAL EQUATION MODEL (SEM)**

It contains measurement model and structural model. In measurement model relationship between item and construct is measured. Item means statement. Construct means heading under which the statement is placed. In structural model relationship between two construct is measured.

To perform SEM analysis different software can be used such as LISREL (Linear Structural Relations), AMOS (Analysis of Momentum Structures), PLS (Partial Least Square), EQS (Equations), CALIS etc.

Different estimation techniques (Mathematical Programs) are used to estimate SEM model are MLE-Maximum Likelihood Estimation, OLS-Ordinary Least Square, WLS-Weighted Least Square, GLS- Generalized Least Square etc. MLE is considered as the most efficient and unbiased estimation technique. But to apply MLE, Data should confirm to normality assumption.

#### **Confirmatory Factor Analysis (CFA).**

CFA is used to find out the statements used are related to the construct. The CFA is otherwise called measurement model because it measures relationship between item and

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construct. CFA is also called as reflective model because the arrow is going from construct to item. CFA can be explained by using following examples

For each of the following statements, please indicate the degree which you are comfortable.

**(SA- Strongly Agree; A- Agree; NAND- Neither Agree nor Disagree; DA- Disagree; SDA- Strongly Disagree)**

1) **Technology**

- a) My bank offers efficient core banking system
- b) My bank has wide spread ATM networks
- c) My bank offers secured net banking services
- d) My bank offers effective Phone banking
- e) My bank offers user friendly services

SA	A	NAND	DA	SDA



2) **Personnel**

- a) The bank has knowledgeable personnel
- b) Front line employees are responsible
- c) Bank executives are courteous towards the  
Customer
- d) Top Management is easily accessible
- e) Personal bankers update the new products
- f) My bank offers prompt service
- g) My bank offers customer friendly environment

SA	A	NAND	DA	SDA

In the above example, Five statements are placed under the construct TECHNOLOGY and seven statements are placed under the construct PERSONNEL. The person who designed the questionnaire may feel that the five statements are relevant to technology which has motivated him to put those five statements under technology. But the respondent may have different perception. Therefore it necessary to check whether those five statements are relevant to technology or not for that purpose CFA is used.

**STRUCTURAL MODEL**

In the structural model, the relationship between constructs is measured. To find out the influence of one statement on another statement the simple regression can be used. But, to find out the influence of one construct on another construct the regression can't be used, because the constructs don't have any values For example in the above

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questionnaire the information are collected only for the statements not for constructs. At the same time the construct can't be treated as additions of all the items (Statements) because some statements are more relevant to constructs than some other items in this cases Structural Equation Model is used.

**1. SUPPLY CHAIN CONCERNS:**

Rate the following supply chain issues that prevent your organization from achieving the full potential of supply chain management?

Please mark your response by rounding off the number

Low	Slightly Low	Moderate	Slightly High	High
1	2	3	4	5

1	Lack of sophisticated information system	1	2	3	4	5
2	Lack of ability in managing Supply chain inventories	1	2	3	4	5
3	Lack of cooperation among supply chain members	1	2	3	4	5
4	Lack of trust among supply chain members	1	2	3	4	5

**2. SUPPLY CHAIN PRACTICES:**

To what extent the following Supply Chain Management (SCM) practices were implemented in your organization?

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Please mark your response by rounding off the number

Not at all Implemented	Somewhat Implemented	Half-way Implemented	Mostly Implemented	Fully Implemented
1	2	3	4	5

1	Close partnership with suppliers	1	2	3	4	5
2	Close partnership with customers	1	2	3	4	5
3	Just in time (JIT) supply	1	2	3	4	5
4	Strategic planning	1	2	3	4	5

**3. SUPPLY CHAIN PERFORMANCE:**

Rate the following supply chain performance of your organization over the past 3 year?

Please mark your response by rounding off the number

Low	Slightly Low	Moderate	Slightly High	High
1	2	3	4	5

1	Improvement in Lead time	1	2	3	4	5
2	Improvement in inventory turns	1	2	3	4	5

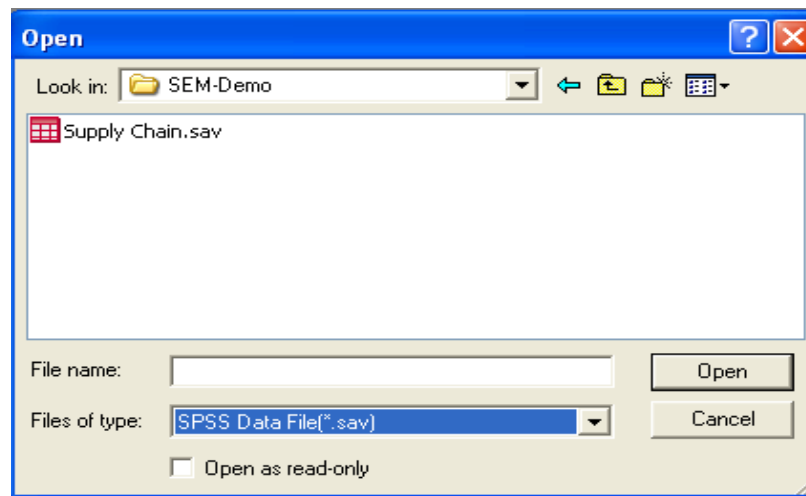
3	Improvement in level of inventory write off	1	2	3	4	5
4	Improvement in Time to market	1	2	3	4	5

In above questionnaire it is clear that there are three constructs namely supply chain concerns, supply chain practices and supply chain performance each constructs having four statements so CFA can be performed if we look at the construct closely

### **USING A PATH DIAGRAM –A MEASUREMENT MODEL**

#### **PROCEDURE:**

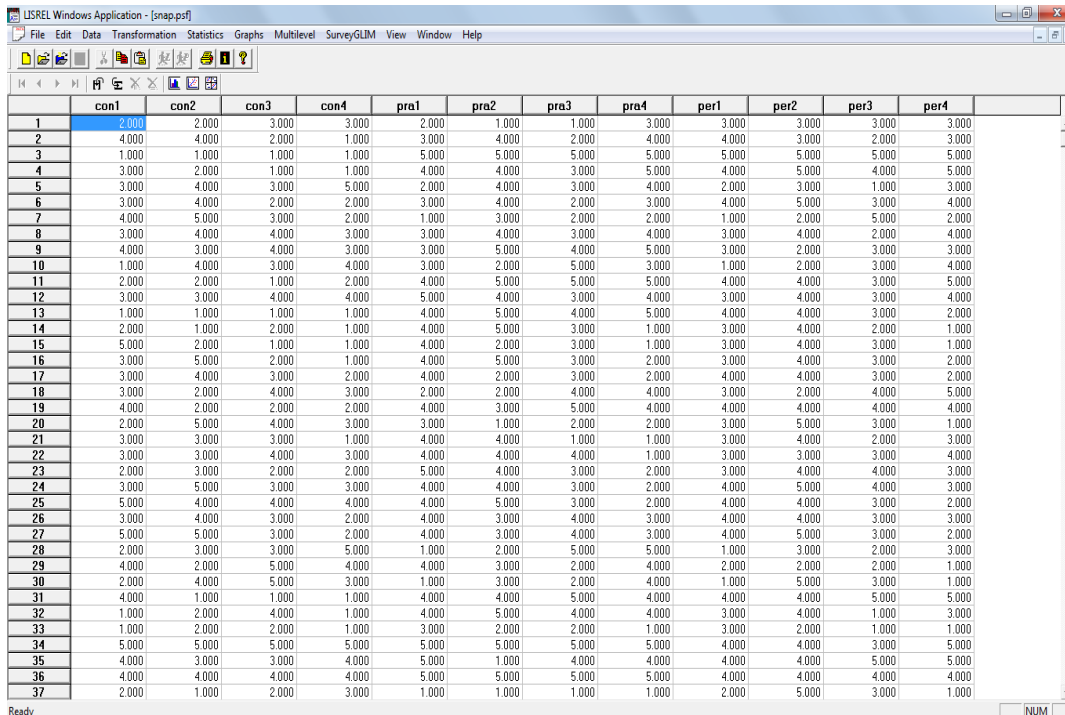
- Use the Import Data option from the File menu of the main window of LISREL for Windows to load the Open dialog box.
- Select the SPSS data file (\*.sav) option from the Files of type drop-down list box.



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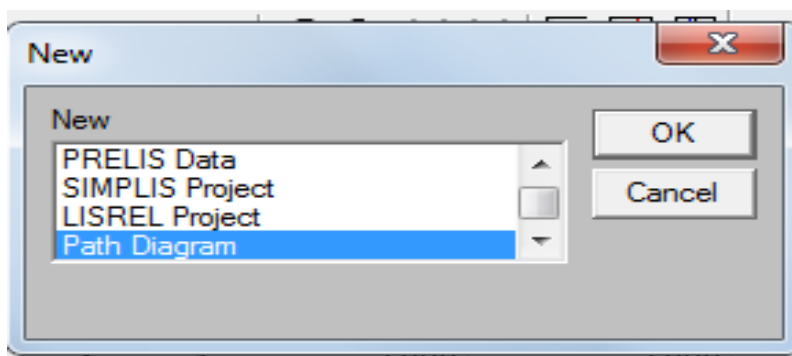
- Browse for the file Supply Chain.sav from SEM-Demo folder and select it.
- Click on the Open button to load the Save As dialog box.
- Enter the name CFA.PSF in the File name .
- Click on the Save button to open the following PSF window.



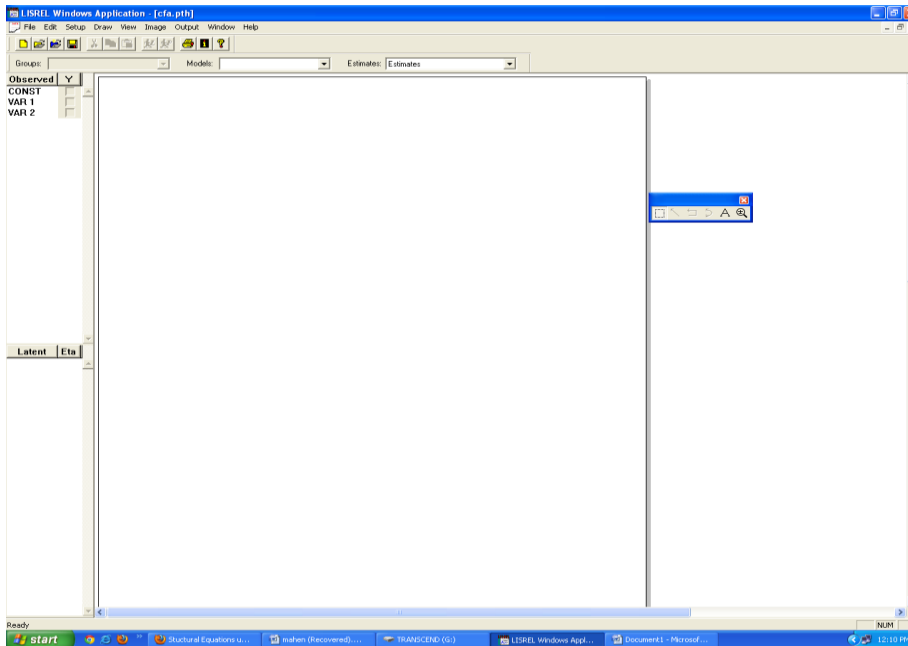
The screenshot shows the LISREL Windows Application interface. The main window displays a data matrix with 37 rows and 13 columns. The columns are labeled con1, con2, con3, con4, pra1, pra2, pra3, pra4, per1, per2, per3, and per4. The data values are numerical, ranging from 1.000 to 5.000. The status bar at the bottom indicates 'Ready' and 'NUM'.

	con1	con2	con3	con4	pra1	pra2	pra3	pra4	per1	per2	per3	per4
1	2.000	2.000	3.000	3.000	2.000	1.000	1.000	3.000	3.000	3.000	3.000	3.000
2	4.000	4.000	2.000	1.000	3.000	4.000	2.000	4.000	4.000	3.000	2.000	3.000
3	1.000	1.000	1.000	1.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000
4	3.000	2.000	1.000	1.000	4.000	4.000	3.000	5.000	4.000	5.000	4.000	5.000
5	3.000	4.000	3.000	5.000	2.000	4.000	3.000	4.000	2.000	3.000	1.000	3.000
6	3.000	4.000	2.000	2.000	3.000	4.000	2.000	3.000	4.000	5.000	3.000	4.000
7	4.000	5.000	3.000	2.000	1.000	3.000	2.000	2.000	1.000	2.000	5.000	2.000
8	3.000	4.000	4.000	3.000	3.000	4.000	3.000	4.000	3.000	4.000	2.000	4.000
9	4.000	3.000	4.000	3.000	3.000	5.000	4.000	5.000	3.000	2.000	3.000	3.000
10	1.000	4.000	3.000	4.000	3.000	2.000	5.000	3.000	1.000	2.000	3.000	4.000
11	2.000	2.000	1.000	2.000	4.000	5.000	5.000	5.000	4.000	4.000	3.000	5.000
12	3.000	3.000	4.000	4.000	5.000	4.000	3.000	4.000	3.000	4.000	3.000	4.000
13	1.000	1.000	1.000	1.000	4.000	5.000	4.000	5.000	4.000	4.000	3.000	2.000
14	2.000	1.000	2.000	1.000	4.000	5.000	3.000	1.000	3.000	4.000	2.000	1.000
15	5.000	2.000	1.000	1.000	4.000	2.000	3.000	1.000	3.000	4.000	3.000	1.000
16	3.000	5.000	2.000	1.000	4.000	5.000	3.000	2.000	3.000	4.000	3.000	2.000
17	3.000	4.000	3.000	2.000	4.000	2.000	3.000	2.000	4.000	4.000	3.000	2.000
18	3.000	2.000	4.000	3.000	2.000	2.000	4.000	4.000	3.000	2.000	4.000	5.000
19	4.000	2.000	2.000	2.000	4.000	3.000	5.000	4.000	4.000	4.000	4.000	4.000
20	2.000	5.000	4.000	3.000	3.000	1.000	2.000	2.000	3.000	5.000	3.000	1.000
21	3.000	3.000	3.000	1.000	4.000	4.000	1.000	1.000	3.000	4.000	2.000	3.000
22	3.000	3.000	4.000	3.000	4.000	4.000	4.000	1.000	3.000	3.000	3.000	4.000
23	2.000	3.000	2.000	2.000	5.000	4.000	3.000	2.000	3.000	4.000	4.000	3.000
24	3.000	5.000	3.000	3.000	4.000	4.000	3.000	2.000	4.000	5.000	4.000	3.000
25	5.000	4.000	4.000	4.000	4.000	5.000	3.000	2.000	4.000	4.000	3.000	2.000
26	3.000	4.000	3.000	2.000	4.000	3.000	4.000	3.000	4.000	4.000	3.000	3.000
27	5.000	5.000	3.000	2.000	4.000	3.000	4.000	3.000	4.000	5.000	3.000	2.000
28	2.000	3.000	3.000	5.000	1.000	2.000	5.000	5.000	1.000	3.000	2.000	3.000
29	4.000	2.000	5.000	4.000	4.000	3.000	2.000	4.000	2.000	2.000	2.000	1.000
30	2.000	4.000	5.000	3.000	1.000	3.000	2.000	4.000	1.000	5.000	3.000	1.000
31	4.000	1.000	1.000	1.000	4.000	4.000	5.000	4.000	4.000	4.000	5.000	5.000
32	1.000	2.000	4.000	1.000	4.000	5.000	4.000	4.000	3.000	4.000	1.000	3.000
33	1.000	2.000	2.000	1.000	3.000	2.000	2.000	1.000	3.000	2.000	1.000	1.000
34	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	4.000	4.000	3.000	5.000
35	4.000	3.000	3.000	4.000	5.000	1.000	4.000	4.000	4.000	4.000	5.000	5.000
36	4.000	4.000	4.000	4.000	5.000	5.000	5.000	5.000	4.000	4.000	4.000	4.000
37	2.000	1.000	2.000	3.000	1.000	1.000	1.000	1.000	2.000	5.000	3.000	1.000

- Select the *New* option on the *File* menu to load the *New* dialog box.
- Select the *Path Diagram* option in the *New* list box.

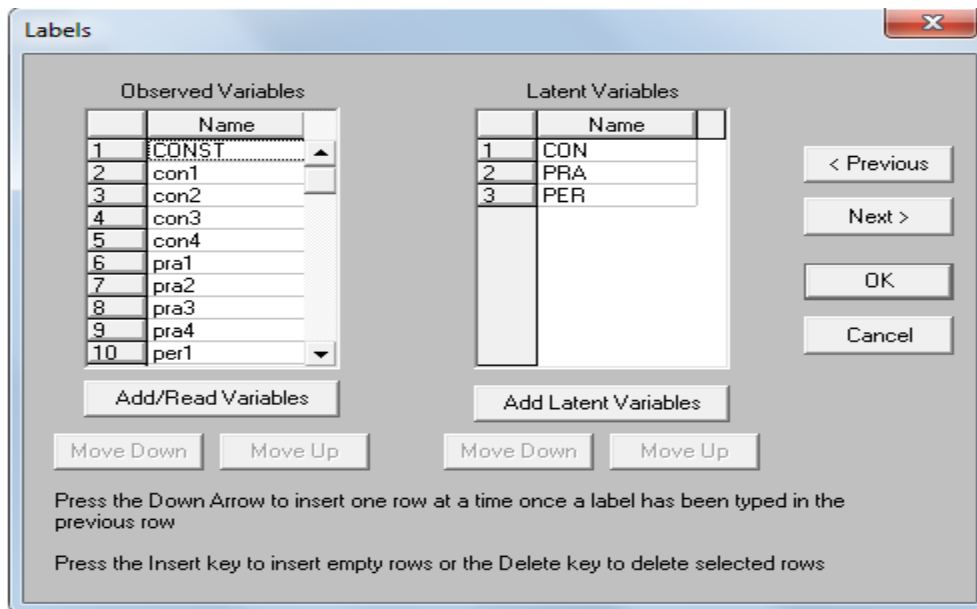


- Click on the *OK* button to load the *Save As* dialog box.
- Enter the name CFA.PTH in the File name string field.
- Click on the Save button to open the empty PTH window for CFA.PTH



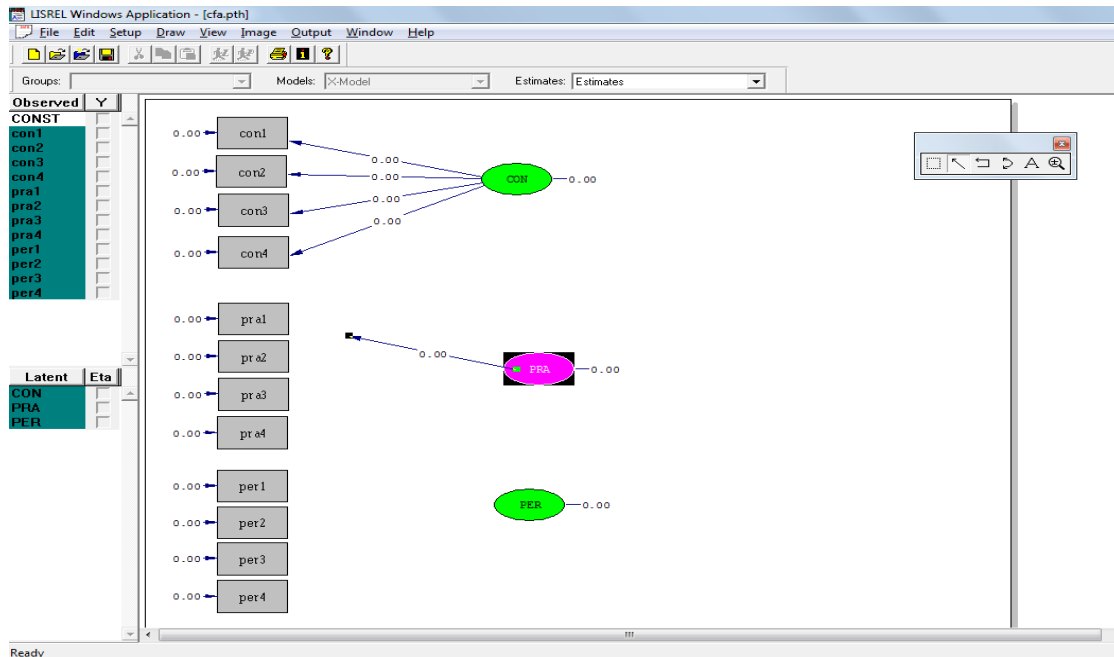
- Select the Variables option on the Setup menu to load the Labels dialog box.
- Click on the Add/Read Variables button to load the Add/Read Variables dialog box.
- Select the PRELIS System File option from the drop-down list box.
- Click on the Browse button to load the Browse dialog box.
- Browse for the file SUPPLY CHAIN.PSF in the SEM subfolder and select it.
- Click on the Open button to return to the Add/Read Variables dialog box.
- Click on the OK button to return to the Labels dialog box.
- Click on the Add Latent Variables button to load the Add Variables dialog box.
- Enter the label CON in the string field.
- Click on the OK button to return to the Labels dialog box.
- Click on the Add Latent Variables button to load the Add Variables dialog box.

- Enter the label PRA in the string field.
- Click on the OK button to return to the Labels dialog box.
- Click on the Add Latent Variables button to load the Add Variables dialog box.
- Enter the label PER in the string field.
- Click on the OK button to produce the following Labels dialog box.
- Click on the OK button to return to the PTH window for SCM.PTH.



- Click, drag and drop the observed variable labels one at a time into the empty PTH window.
- Click, drag and drop the latent variable labels one at a time into the empty PTH window.
- Click on the Arrow button on the drawing toolbar.

→ Click and drag 5 paths from CON to CON 1, CON 2, CON 3 and CON 4.



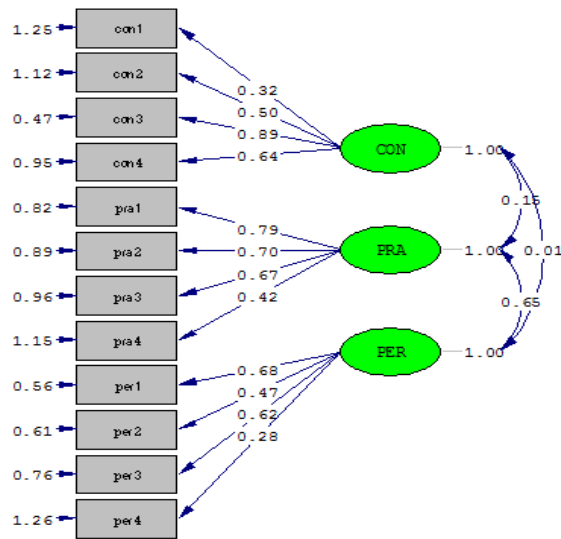
→ Click and drag 4 paths from PRA then PRA 1, PRA 2, PRA 3, and PRA 4.

→ Click and drag 3 paths from PER the PER 1, PER 2, PER 3 and PER 4

→ Click on the Build SIMPLIS Syntax option on the Setup menu to open the SPJ window for SCM.SPJ.

→ Click on the Run LISREL button to produce the following PTH window.





Chi-Square=111.30, df=51, P-value=0.00000, RMSEA=0.068

### RESULTS OF GOODNESS OF FIT TEST FOR SEM

Model	Chi-square Value	Df	Normed Chi-Square	P-Value	GFI	AGFI	CFI	RMESA
Study model	111.30	51	2.18	0.00	0.93	0.90	0.90	0.068
Recommended value			Below 3	> 0.05	> .9	> .9	> .9	< .08

### USING A PATH DIAGRAM –A STRUCTURAL MODEL

#### PROCEDURE:

→ Use the Import Data option from the File menu of the main window of LISREL for Windows to load the Open dialog box.

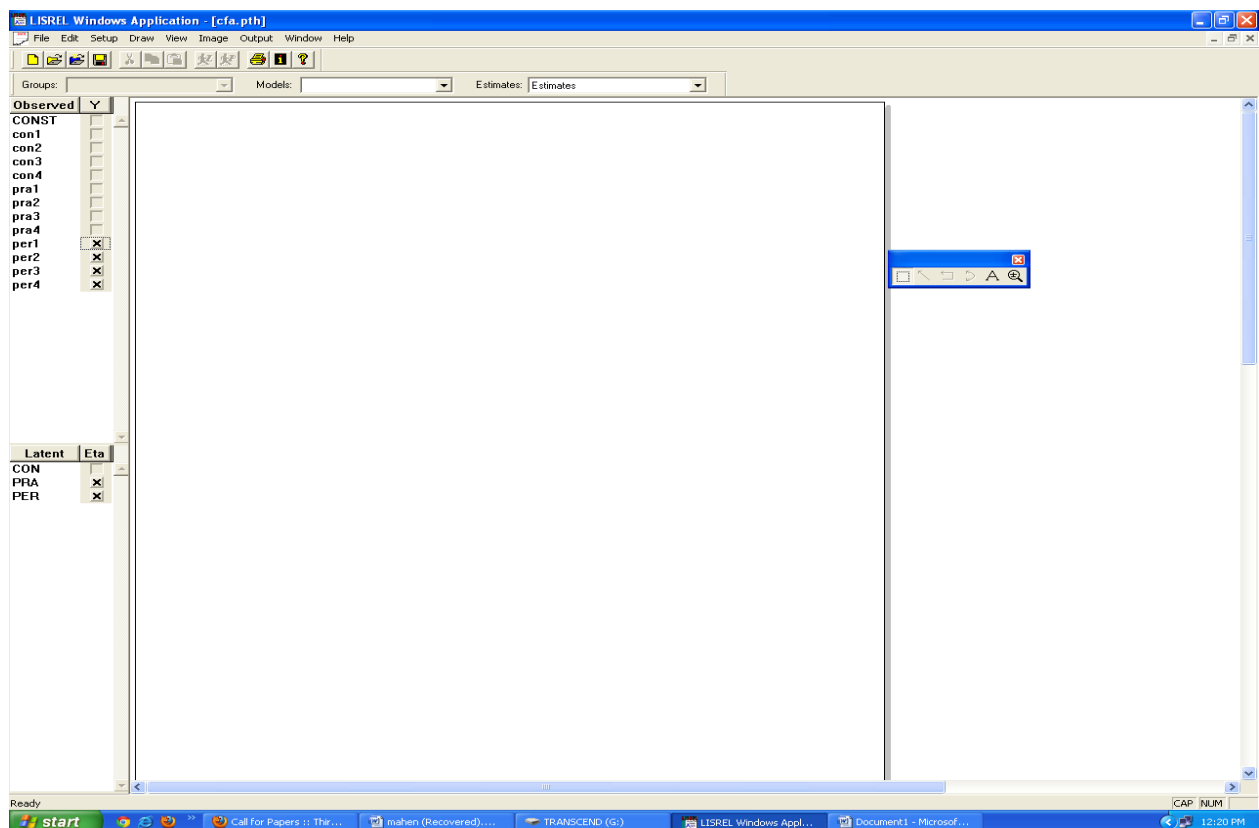
→ Select the SPSS data file (\*.sav) option from the Files of type drop-down list box.

- Browse for the file Supply Chain.sav and select it.
- Click on the Open button to load the Save As dialog box.
- Enter the name SEM.PSF in the File name string field to produce the following dialog box.
- Click on the Save button to open the following PSF window.
- Select the *New* option on the *File* menu to load the *New* dialog box.
- Select the *Path Diagram* option in the *New* list box.
- Click on the *OK* button to load the *Save As* dialog box.
- Enter the name SEM.PTH in the File name string field.
- Click on the Save button to open the empty PTH window for SEM.PTH
- Select the Variables option on the Setup menu to load the Labels dialog box.
- Click on the Add/Read Variables button to load the Add/Read Variables dialog box.
- Select the PRELIS System File option from the drop-down list box.
- Click on the Browse button to load the Browse dialog box.
- Browse for the file SUPPLY CHAIN.PSF in the SEM subfolder and select it.
- Click on the Open button to return to the Add/Read Variables dialog box.
- Click on the OK button to return to the Labels dialog box.
- Click on the Add Latent Variables button to load the Add Variables dialog box.
- Enter the label CON in the string field.
- Click on the OK button to return to the Labels dialog box.
- Click on the Add Latent Variables button to load the Add Variables dialog box.
- Enter the label PRA in the string field.
- Click on the OK button to return to the Labels dialog box.

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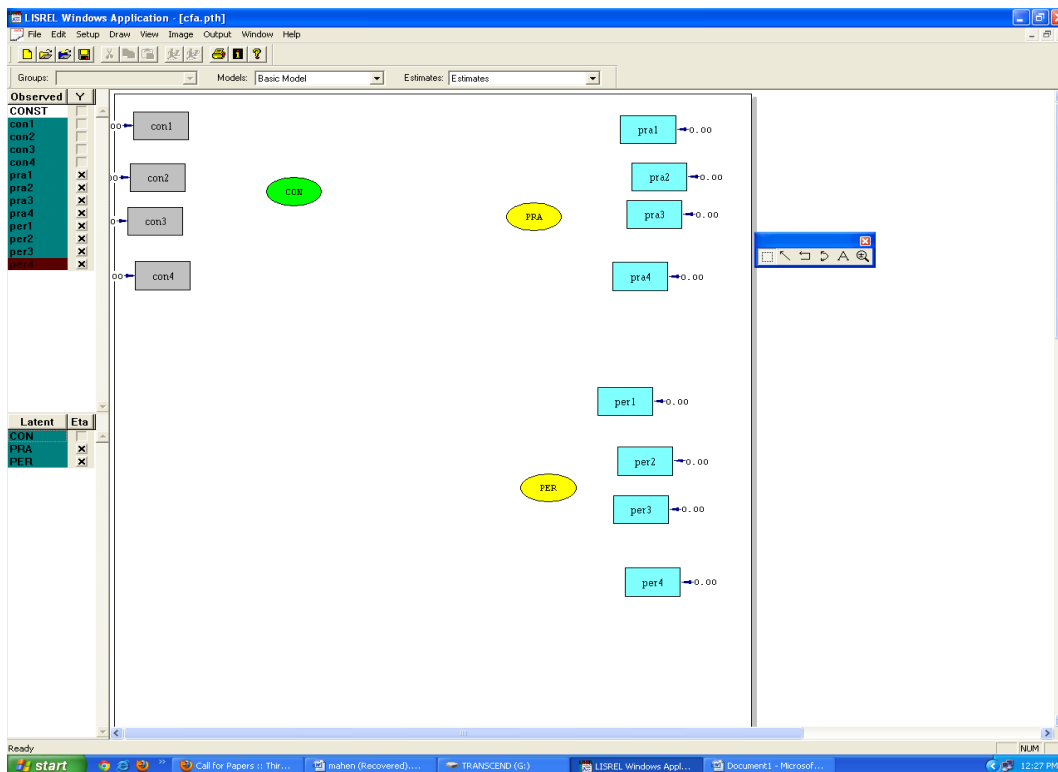
---

- Click on the Add Latent Variables button to load the Add Variables dialog box.
- Enter the label PER in the string field.
- Click on the OK button to produce the following Labels dialog box.
- Click on the OK button to return to the PTH window for SCM.PTH.
- Check the Y observed boxes for all measured items.
- Click the Eta for all boxes of dependent variable that is PRA (PRA to PRA 1, PRA 2, PRA 3, and PRA 4. ) and PER(PER 1, PER 2, PER 3 and PER 4).



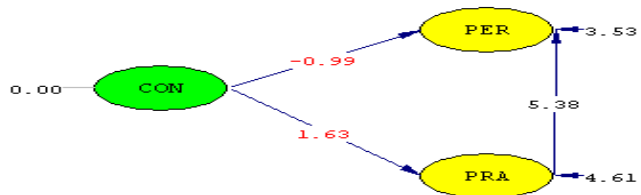
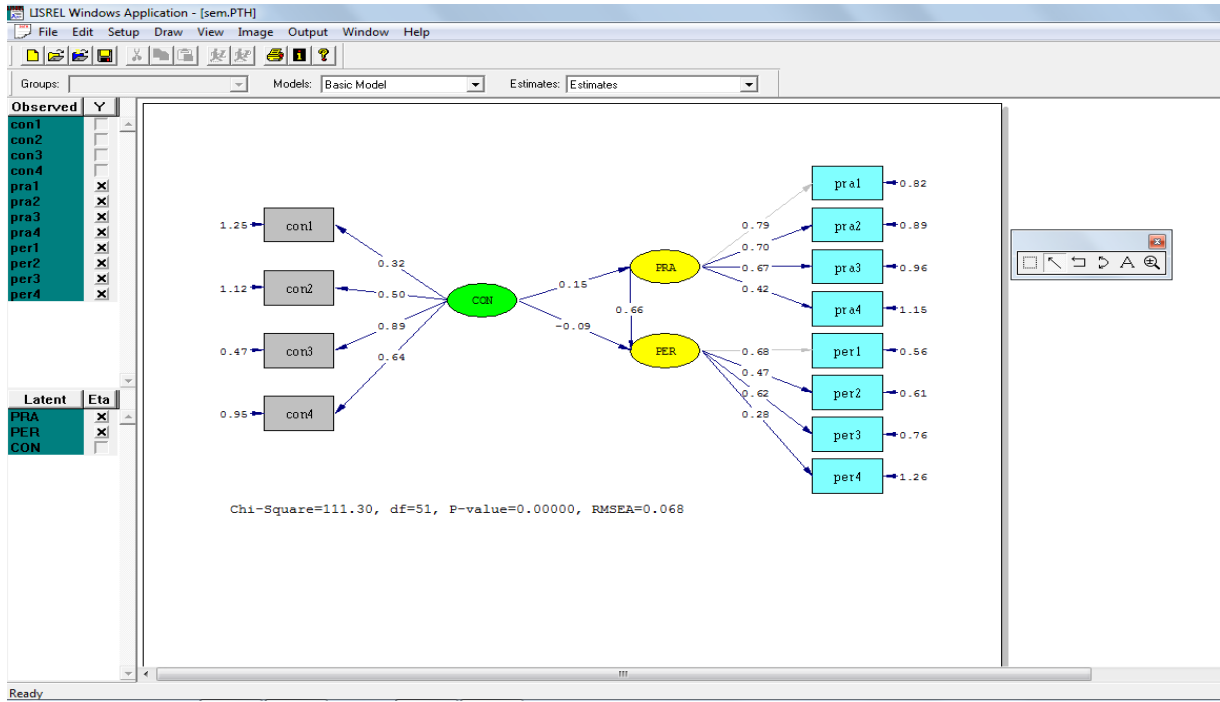
- Click, drag and drop the observed variable labels one at a time into the empty PTH window.
- Click, drag and drop the latent variable labels one at a time into the empty PTH window.

- Click on the Arrow button on the drawing toolbar.
- Click and drag 5 paths from CON to CON 1, CON 2, CON 3, and CON 4
- Click and drag 4 paths from PRA to PRA 1, PRA 2, PRA 3, and PRA 4.
- Click and drag 4 paths from PER to PER 1, PER 2, PER 3 and PER 4.
- Click and drag 2 paths from CON and PRA to PER.
- Click and drag a path from PRA to PER to produce the following PTH window.



- Click on the Build SIMPLIS Syntax option on the Setup menu to open the SPJ window for depress2.SPJ.
- Click on the Run LISREL button to produce the following PTH window.

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Chi-Square=111.30, df=51, P-value=0.00000, RMSEA=0.068

**RESULTS OF SIGNIFICANCE TEST FOR SEM**

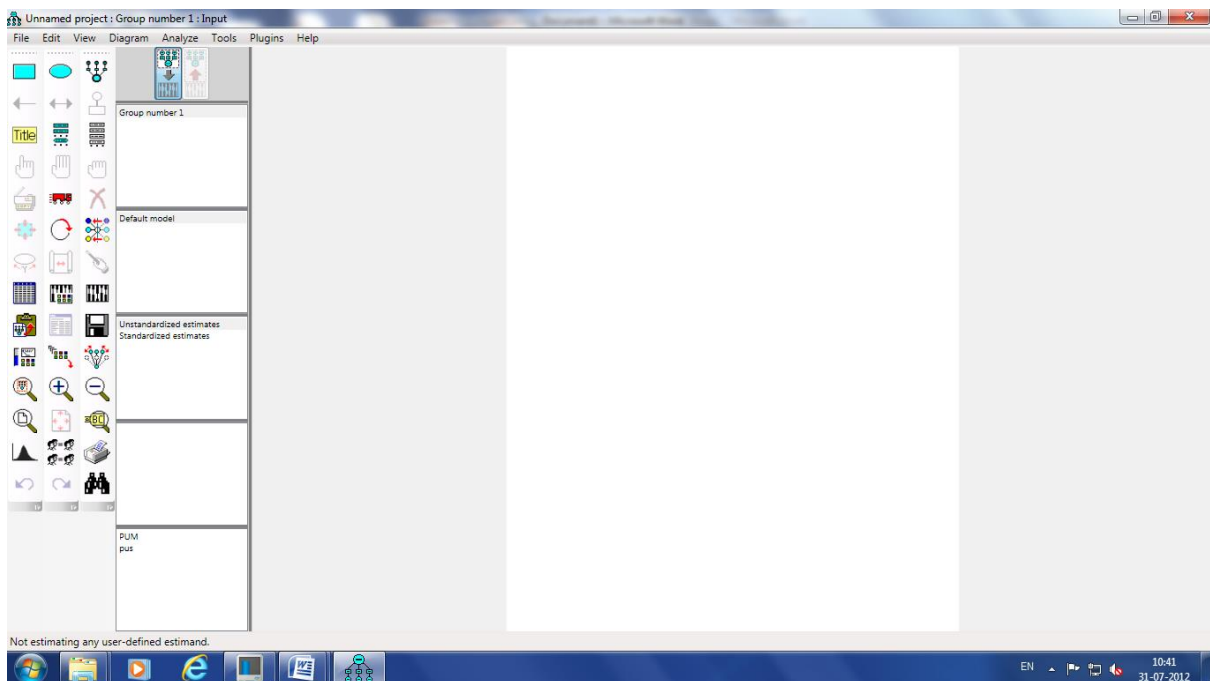
<b>Path</b>	<b>Path Coefficient</b>	<b>t-value</b>	<b>p-value</b>	<b>significant</b>
CON-----PRA	0.16	0.99	Greater than 0.01	NO
CON-----PER	-0.09	1.63	Greater than 0.01	NO
PRA-----PER	0.66	5.38	Less than 0.01	YES

Structural Equation model is used to determine the strength of the relationship between unobserved variables (Latent variables). The above Figure displays the path diagram resulting from the structural modeling analysis from LISREL. The findings for the structural equation model shows that the strength of the relationship between the three latent or unobserved variables, here there is dependence relationship are shown in the diagram. First relationship between Supply Chain Concerns (Exogenous Variable) and Supply chain practices (Endogenous Variable) is 0.16 (Covariance) and it is greater than significant level value. Theoretically, it means that supply chain concerns are not having an impact on supply chain practices. Second relationship between Supply Chain Concerns (Exogenous Variable) and Supply chain performance (Endogenous Variable) is -0.09 (covariance) and it is greater than significant level value. Theoretically, it means that supply chain concerns are not having an impact on supply chain performance and

final relationship between Supply Chain practices (Exogenous Variable) and Supply chain performance (Endogenous Variable) is 0.66 (covariance) and it is less than significant level value . Theoretically, it means that supply chain concerns are having a positive impact on supply chain performance

### **STRUTURAL EQUATION MODEL (SEM)**

The first step is to launch AMOS. Select the Start menu from the Windows taskbar, then select Programs, then choose the AMOS 4 program set, then select AMOS Graphics. You will now see a blank AMOS Graphics diagram page that looks like is:

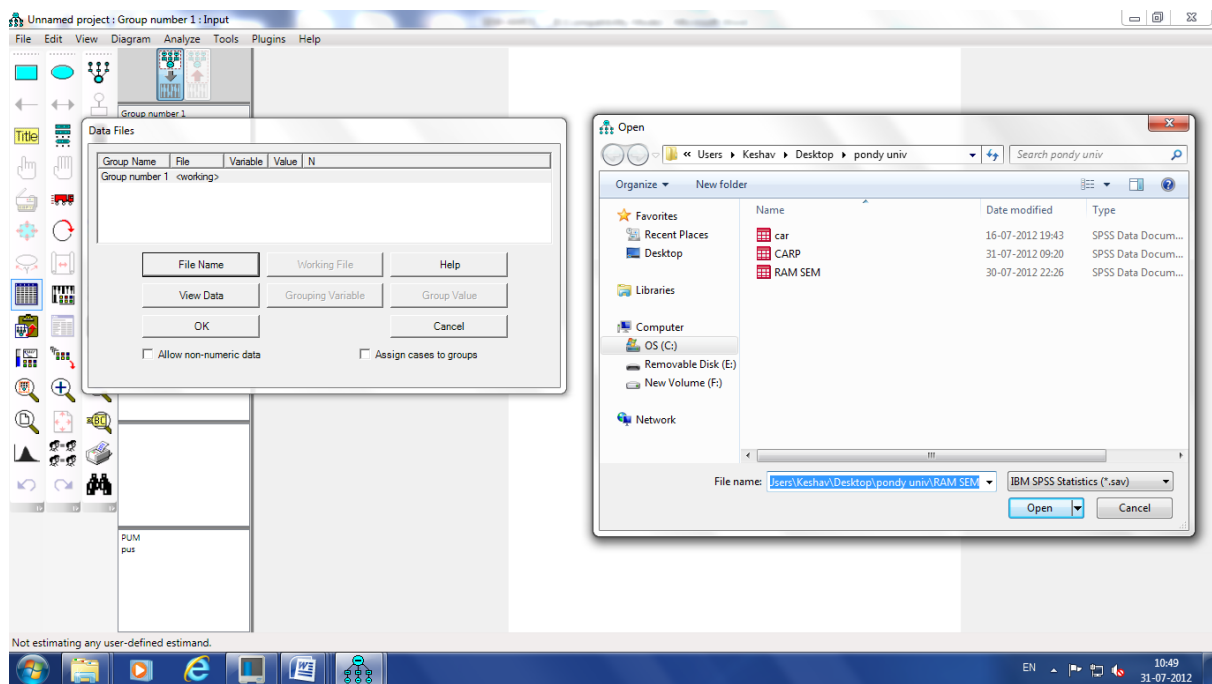


You will also see a floating toolbar appear. The toolbar may partially obscure the AMOS drawing area, but you can move it out of the way by dragging it to the side of your computer screen. Select the toolbar by single-clicking on it with your mouse pointer. If you place your mouse pointer over any tool icon with the toolbar selected, AMOS displays the name and function of the tool.

### **1. MEASUREMENT MODEL STEPS**

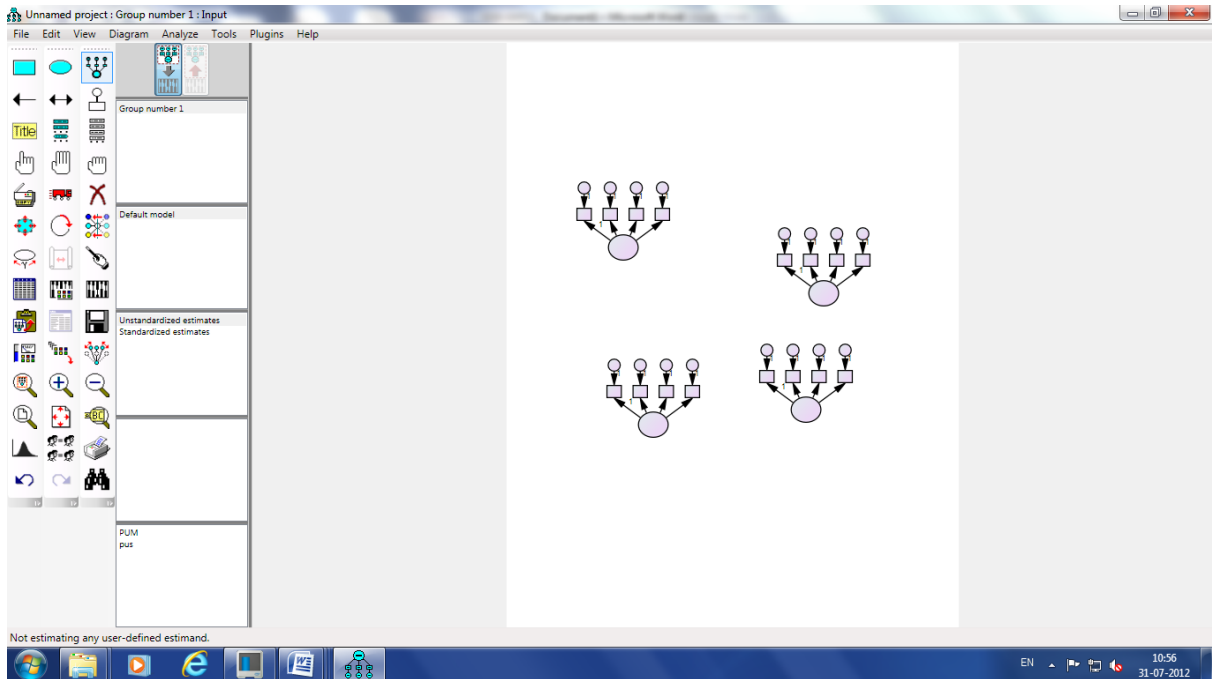
Step 1: Click File → Data File.

Step 2: Click Filename and Select the (RAMSEM.sav) file. Click Open and then OK.

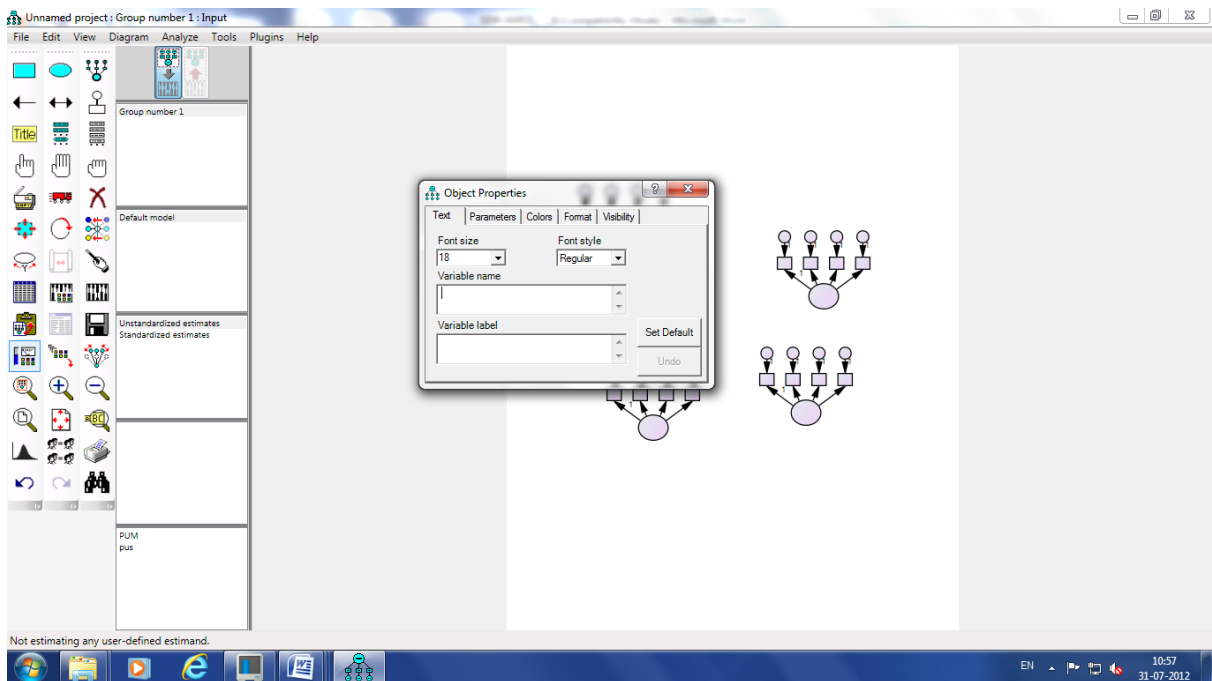


Step 3: Click Diagram → Draw Indicator variables . Click the path diagram screen and click number of times based on the number of measurement Items.





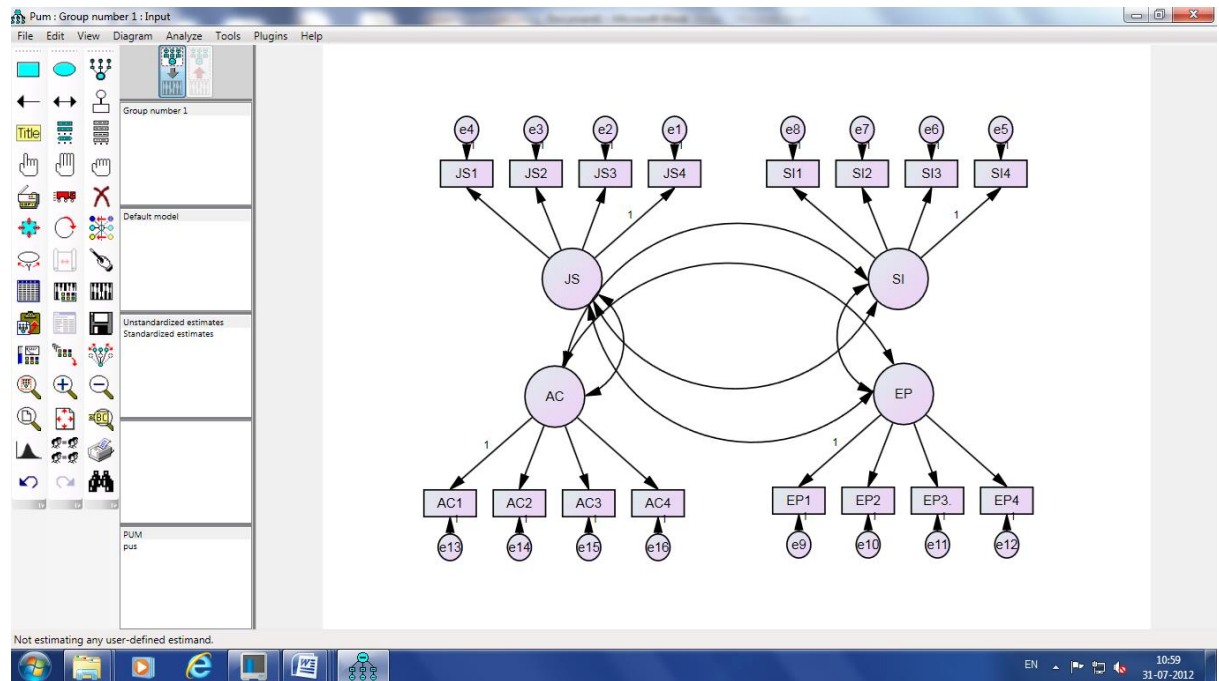
Step 4: Click View → Object Properties and name the unobserved variables.



Step 5: Click View → Variable in Dataset and drag the observed variables to the square boxes in the path diagram.

Step 6: Click View → Object Properties and name the unique variables for all observed variables.

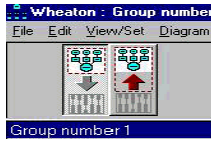
Step 7: Click Diagram → Draw Covariance and connect all the unobserved variables.



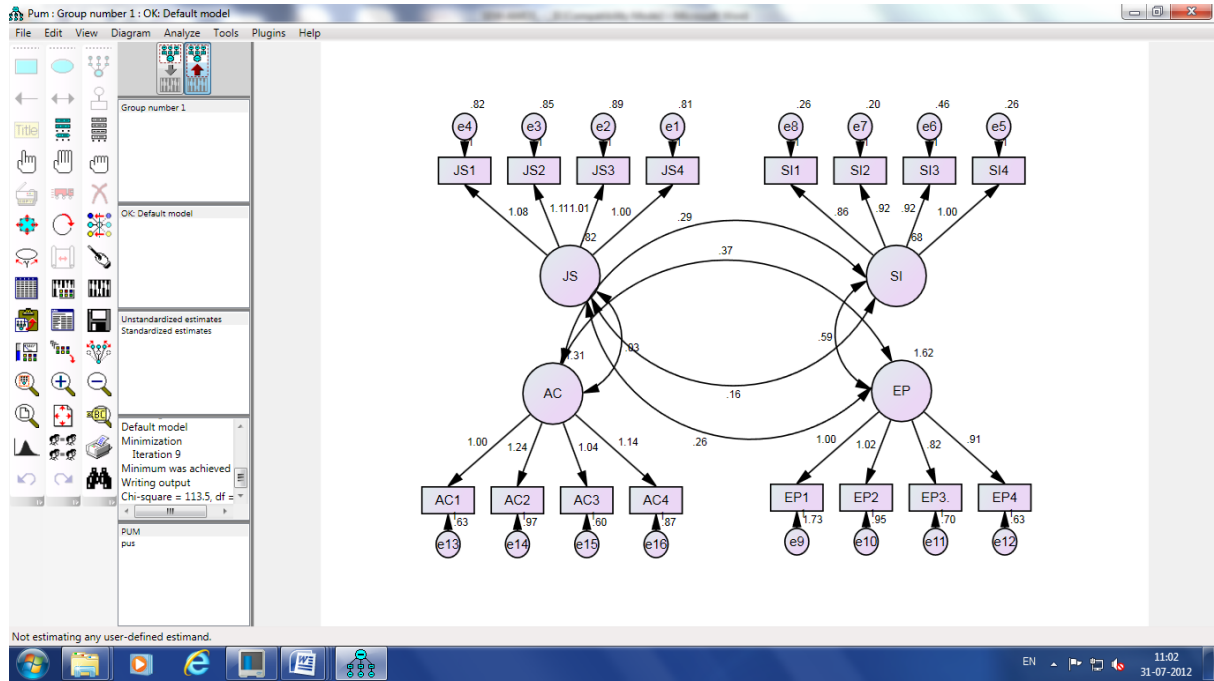
Step 8: Click Analyze → Calculate Estimates.

Step 9: Save the output in a folder.

Step 10: Use the button shown below to generate output path diagram to get the estimate



values.



Click the view text to show the text output

The screenshot shows the Amos Output window for a structural model. The main panel displays the following data:

Estimates (Group number 1 - Default model)					
Scalar Estimates (Group number 1 - Default model)					
Maximum Likelihood Estimates					
Regression Weights: (Group number 1 - Default model)					
		Estimate	S.E.	C.R.	P
JS4	<--- F1	1.000			
JS3	<--- F1	1.010	.086	11.760	***
JS2	<--- F1	1.113	.091	12.257	***
JS1	<--- F1	1.083	.089	12.223	***
SI4	<--- F2	1.000			
SI3	<--- F2	.917	.054	16.906	***
SI2	<--- F2	.917	.044	20.793	***
SI1	<--- F2	.856	.045	19.112	***
EP1	<--- F3	1.000			
EP2	<--- F3	1.023	.073	14.075	***
EP3	<--- F3	.816	.059	13.763	***
EP4	<--- F3	.910	.063	14.384	***
AC1	<--- F4	1.000			
AC2	<--- F4	1.237	.067	18.410	***
AC3	<--- F4	1.036	.055	18.838	***
AC4	<--- F4	1.144	.063	18.203	***

Standardized Regression Weights: (Group number 1 - Default model)	
	Estimate
JS4 <--- F1	.709
JS3 <--- F1	.697
JS2 <--- F1	.738
JS1 <--- F1	.735

## 1. STRUTURAL MODEL STEPS

Step 1: Click File → Data File.

Step 2: Click Filename and Select *the same* file. Click Open and then OK.

Step 3: Click Diagram → Draw Indicator variables. Click the path diagram screen and click based on the number of measurement Items.

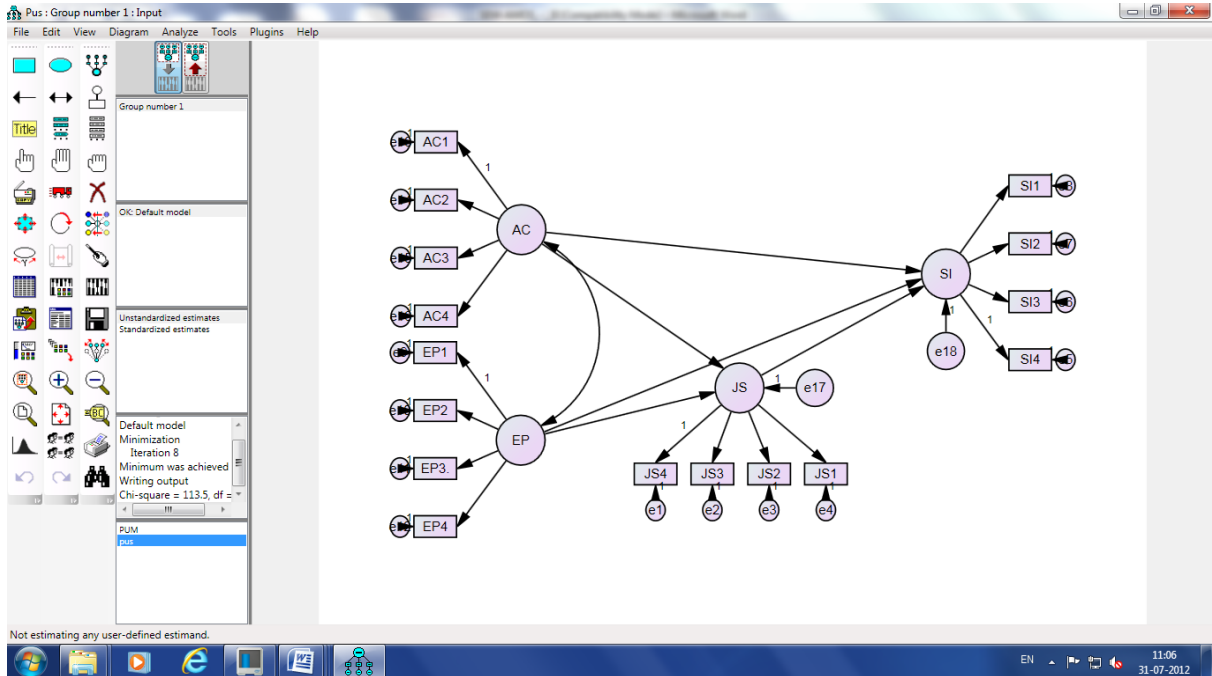
Step 4: Click View → Object Properties and name the unobserved variables.

Step 5: Click View → Variable in Dataset and drag the observed variables to the square boxes in the path diagram.

Step 6: Click View → Object Properties and name the unique variables for all observed variables.

Step 7: Click Diagram → Draw Unique Variables for the endogenous variables and mention the error number.

Step 8: Click Diagram → Draw Paths and connect it from AC→JS and EP→ JS and JS→SI

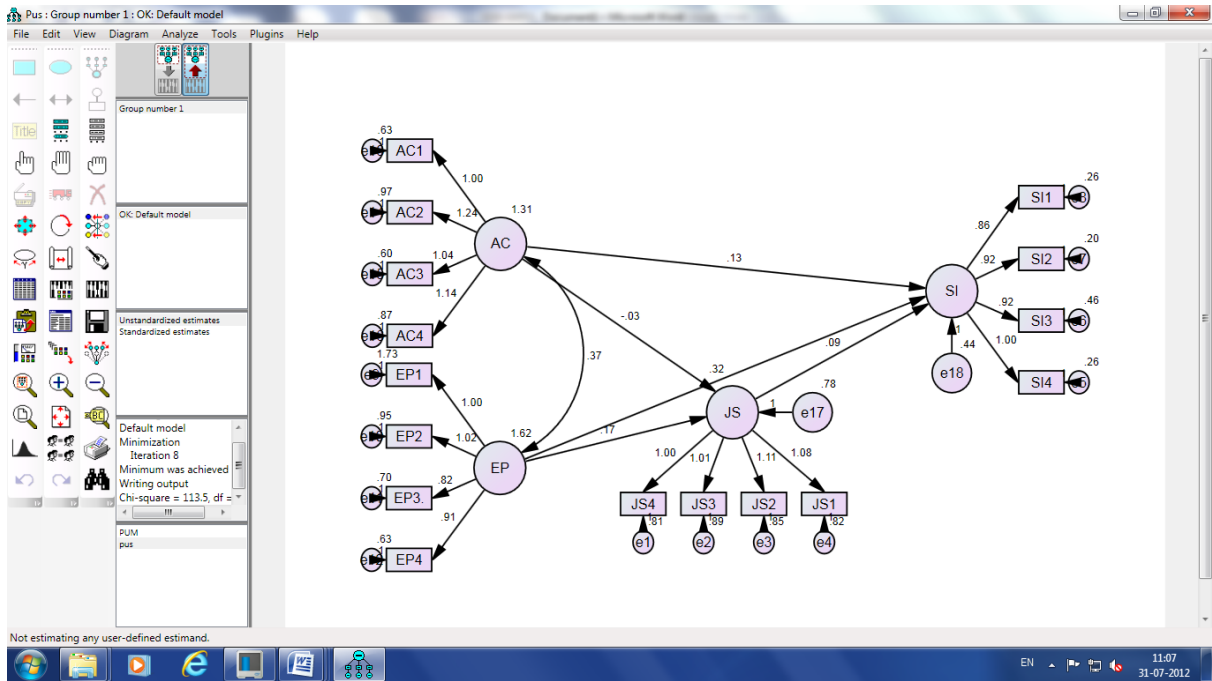


Step 9: Click Analyze→Calculate Estimates.

Step 10: Save the output in a folder.

Step 11: Click on the button as shown below to get the results.

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Click the view text

**Model Fit Summary**

Model	NP	DF	P	CMIN/DF
Default model	38	98	135	1.159
Saturated model	136	0	0	
Independence model	16	120	0.000	27.505

**RMR, GFI**

Model	RMR	GFI	AGFI	PGFI
Default model	.046	.966	.953	.696
Saturated model	.000	1.000		
Independence model	.574	.380	.298	.336

**Baseline Comparisons**

Model	NFI	RFI	IFI	TLI	CFI
Default model	.966	.958	.995	.994	.995
Saturated model	1.000	1.000	1.000	1.000	1.000
Independence model	.000	.000	.000	.000	.000

**Parsimony-Adjusted Measures**

Model	PRATIO	PNFI	PCFI
Default model	.817	.789	.813
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

**Goodness of fit statistics**

Chi-square value ( $p > .05$ )

**Absolute fit measures**

Goodness of fit index  $> .9$

Root mean square error of approximation  $< .07$

Root mean square residual  $< .08$

Standardized root mean residual  $< .08$

Normed chi-square  $< 3$

**Incremental fit indices**

Normed fit index  $> .9$

Non normed fit index

Comparative fit index  $> .9$

Relative fit index  $> .9$

**Parsimony fit indices**

Parsimony normed fit index  $> .9$

Adjusted goodness of fit index  $> .9$

**Convergent validity**

Loading value more than  $.7$

Average variance extracted  $.5$

**Discriminant validity**

AVE  $>$  squared inter construct correlation

Insignificant loading with other constructs

**Nomological validity**

Correlation between constructs should reflect theory

**Standardized regression estimates –hypothesis testing based on significant level**

**Standadised residuals should not be more than 2.5**

**Modification index not more than 4**

- 11

**CONJOINT ANALYSIS**

The first step in a conjoint analysis is to create the combinations of factor levels that are presented as product profiles to the subjects. Since even a small number of factors and a few levels for each factor will lead to an unmanageable number of potential product profiles, you need to generate a representative subset known as an orthogonal array.

The Generate Orthogonal Design procedure creates an orthogonal array—also referred to as an orthogonal design—and stores the information in an SPSS data file. Unlike most procedures, an active dataset is not required before running the Generate Orthogonal Design procedure. If you do not have an active dataset, you have the option of creating one, generating variable names, variable labels, and value labels from the options that you select in the dialog boxes. If you already have an active dataset, you can either replace it or save the orthogonal design as a separate SPSS data file.

To create an orthogonal design:

► From the menus choose:

Data

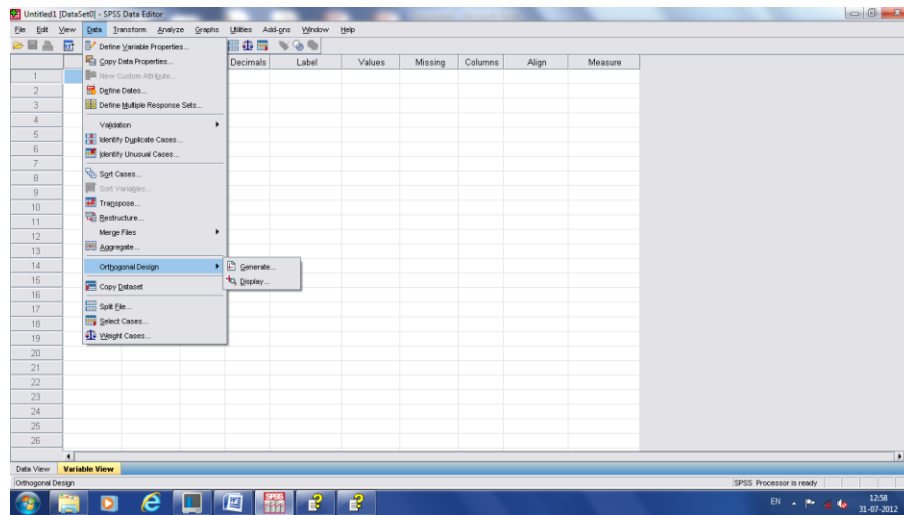
Orthogonal Design

Generate

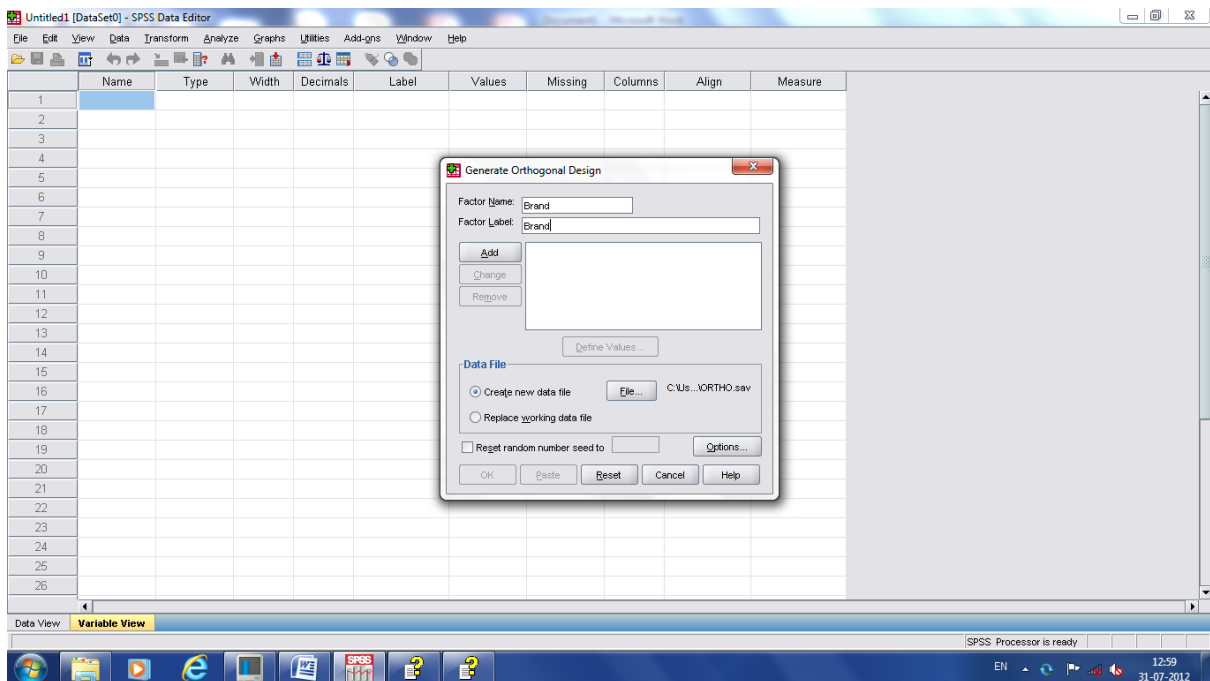


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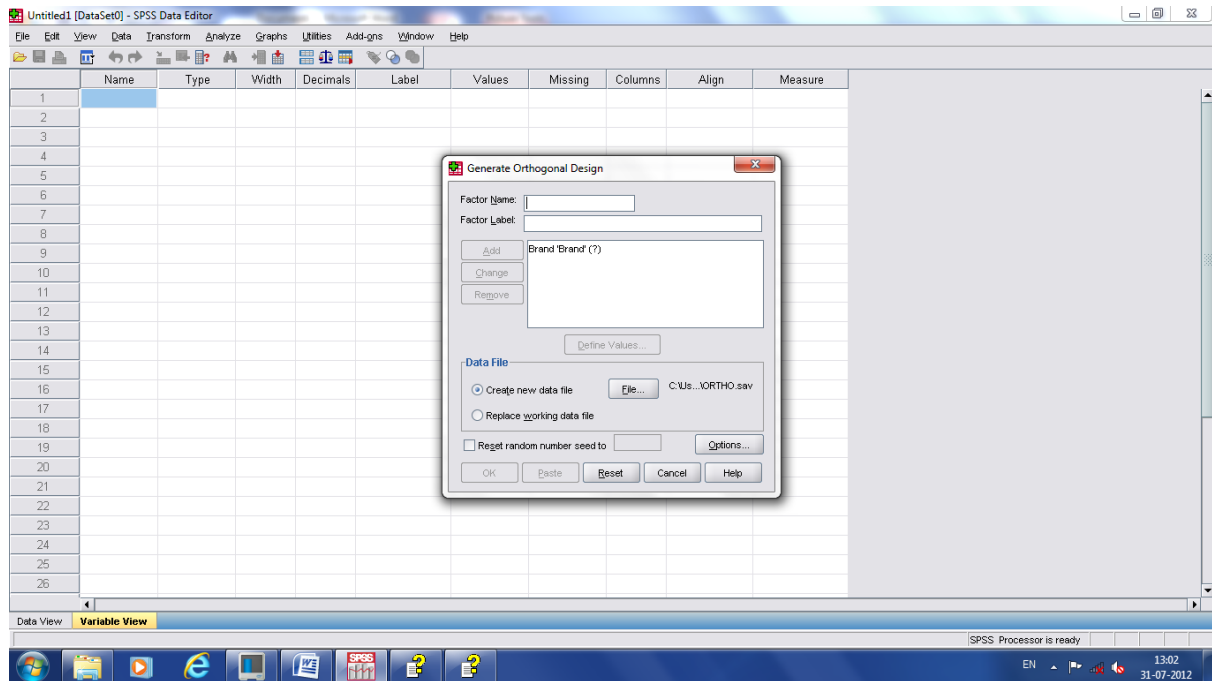
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► Enter brand in the Factor Name text box, and enter brand in the Factor Label text box



► Click Add.

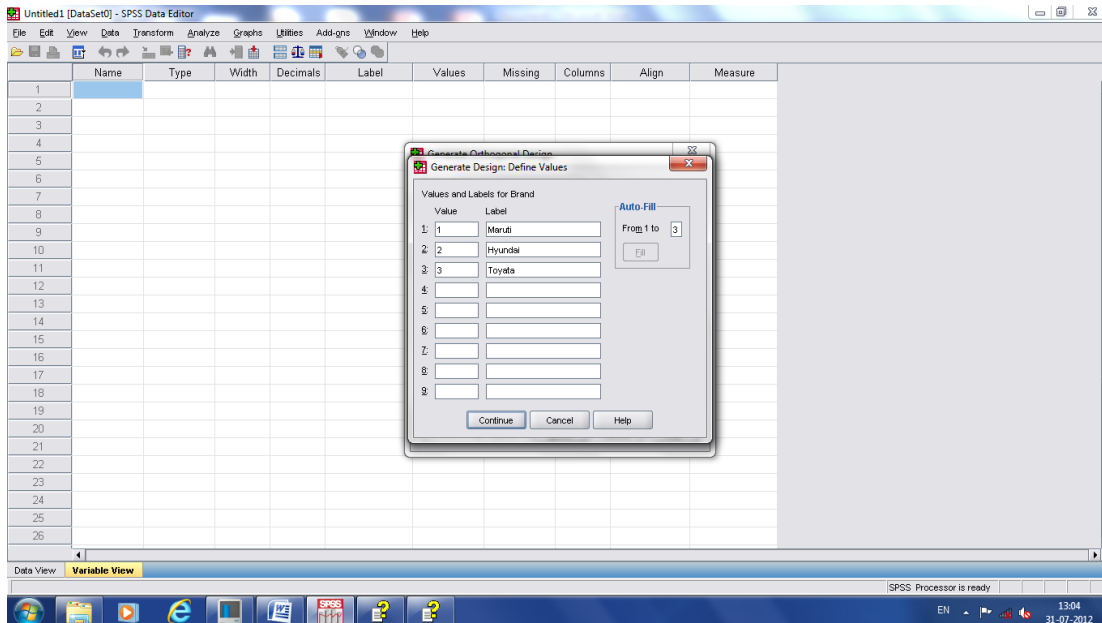


This creates an item labeled brand 'brand' (?). Select this item.

► Click Define Values

Enter the values 1, 2, and 3 to represent the brand. Enter the labels maruti, Hyundai and Toyota as well.

► Click Continue.



You'll now want to repeat this process for the remaining factors, brand, price, seal, and money. Use the values and labels from the following table, which includes the values you've already entered for package.

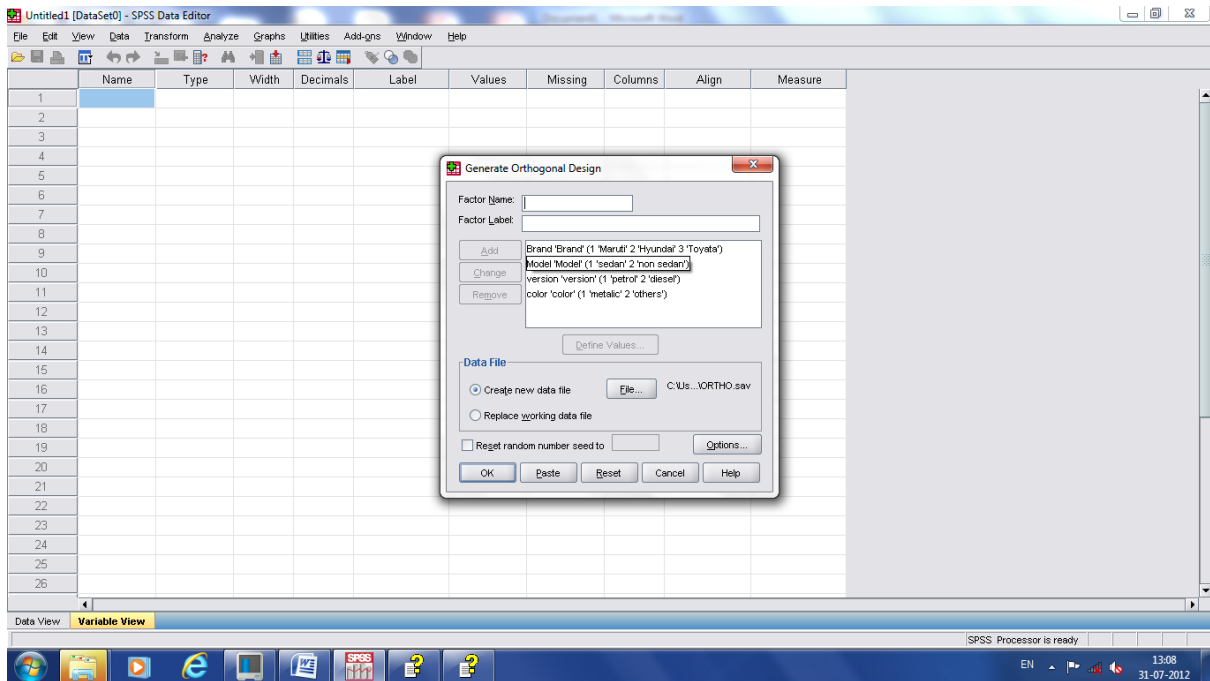
### **Factor Values Labels**

brand 1, 2, 3 Maruti, Hyundai, toyota

model 1, 2 Sedan, non sedanl

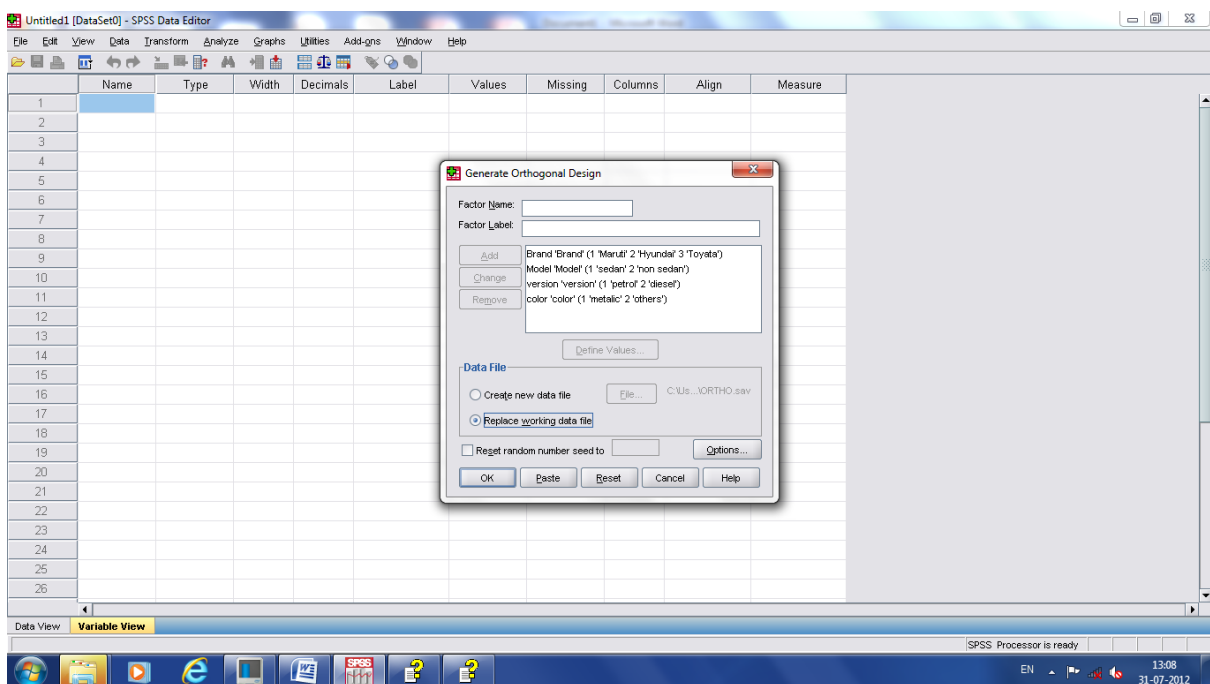
version 1,2 Petrol, diesel

color 1, 2 Metallic, non metallic



Once you have completed the factor specifications:

- ▶ Select Replace working data file in the Data File group in the Generate Orthogonal Design dialog box. The generated design will replace the active dataset

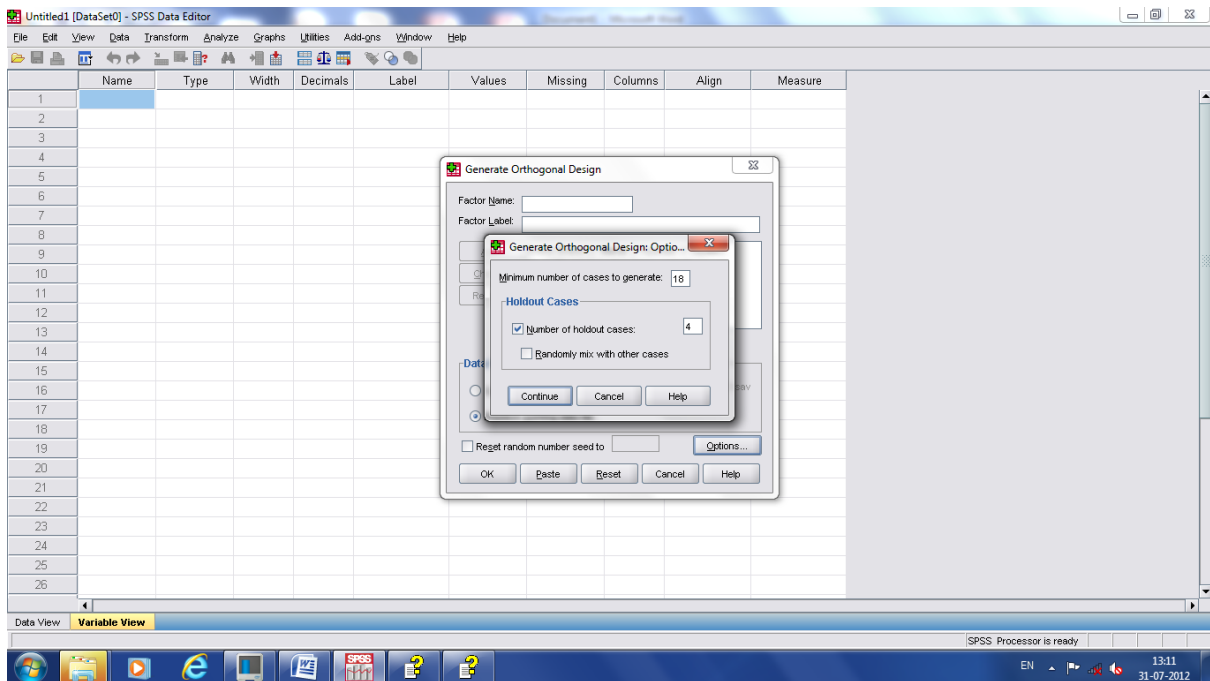


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Select Reset random number seed to and enter the value 2000000

- ▶ Click Options.
- ▶ In the Minimum number of cases to generate text box, type 18
- ▶ Select Number of holdout cases and type 4.



- ▶ Click Continue in the Generate Orthogonal Design Options dialog box.
- ▶ Click OK in the Generate Orthogonal Design dialog box.

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The screenshot shows the SPSS Data Editor interface in Variable View. The table below represents the data structure shown in the interface:

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure
1	Brand	Numeric	8	2	Brand	{1.00, Marut...	None	10	Right	Scale
2	Model	Numeric	8	2	Model	{1.00, seda...	None	10	Right	Scale
3	version	Numeric	8	2	version	{1.00, petrol...	None	10	Right	Scale
4	color	Numeric	8	2	color	{1.00, metal...	None	10	Right	Scale
5	STATUS_	Numeric	8	0		{0, Design)...	None	10	Right	Scale
6	CARD_	Numeric	8	0		None	None	10	Right	Scale
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										

The orthogonal design is displayed in the Data Editor and is best viewed by displaying value labels rather than the actual data values. This is accomplished by choosing Value Labels from the View menu.

The variables in the data file are the factors used to specify the design. Each case represents one product profile in the design. Notice that two additional variables, CARD\_ and STATUS\_, appear in the data file. CARD\_ assigns a sequential number to each profile that is used to identify the profile. STATUS\_ indicates whether a profile is part of the experimental design (the first 18 cases), a holdout case (the last 4 cases), or a simulation case (to be discussed in a later topic in this case study).

The orthogonal design is a required input to the analysis of the data. Therefore, you will want to save your design as an SPSS data file. For convenience, the current design has been saved in car.sav (orthogonal designs are also referred to as plans).

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Once you have created an orthogonal design, you'll want to use it to create the product profiles to be rated by the subjects. You can obtain a listing of the profiles in a single table or display each profile in a separate table.

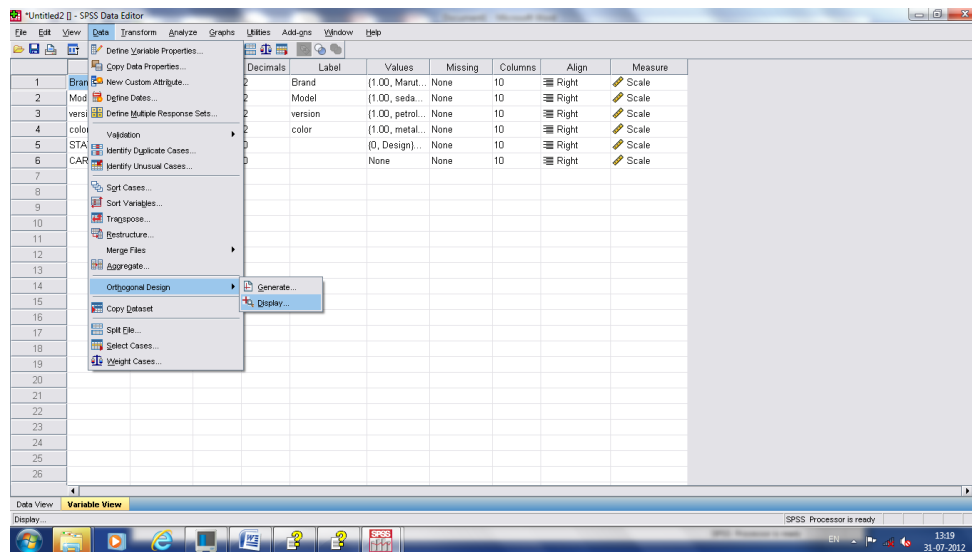
To display an orthogonal design:

► From the menus choose:

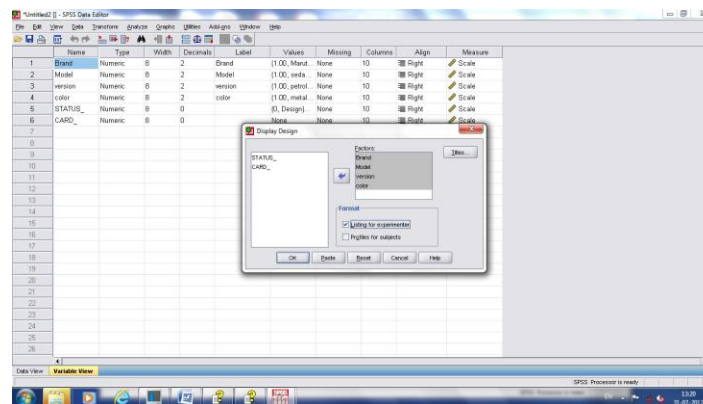
Data

OrthogonalDesign

Display...



► Select brand, model, version and color for the factors.



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► Select Listing for experimenter in the Format group. This results in displaying the entire orthogonal design in a single table.

► Click OK.

<b>Card List</b>					
	Card ID	Brand	Model	version	color
1	1	Hyundai	Sedan	petrol	others
2	2	Hyundai	non sedan	diesel	metallic
3	3	Maruti	Sedan	diesel	metallic
4	4	Toyata	Sedan	petrol	others
5	5	Maruti	Sedan	diesel	metallic
6	6	Maruti	non sedan	petrol	others
7	7	Hyundai	Sedan	petrol	metallic
8	8	Maruti	Sedan	petrol	others
9	9	Hyundai	non sedan	diesel	others
10	10	Hyundai	Sedan	petrol	metallic
11	11	Maruti	non sedan	petrol	metallic



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12	12	Hyundai	Sedan	petrol	metallic
13	13	Maruti	Sedan	petrol	metallic
14	14	Toyata	Sedan	diesel	metallic
15	15	Toyata	Sedan	petrol	metallic
16	16	Toyata	non sedan	petrol	metallic
17	17	Toyata	non sedan	petrol	metallic
18	18	Toyata	Sedan	diesel	others
19 <sup>a</sup>	19	Toyata	non sedan	diesel	metallic
20 <sup>a</sup>	20	Toyata	non sedan	petrol	others
21 <sup>a</sup>	21	Hyundai	non sedan	petrol	others
22 <sup>a</sup>	22	Hyundai	non sedan	petrol	metallic
a. Holdout					

The preference data collected from the subjects is stored in carpet\_prefs.sav.

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CONJOINT PLAN='file specification'

/DATA='file specification'

/SEQUENCE=PREF1 TO PREF22

/SUBJECT=ID

/FACTORS=brand model version color (DISCRETE)

/PRINT=SUMMARYONLY.

<b>Utilities</b>			
		Utility Estimate	Std. Error
brand	Maruti	1.036	.550
	Hyundai	.762	.550
	Toyata	-1.798	.550
model	Sedan	.295	.413
	non sedan	-.295	.413
version	Petrol	-.732	.413
	Diesel	.732	.413
color	Metallic	-.821	.413
	non metallic	.821	.413
(Constant)		9.920	.456

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<b>Importance Values</b>	
Brand	42.086
Model	19.701
Version	16.681
Color	21.531
Averaged Importance Score	

<b>Correlations<sup>a</sup></b>		
	Value	Sig.
Pearson's R	.778	.000
Kendall's tau	.482	.003
Kendall's tau for Holdouts	-.667	.087
a. Correlations between observed and estimated preferences		

### Analytical Hierarchy Process

**DATA Collection:** The data has been collected from the Annual General Reports from 2004-2011 for the following companies- Tata Consultancy Services, Infosys Ltd., Wipro Ltd., Mphasis, Mahindra Satyam, HCL Infosystem , Tech Mahindra and HCL Technologies ltd . The average value of 8 years data has been used to do the pair-wise comparison.

The basic procedure to carry out the AHP consists of the following steps:

#### **1. Structuring a decision problem and selection of criteria**

The first step is to decompose a decision problem into its constituent parts. In its simplest form, this structure comprises a goal or focus at the topmost level, criteria (and sub criteria) at the intermediate levels, while the lowest level contains the options. Arranging all the components in a hierarchy provides an overall view of the complex relationships and helps the decision maker to assess whether the elements in each level are of the same magnitude so that they can be compared accurately.

In this process, we have taken 5 most important criteria to understand the financial health of the companies- the criteria's are - **Current Ratio, Debt Equity Ratio, Return on Equity (ROE), Debtors Turnover Ratio and Operating Profit Margin.**

#### **2. Priority setting of the criteria by pair wise comparison (weighing)**

For each pair of criteria, the decision maker is required to respond to a question such as "How important is criterion A relative to criterion B?" Rating the relative "priority" of the criteria is done by assigning a weight between 1 (equal importance) and 9 (extreme importance) to the more important criterion, whereas the reciprocal of this value is

assigned to the other criterion in the pair. The weighing are then normalized and averaged in order to obtain an average weight for each criterion.

<b>Intensity of Importance</b>	<b>Definition</b>	<b>Explanation</b>
1	Equal importance	Two factors contribute equally to the objective
3	Somewhat more important	Experience and judgement slightly favour one over the other.
5	Much more important	Experience and judgement strongly favour one over the other.
7	Very much more important	Experience and judgement very strongly favour one over the other. Its importance is demonstrated in practice.
9	Absolutely more important.	The evidence favouring one over the other is of the highest possible validity.
2,4,6,8	Intermediate values	When compromise is needed.

**Table 4.1 : Rating Priority table**

- The ranking is done as per the Ranking Table and its corresponding opposite relationship is filled with the reciprocal of the parent relationship. The following table uses the 9 point scale of Saaty's rating scale .

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Company	TCS	Infosys	Wipro	HCL Technologies	Satyam	Mphasis	Tech Mahindra	HCL Infosystems
TCS	1	1/3	2	2	3	3	2	1/7
Infosys	3	1	1/5	3	4	2	4	1/5
Wipro	1/2	5	1	2	3	2	5	1
HCL Technologies	1/2	1/3	1/2	1	3	2	3	1/9
Satyam	1/5	1/7	1/3	1/3	1	2	2	1/9
Mphasis	1/3	1/5	1/2	1/2	1/2	1	3	1/9
Tech Mahindra	1/5	1/7	1/5	1/3	1/2	1/3	1	1/9
HCL Infosystems	7	5	1/7	7	8	5	4	1

**Table 4.2: Option Performance Matrix**

This matrix, which we call the Option Performance Matrix (OPM), summarises the respective capability of the 8 companies with respect to one another in terms of what the firm wants. Reading down each column, it somewhat states the obvious. Now if one of the performance criteria of Wipro is “Much more important” than the same performance

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criteria for overall evaluation of Infosys under consideration then, Wipro will be assigned 5 against Infosys and Infosys will be assigned the reciprocal value - 1/5 against Wipro.

The screenshot shows an Excel spreadsheet with a comparison matrix for Debtors Turnover Ratio. The table includes columns for various companies and rows for different financial ratios like Current Ratio, Debt Equity ratio, ROE, etc. A 'Normalized' column is also present.

CRISP Score and Normalized table for parameters

4. Normalize the table by dividing each cell value by root mean square value of the corresponding column.

Company	TCS	Infosys	Wipro	HCL Technologies	Satyam	Mphasis	TechMahindra	HCL Infosystems
TCS	0.07	0.02	0.41	0.123711	0.13	0.17	0.083333	0.051253
Infosys	0.23	0.08	0.04	0.185567	0.17	0.11	0.166667	0.071754
Wipro	0.03	0.41	0.20	0.123711	0.13	0.11	0.208333	0.35877

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	9267	1442	5078		0435	5385		
HCL Technologies	0.03 9267	0.02 7429	0.10 2539	0.061856	0.13 0435	0.11 5385	0.125	0.039863
Satyam	0.01 5707	0.01 1755	0.06 8359	0.020619	0.04 3478	0.11 5385	0.0833333	0.039863
Mphasis	0.02 6178	0.01 6458	0.10 2539	0.030928	0.02 1739	0.05 7692	0.125	0.039863
Tech Mahindra	0.01 5707	0.01 1755	0.04 1016	0.020619	0.02 1739	0.01 9231	0.041667	0.039863
HCL Infosystems	0.54 9738	0.41 1442	0.02 9297	0.43299	0.34 7826	0.28 8462	0.166667	0.35877

**Table 4.3: Normalized table of Option Performance Matrix**

5 . The **square of the normalized table** is calculated and Eigen values are obtained by finding its respective weights. The above process is repeated until the Eigen values obtained are steady and do not change further. The Step 2&3 are repeated for all the criterion under consideration.



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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
31	2nd Set of Eigen values																			
32	5	2.979830508	0.7590016	0.945418	0.601975	5	2.979830508	0.759	0.945418	0.601975	161.29523	83.89733	19.0159	26.42893	17.38397	308.0214	0.038521			Weight
33	11.34488	5	1.3738999	2.117385	1.264781	11.34488	5	1.3739	2.117385	1.2647805	320.88989	169.475	38.28041	52.55901	34.66991	615.8742	0.077022			
34	55.94547	25.34635225	5	7.920435	5.577242	55.94547	25.34635225	5	7.920435	5.5772424	1374.6046	726.5056	166.8483	228.8801	149.6757	2646.514	0.330975			
35	34.0299	19.85140571	4.0142979	5	3.556367	34.0299	19.85140571	4.0143	5	3.5563668	954.65079	496.7413	114.1399	158.4937	103.5452	1827.571	0.228557			
36	46.27144	26.73406212	5.8751808	7.730685	5	46.27144	26.73406212	5.87518	7.730685	5	1357.7733	707.601	161.6351	224.193	146.9274	2598.13	0.324924			
37	3rd Set of Eigen Values																			
38	Values																			
39	161.2952	83.89733199	19.015904	26.42893	17.38397	161.2952	83.89733199	19.0159	26.42893	17.383969	127911.19	66995.15	15278.02	21110.96	13849.65	245145	#REF!			Weight
40	320.8899	169.474963	38.280409	52.55901	34.66991	320.8899	169.474963	38.2804	52.55901	34.66991	256010.61	134095.2	30579.56	42252.86	27719.86	490658.1	#REF!			
41	1374.605	726.5056435	166.84834	228.8801	149.6757	1374.605	726.5056435	166.848	228.8801	149.67574	1105922.3	579271.3	132105.8	182534.3	119748	2119582	#REF!			
42	954.6508	496.741339	114.13987	158.4937	103.5452	954.6508	496.741339	114.14	158.4937	103.5452	762174.12	399200.2	91040.05	125797.3	82526.46	1460738	#REF!			
43	1357.773	707.6010328	161.6351	224.193	146.9274	1357.773	707.6010328	161.635	224.193	146.92743	1081768.9	566594.9	129213.1	178543.6	117130.6	2073251	#REF!			
44																				
45	0.038368	Current Ratio	5th most important																	
46	0.076793	Debt Equity rat	4th most important																	
47	0.331735	ROE	Most important																	
48	0.22862	Debtors Turno	3rd Most important																	
49	0.324484	Operating Prof	2nd Most important																	
50																				
51																				

**Calculation of Eigen Values**

**6. Pair wise comparison of options on each criterion (scoring)**

Perfect consistency rarely occurs in practice. In the AHP the pair wise comparisons in a judgment matrix are considered to be adequately consistent if the corresponding consistency ratio (CR) is less than 10%. The CR coefficient is calculated as follows.

First, the consistency index (CI) needs to be estimated. This is done by adding the columns in the judgment matrix and multiply the resulting vector by the vector of priorities (i.e., the approximated eigen vector) obtained earlier. This yields an approximation of the maximum eigen value, denoted by  $\lambda_{max}$ .

Then, the CI value is calculated by using the formula:

$$CI = (\lambda_{max} - n)/(n - 1).$$

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'n' is the number of parameters under consideration. Next the consistency ratio CR is obtained by dividing the CI value by the Random Consistency index (RCI) as given in following table.

RCI values for different values of  $n$ .

n	1	2	3	4	5	6	7	8	9
RCI	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45

If the CR value is greater than 0.10, then it is a good idea to study the problem further and re-evaluate the pairwise comparisons.

7. Based on the Eigen values and the Consistency Index, the ranking done for one of the parameter below. The value depends on the criterion. For example, the higher the Operating Profit Margin, the better it is. However in case of Debt to Equity Ratio, the lower values are preferable.

<b>Eigen values</b>	<b>Company</b>
	HCL
0.310662493	Infosystems
0.236418329	Wipro
0.153314966	TCS
0.107832098	Infosys
0.065208618	HCL

	Technologies
0.052200677	Mphasis
0.044037054	Satyam
0.030325765	techMahindra

**Table 4.4: Eigen Values**

8. The Step 3-7 are repeated for **the weighted matrix of parameters against which the companies are evaluated** and the ranks are obtained for the points under consideration.

Weights	Parameters
0.331735431	ROE
0.324484226	Operating Profit Margin
0.228619911	Debtors Turnover Ratio
0.076792825	Debt Equity ratio
0.038367606	Current Ratio

**Parameters**

**Ranking**

9. In a final step the option scores are combined with the criterion weights to produce an overall score for each option. The extent to which the options satisfy the criteria is weighed according to the relative importance of the criteria. This is done by simple weighted summation. The two matrices are multiplied and the ranking of each company is obtained. The Parameter Value's are multiplied with the Eigen values of the corresponding parameter of the companies. Finally, after judgements have been made on the impact of all the elements and priorities have been computed for the hierarchy as a whole. The combination weight of all the criterion is considered and the value of Eigen value is calculated.

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<b>Parameters</b>	<b>Current Ratio</b>	<b>Debt Equity ratio</b>	<b>ROE</b>	<b>Debtors Turnover Ratio</b>	<b>Operating Profit Margin</b>
<b>Parameter Value</b>	0.038367 6	0.0767928 2	0.33173543 1	0.228619911	0.324484226
<b>TCS</b>	0.273133 3	0.0217484 1	0.30790970 4	0.153314966	0.124596089
<b>Infosys</b>	0.087968 1	0.3211312 1	0.18422527 4	0.107832098	0.420779287
<b>Wipro</b>	0.093194 1	0.1502836 8	0.12713843 5	0.236418329	0.202101922
<b>HCL Technologies</b>	0.079165 0	0.0781830 4	0.11012520 7	0.065208618	0.050933576
<b>Satyam</b>	0.092267 3	0.1302374 5	0.04366997 9	0.044037054	0.03472112
<b>Mphasis</b>	0.182503 2	0.1289837 5	0.05343728 7	0.052200677	0.074069427
<b>Tech Mahindra</b>	0.133886 4	0.0916267 2	0.08165390 2	0.030325765	0.05806333
<b>HCL Infosystems</b>	0.057882 2	0.0778056 9	0.09184021 1	0.310662493	0.034735249

**Overall Weighted Eigen Values**

10. The average value of all the parameters are calculated and the final Eigen values are obtained to find the arrive at the ultimate ranking matix.

<b>Company Name</b>	<b>Data</b>	<b>Ranking</b>
Infosys	0.250338559	1
TCS	0.189774471	2
Wipro	0.176921491	3
HCL Infosystems	0.120957047	4
HCL Technologies	0.077008835	5
Mphasis	0.070602755	6
Tech Mahindra	0.065034378	7
Satyam	0.049362464	8

**TOPSIS**

TOPSIS is a multiple criteria method to identify solutions from a finite set of alternatives based upon simultaneous minimization of distance from an ideal point and maximization of distance from a nadir point. TOPSIS can incorporate relative weights of criterion importance. The acronym TOPSIS stands for **T**echnique for **P**reference by **S**imilarity to the **I**deal **S**olution.

TOPSIS was initially presented by Hwang and Yoon, Lai et al. TOPSIS is attractive in that limited subjective input is needed from decision makers. The only subjective input needed is weights.

There are several applications of TOPSIS using different weighting schemes and different distance metrics, and compares results of different sets of weights applied to a previously used set of multiple criteria data. Comparison is also made against SMART

and centroid weighting schemes. TOPSIS was not found to be more accurate, but was quite close in accuracy. Using first-order and second-order metrics were found to be quite good, but the infinite order was found to decline in accuracy.

TOPSIS has been applied to a number of applications, although it is not nearly as widely applied as other multi attribute methods. A variant of TOPSIS was used for selection of grippers in flexible manufacturing. In other manufacturing applications, it has been used in a case selecting a manufacturing process and in an application selecting robotic processes. Neural network approaches to obtain weights for TOPSIS have been applied, and fuzzy set extensions implemented. TOPSIS has also been used to compare company performances and financial ratio performance within a specific industry. TOPSIS was applied to financial investment in advanced manufacturing systems.

## 2. TOPSIS METHOD

**Step 1.** We usually transform the cost criteria into benefit criteria, by using crisp score rating,

The ratios are allotted the value based on the preference of each ratio based on the perception and the importance of each ratios. Allot the crisp score only to the higher or the important side while the opposite sided is allotted the value as  $X_{ij}$   
 $= 1 - X_{ji}$

	Current Ratio	Debt Equity ratio	ROE	Debtors Turnover Ratio	Operating Profit Margin
TCS	0.895	0.115	0.895	0.695	0.695
Infosys	0.495	0.895	0.695	0.895	0.895

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Wipro	0.495	0.295	0.695	0.495	0.895
HCL					
Technologies	0.295	0.495	0.495	0.495	0.295
Satyam	0.295	0.695	0.115	0.295	0.295
Mphasis	0.695	0.695	0.295	0.495	0.695
Tech					
Mahindra	0.695	0.295	0.495	0.115	0.495
HCL					
Infosystems	0.115	0.295	0.495	0.895	0.115

**Step 2.** The weights of the ratios or the priority vectors are calculated by using the root mean square to get the weights of the ratios

**Step 3.** Then the normalized matrix is generated by dividing each element of the crisp score matrix by the root mean square value of the column. This generates the normalized matrix.

<b>Company</b>	<b>Current Ratio</b>	<b>Debt Equity ratio</b>	<b>ROE</b>	<b>Debtors Turnover Ratio</b>	<b>Operating Profit Margin</b>
TCS	0.572449128	0.076053943	0.554799	0.406690132	0.401231689
Infosys	0.316605942	0.591898078	0.430822	0.523723263	0.516694046
Wipro	0.316605942	0.195094897	0.430822	0.289657	0.516694046
HCL	0.188684349	0.327362624	0.306844	0.289657	0.170306976

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Technologies					
Satyam	0.188684349	0.459630351	0.071287	0.172623869	0.170306976
Mphasis	0.444527535	0.459630351	0.182867	0.289657	0.401231689
Tech Mahindra	0.444527535	0.195094897	0.306844	0.067294051	0.285769333
HCL Infosystems	0.073554916	0.195094897	0.306844	0.523723263	0.066390855

**Step 4.** Next we need to generate the weighted matrix, which is obtained by multiplying the normalized matrix with the weights of the respective ratios

PMARK\*WT=WEIGTED MATRIX

	<b>Current Ratio</b>	<b>Debt Equity ratio</b>	<b>ROE</b>	<b>Debtors Turnover Ratio</b>	<b>Operating Profit Margin</b>	<b>Geometric Mean</b>	<b>Weights</b>
<b>Current Ratio</b>	1.000	0.295	0.115	0.295	0.115	0.25834969	0.100263522
<b>Debt Equity ratio</b>	0.705	1.000	0.115	0.295	0.295	0.37128397	0.144092445
<b>ROE</b>	0.885	0.885	1.000	0.895	0.695	0.86604184	0.336104162
<b>Debtors Turnover</b>	0.705	0.705	0.105	1.000	0.695	0.51512244	0.199915046



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<b>Ratio</b>							
<b>Operating Profit Margin</b>	0.885	0.705	0.305	0.305	1.000	0.56590876	0.219624824

**Step 5.** Generate the best and the worst score of the ratios by finding the maximum and the minimum value of each ratio.

<b>SUB CRITERIA</b>	<b>BEST</b>	<b>WORST</b>
Current Ratio	0.057395766	0.007375
Debt Equity ratio	0.085288041	0.010959
ROE	0.186470399	0.02396
Debtors Turnover Ratio	0.10470016	0.013453
Operating Profit Margin	0.074451709	0.009566

**Step 6.** Next generate the positive score by finding the root mean square value of the difference between the best score and the score and the respective element of the normalized matrix, similarly generate the negative score using the worst value. The net score is generated using the formulae

$$\text{Net score} = \text{Negative score} / (\text{negative score} + \text{positive score})$$

<b>POSTIVE SCORE</b>	<b>NEGATIVE SCORE</b>	<b>NET SCORE</b>
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0.079680859	0.18932328	0.703793185
0.04893207	0.182366126	0.788445949
0.339218253	0.15168998	0.308998648
0.120663255	0.099564268	0.452097299
0.188868362	0.062094089	0.247423822
0.11898143	0.121046505	0.504301738
0.140755817	0.094578567	0.401890134
0.130102526	0.12201812	0.483967188

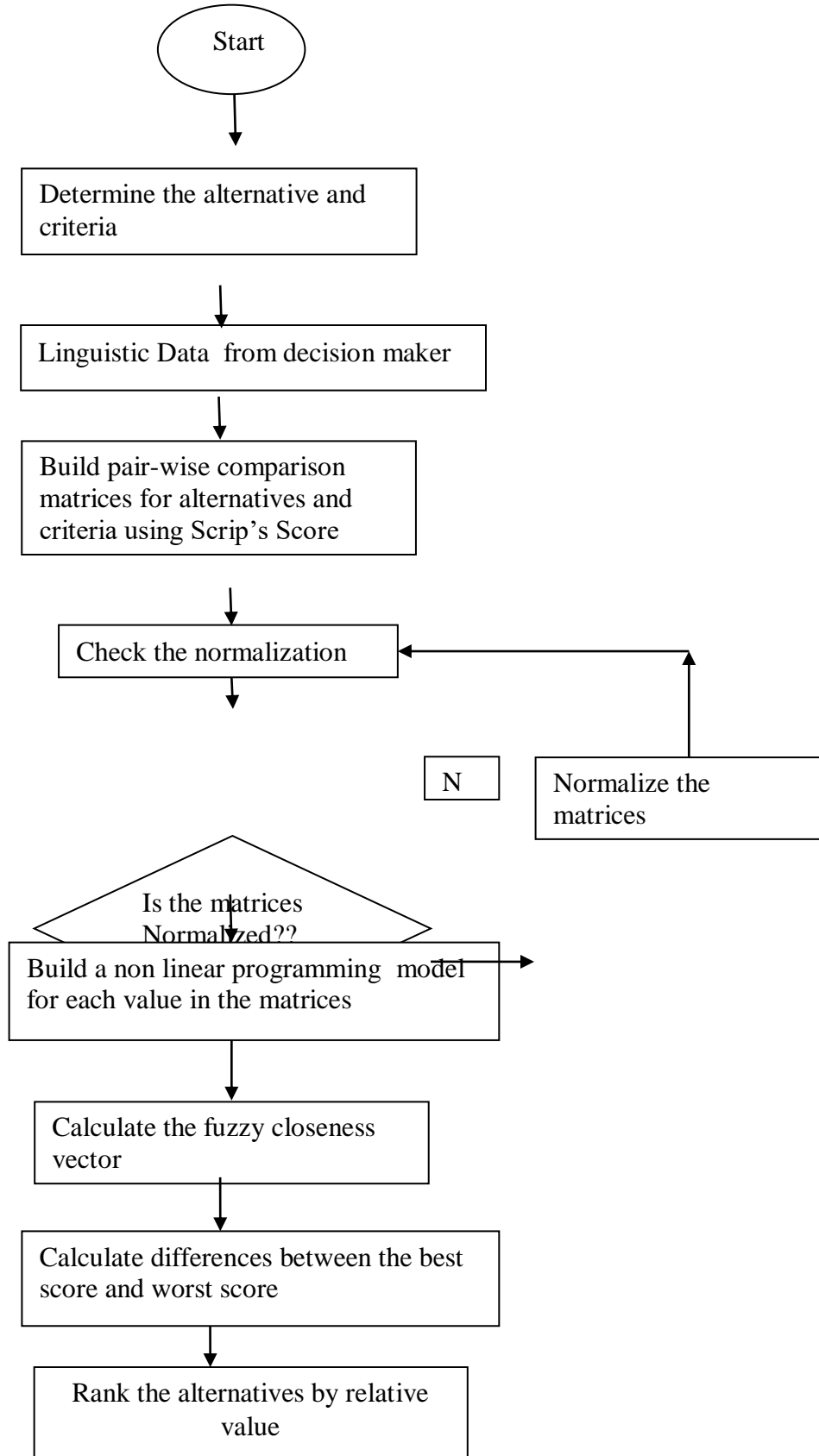
Thus, the net score is used to rank the companies with the highest score being the best and so on

<b>RANK</b>	<b>COMPANY</b>	<b>SCOR</b>
1	Infosys	0.788445949
2	TCS	0.703793185
3	HCL Infosystems	0.483967188
4	HCL Technologies	0.452097299
5	Tech Mahindra	0.401890134
6	Wipro	0.308998648
7	Satyam	0.247423822
8	Mphasis	0.134171427

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The above table shows that the ranks of software company performance evaluation. Infosys score is highest than other software companies. Followed by Tata Consultancy Services rank is second, third rank is HCL Info system. Fourth rank is held by HCL Technologies. Fifth rank is Tech Mahindra and sixth rank is Wipro. The last two ranks are held by Satyam and Mphasis respectively.

1.CRIPS SCORE									
FIVE POINT									
Current Ratio	Debt Equity ratio	ROE	Debtors Turnover Ratio	Operating Profit Margin	Current Ratio	Debt Equity ratio	ROE	Debtors Turnover Ratio	Operating Profit Margin
0.895	0.115	0.895	0.695	0.695	1.000	0.295	0.115		
0.495	0.895	0.695	0.895	0.895	0.705	1.000	0.115		
0.495	0.295	0.695	0.495	0.895	0.885	0.885	1.000		
0.295	0.495	0.495	0.495	0.295	0.705	0.705	0.105		
0.295	0.695	0.115	0.295	0.295	0.885	0.705	0.305		
0.695	0.695	0.295	0.495	0.495					
0.695	0.295	0.495	0.115	0.495					
0.115	0.295	0.495	0.895	0.115					
2.NORMALIZATION									
WEIGHTED MATRIX									
0.572449128	0.076053943	0.55479944	0.406690132	0.401231689	0.057395766	0.010958799	0.186470399	0.081303477	0.057814455
0.316605942	0.591898078	0.43082191	0.523723263	0.516694046	0.031744027	0.085288041	0.144801036	0.10470016	0.074451709
0.316605942	0.195094897	0.43082191	0.289657	0.516694046	0.031744027	0.028111701	0.144801036	0.057906793	0.074451709
0.188684349	0.327362624	0.30684438	0.289657	0.170306976	0.018918157	0.047170481	0.103131673	0.057906793	0.024539949
0.188684349	0.459630351	0.07128708	0.172623869	0.170306976	0.018918157	0.066229261	0.023959804	0.034510109	0.024539949
0.444527535	0.459630351	0.18286685	0.289657	0.401231689	0.044569896	0.066229261	0.06146231	0.057906793	0.057814455
0.444527535	0.195094897	0.30684438	0.067294051	0.285769333	0.044569896	0.028111701	0.103131673	0.013453093	0.041177202
0.073554916	0.195094897	0.30684438	0.523723263	0.066390855	0.007374875	0.028111701	0.103131673	0.10470016	0.009666421



Flowchart for TOPSIS

STOP

### ANALYSIS OF TECHNICAL EFFICIENCY

The technical efficiency of insurance companies can be measured in terms of input and output variables. The technical efficiency means efficiency of insurance companies in utilizing input to generate output. The main aim of insurance companies is to collect premium from policy holders. The strength of insurance companies can be judged in terms of premium collected by them. Therefore premium collected is taken as output variable. The premium is collected by using agents, branches and employees. The input variables taken for the study are no. of agents, no. of policy, no. of employees, no. of clients, no. of branches and no. of schemes. The technical efficiency is measured by taking all companies and by taking life insurance companies alone.

**TABLE 1: TECHNICAL EFFICIENCY SCORE OF ALL INSURANCE  
COMPANIES IN INDIA FOR THE YEAR 2009-2010**

S. No	Insurance companies	Technical Efficiency	Rank	Technical Efficiency	Rank
1	LIC (Life Insurance Corporation of India)	1	1	1	1
2	HDFC Standard Life Insurance Co Ltd	0.029	20	0.029	12

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3	Birla Sun Life Insurance Co Ltd	0.123	11	0.123	6
4	Max New York Life Insurance Co Ltd	0.014	23	0.014	15
5	Kotak Mahindra Old Mutual Life Insurance	0.16	9	0.16	5
6	Aviva Life Insurance Company India	0.087	15	0.087	9
7	Aegon Religare	0.052	17	0.052	11
8	Canara HSBC	0.582	3	0.582	2
9	DLF Pramerica	0.101	14	0.101	8
10	India First	0.02	21	0.02	13
11	IDBI Fortis	0.017	22	0.017	14
12	ING Vysysa	0.369	6	0.369	4
13	Sahara	0.08	16	0.08	10
14	Met Life	0.459	4	0.459	3
15	Star Union Diachi	0.114	23	0.114	7
	<b>Average</b>			<b>0.214</b>	
1	ICICI Prudential Life Insurance Co Ltd	0.178	8	1	1
2	Bajaj Allianz Life Insurance Co Ltd	0.343	7	1	1
3	SBI Life Insurance Co Ltd	0.414	5	1	1
4	Reliance Life Insurance Co Ltd	0.124	10	0.747	5
5	Bharti AXA	0.105	13	0.433	6
6	Future generali	0.044	18	0.205	7
7	Shriram	0.032	19	0.186	8

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8	Tata AIG	0.801	2	1	1
	<b>Average</b>	<b>0.228</b>		<b>0.696</b>	

Around 23 insurance companies are taken for the study. The technical efficiency is measured by using DEA method. Table 1 contains technical efficiency score for different insurance companies. The rank for the insurance companies is derived based on technical efficiency score. From the table 1 it is clear that LIC (Life Insurance Corporation of India) is the most technically efficient insurance company in India for the year 2009-2010. Tata AIG performs at 80 percent efficiency though its parent company in US has faced some difficulties during subprime crisis. The other insurance companies which are in the order of efficiency are Canara HSBC (58%), Metlife (46%) and SBI life (41%). This shows that only three companies have efficiency more than 50 percent. Many companies have efficiency score less than 10 percent. The average technical efficiency score of all insurance companies is 0.228. Though there are many leading insurance companies their rank for technical efficiency are much lower. The main reason behind poor efficiency is due to high level of efficiency of LIC. The efficiency score is relative to top performing company. This indicates that the new insurance companies should find out ways by which the efficiency can be improved.

The insurance companies can be divided into life assurance companies and general insurance companies. Though all are called as insurance companies and controlled by IRDA, there is basic difference in operation between life insurance and general insurance. Therefore separate analysis required for life insurance companies and general insurance companies. From the table 2 it is clear that LIC (Life Insurance Corporation of India) is

the most efficient life insurance company in India for the year 2009-2010. There is no much difference in efficiency score obtained in the earlier analysis (table 1) and present analysis (Table 2). Among the life insurance companies LIC and Canara HSBC are doing good. There is a vast difference in the technical efficiency score of different companies. The average technical efficiency score of all life insurance companies is 0.214. This average efficiency is less than overall average efficiency obtained in the previous analysis.

From the table 3 it is clear that ICICI Prudential Life Insurance Co Ltd, Bajaj Allianz Life Insurance Co Ltd, SBI Life Insurance Co Ltd and Tata AIG are most efficient general insurance companies in India for the year 2009-2010. Their dominance shows that the other insurance companies have performed relatively much lower. The efficiency of shriram and future generali are very less. The lagging companies must work on effective utilization of resources to improve their efficiency. The average technical efficiency score of all general insurance companies is 0.696.



**PROJECT TITLE**

**FINANCE**

1. Performance evaluation of commercial banks in India using camel model
2. A study on influence of locus of control on investment behavior of individual investor
3. Predicting solvency of IT companies in India
4. A study on the effectiveness of technical indicators and candlestick patterns in predicting the share price movement with special reference to IT sector
5. A study on the performance of sectoral funds
6. A study of investor's preference towards wealth management with reference to Bajaj Allianz.
7. Study the effect of economic growth on the real estate industry in major cities of India
8. A study on the impact of dividend announcements on share price
9. Working capital management
10. Performance appraisal using Ratio analysis, fund flow and cash flow statements
11. Predicting solvency of company using Z score
12. Determinants of PE Ratio
13. Factors influencing FII investment
14. Performance of IPO's
15. Industry analysis - may be Telecom industry
16. Impact of economic factors on share price - may be inflation, Balance of payment

17. Stock market system in BRIC Nations
18. Comparison of Performance of Bank shares
19. Performance evaluation mutual funds using sharpe, Jensen and Treynors, Fama
20. Performance of Banks after Merger
21. Receivables management
22. Investors preference towards -----
23. Determinants of Risk bearing capacity of investors
24. Post purchase behaviour of policy holders
25. Investment behaviour of mutual fund investors
26. Investor preference for credit cards
27. Investor perception about services provided by banks
28. Investors perception about e-banking services
29. Apprising performance of banks using CAMEL model
30. Application of EKB model for investment decision making
31. Opinion of investors about operations of FII's
32. Effectiveness of Technical tools
33. Determinants of EPS or Anatomy of EPS
34. Effectiveness solvency prediction models in predicting solvency of banks
35. Predicting share price of ICICI, HDFC and Axis Bank using valuation Models
36. Effectiveness of valuation models in predicting share price of ICICI bank
37. Life style of Chennai Investors
38. Personality characteristics of Stock market investors
39. Impact of Locus of control on investment practices

40. Mapping Mutual fund schemes
41. Characteristics and perception of house loan borrowers
42. Need and importance of Food security
43. Applicability of Random walk theory to Indian Stock Market
44. Information efficiency of Indian Stock market
45. Indian Stock Market Reaction to the Quarterly Earnings Information
46. Analytical Study on Interim Reporting and its Impact on Share Prices

### **MARKETING**

1. A study on mandi owners perception about branded rice in Chennai
2. A study on satisfaction and loyalty of customers of more super market in Chennai
3. Assessment of marketing feasibility to locate a retail store
4. Perceptual mapping of different customers loans offered in Indian overseas bank
5. A study on women consumer attitude of purchasing car
6. A study on market potential of float glasses in Chennai region

### **HR**

1. A study on lifestyle and environmental changes and coping strategies of migrant workers at saint Gobain glass Ltd. Sriperumbudur
2. A study on organizational citizenship behavior and its impact on job satisfaction of the employees at TNPL
3. Training effectiveness among managerial staff in Chennai port trust

4. A study on employer branding
5. Gap analysis using Job analysis

#### **SYSTEMS AND OPERATIONS**

1. Relative effects of design, integration and information sharing on supply chain performance
2. Quality management practices in wheels India.
3. Benchmarking the operational efficiency of third party logistics providers using data envelopment analysis
4. Implementing supply chain management in a firm
5. The linkage between supply chain integration and manufacturing improvement programmes
6. An investigation of supply chain performance measurement in the Indian automotive sector
7. The impact of ERP systems on firm and business process performance
8. An AHP approach in benchmarking logistics performance of the postal industry
9. Electronic commerce strategy, operations, and performance in -----
10. Performance measurement in agri-food supply chains in -----
11. A data envelopment analysis approach to measuring vendor performance

## **FORMAT OF A PROJECT REPORT**

Acknowledgement

Abstract

Contents

List of tables

List of figures

Abbreviations

### **(INTRODUCTION)**

1.1 Introduction to the project

1.2 Company

1.3 Product

1.4 Need for the study

1.5 Objectives

1.6 Scope of the Study

1.7 Significance of the Study

1.8 Limitation

### **(REVIEW OF LITERATURE)**

2.1 Introduction-operational definition

2.2 Review relating concepts

2.3 Review relating to variables

**--3 (RESEARCH METHODOLOGY)**

3.1 Research Design

3.2 Nature and sources of data

3.3 Questionnaire design and development

3.4 Pilot study

3.5 Reliability and validity of the questionnaire

3.6 Sample design

Sample unit

Sample frame

Sample size

Sampling technique

3.7 Period of the study

3.8 Tools, techniques and formula used

3.9 Software packages used

**--4 (DATA ANALYSIS AND INTERPRETATION)**

4.1 Profile of the respondents

4.2 Concept or variable wise analysis

**--5 (SUMMARY OF FINDINGS, RECOMMENDATIONS, SCOPE FOR FURTHER STUDIES, IMPLICATION OF THE STUDY AND CONCLUSION)**

1. General findings and Specific findings
2. Recommendations
3. Educational and societal implications
4. Directions for future research
5. Conclusion

**Bibliography** (Follow either APA or Harvard Style)

1. Books
2. Published articles
3. Secondary sources
4. Working papers
5. Reports

**Appendix / Annexure**

Questionnaire

Sample frame

Big Table



## **ABSTRACT**

An abstract is a brief summary of a project, it should have need for the study, objectives, research methodology and tools used for the study and finding. One sentence may be devoted for each of the above stated things

## **SCOPE OF THE STUDY**

It is like boundary of the research, it refers to the parameters in with the study will be operating in. Here you have to state the aspects you have covered in the research including variables, area and model.

## **REVIEW OF LITERATURE**

Punithavati Pandian (1997) consolidating the views of economists, says that Investment is the employment of funds on assets with the aim of earning income or capital appreciation. The investment has two attributes namely time and risk. Present consumption is sacrificed to get return in the future. The sacrifice that has to be borne is certain but the return in the future may be uncertain. This attribute of investment indicates the risk factor. The risk is undertaken with a view to reap some return from the investment. For a layman, investment means some monetary commitment.

## **QUESTIONNAIRE**

Profile of the respondents

Try to collect data in metric form

Try to use statement wherever possible

Convert yes or no question into statement form of question

Different scale

Break variables into construct and every construct use some statement otherwise called items

## **HYPOTHESIS**

Chi-square- H<sub>0</sub>: There is no significant association between income and saving of the respondents

ANOVA- H<sub>0</sub>: There is no significant difference among different income categories with respect to their saving

Correlation - H<sub>0</sub>: There is no significant relationship between income and saving of the respondents

**If significant value is less than 0.05 then**

For Chi-Square analysis “there is significant association between income and saving of the respondents”

For ANOVA analysis “there is significant difference among different income categories with respect to their saving”

For Correlation analysis “there is significant relationship between income and saving of the respondents”

### **Sampling Technique**

Convenience, Random, Multi stage

## **ANALYSIS INTERPRETATION**

### **4.1 Profile of the Respondents**

Profile means the demographic characteristics of the sample respondents. The demographic characteristics include, age, sex, educational qualification and marital status of the respondents. The study is conducted among teachers of Government Colleges, Aided Colleges and Universities in Tamil Nadu. The following table shows break up of respondents from each segment of the population.

**TABLE 4.1.1:TYPE OF INSTITUTION**

Institution	Frequency	Percentage
Government	114	20.7
Aided	295	53.4
University	143	25.9
Total	552	100.0

From the above table 4.1.1 it is clear that around 20 percent of the sample respondents are working in Government Colleges and 53 percent of them are working in Government Aided Colleges and 26 percent of the sample respondents are working in universities. As the number of teachers working in Government Aided Colleges are more than that of Government Colleges, more number of Aided College teachers are included in the sample size.

**Table 4.1.2: Age of respondents**

Age	Frequency	Percent
18-28	31	31.0
29-38	66	66.0

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39-48	3	3.0
Total	100	100.0

The above table indicates that 31% of the respondents fall under the age group category 18-28 years, 3% under the category of 39-48 and 66% under the category 29-38. Thus a majority of the ex-employee respondents fall in the age group 29-38, and are in the transition of the Early earning stage and Established earning stage of the Financial planning cycle.

**Points:**

Every table should have number and name

Unnecessary rows and columns should not be there in the table

First interpretation for the table and then inference should be written. Inference means what you infer from the table or what is the conclusion derive from the table

The analysis should be in present tense

Don't give unnecessary space before and after the table

**Table No. 4.2.1: Chi-Square Test**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	39.588 <sup>a</sup>	10	.000
Likelihood Ratio	16.978	10	.075
Linear-by-Linear Association	.039	1	.843
N of Valid Cases	100		
a. 14 cells (77.8%) have expected count less than 5. The minimum expected count is .03.			

For example in the above table, We will not using Likelihood Ratio, Linear by linear association and N of valid cases values for analysis purpose so above thing should be avoided in the table. Then under the table there is a statement “a. 14 cells (77.8%) have expected count less than 5. The minimum expected count is .03.” which is warring so that should be removed

Normally if you copy the SPSS table it will be in Arial so convert into Times new roman or whatever form your body is in

Whenever you copy a table there will not be any rows for the table but it always better to put lines for rows then table should be in centre and values inside the cell should be in centre

After making above correction the table is displayed below

**Table: 4.3.30: Association between Age and the reason for taking up a job at Hurix**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	39.588 <sup>a</sup>	10	0.000

Don't not give - name with tools name

For example if you use correlation to find out relationship of age and satisfaction the - should be relationship between age and satisfaction and not correlation between age and satisfaction or simply correlation

Avoid we and I in the project report

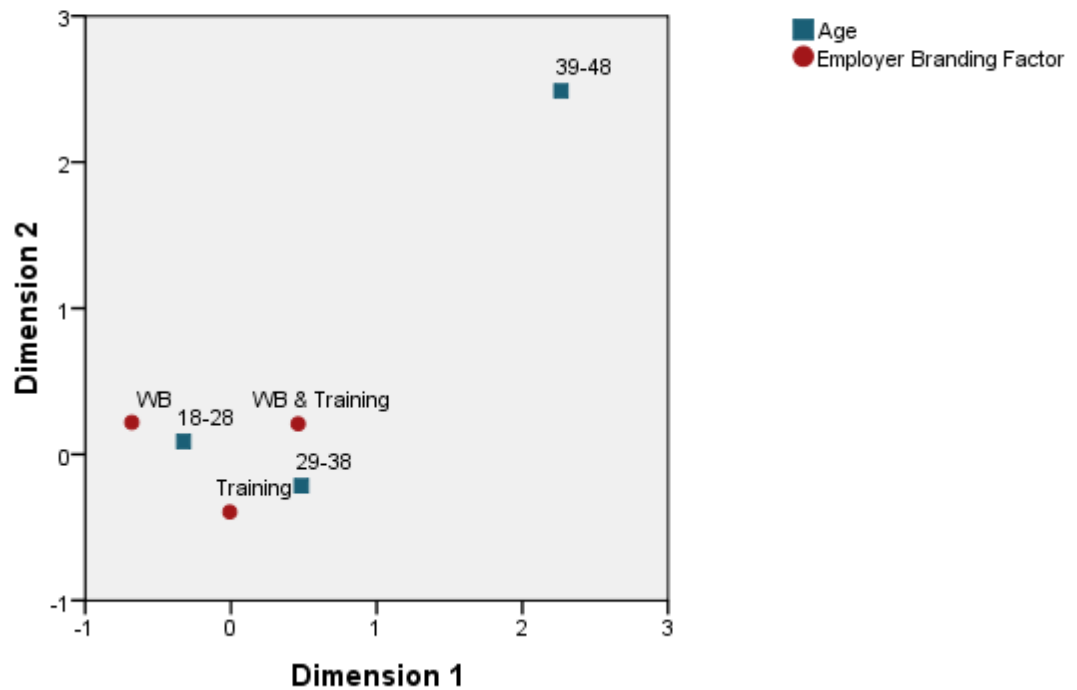
Analysis should have different sub -s for example

- 4.1 Profile of the Respondents
- 4.2 Respondent's outlook about Hurix System:
  
- 4.3 Brand Perception of the Respondents

If you paste figure from SPSS it will be like this

**Row and Column Points**

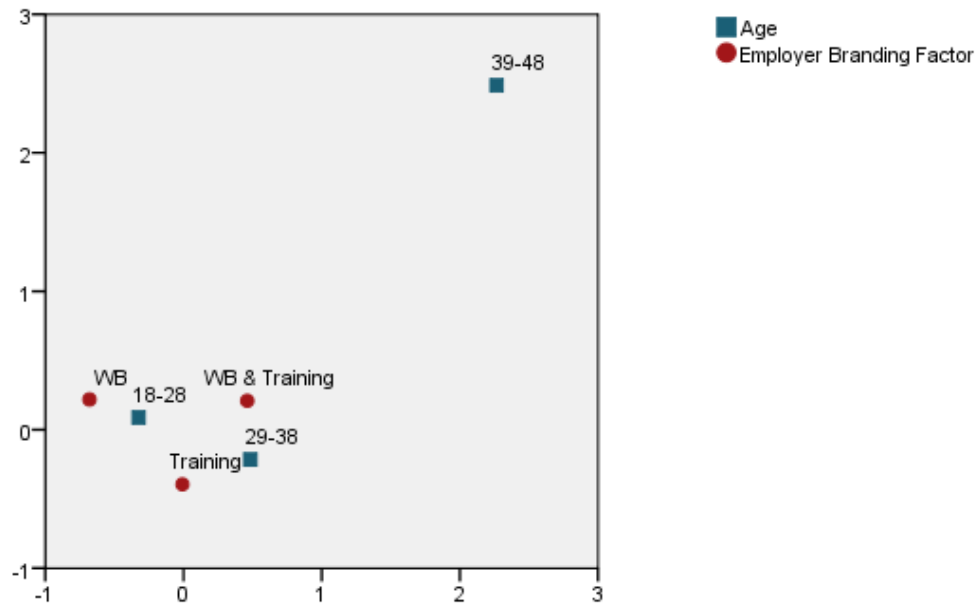
**Symmetrical Normalization**



We will not be using row and column points, symmetrical normalization and dimension. so those things should be removed. To remove this select the picture you will you get crop function in the menu bar. By using crop function remove unnecessary space and unnecessary words



**Figure 4.3.4 Correspondence analysis of the Employer branding variables**



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**To find out the association between income and savings**

**1. Monthly Income**

- a) Below 10000                      b) 10000-20000                      c) 20000-30000  
d) 30000-40000                      e) 40000-50000                      f) Above 50000

**1. (I).** Which of the following do you use to purchase family requirement things?

- (a) Only Maligai kadai (road corner shop).  
(b) Only Retail Store.  
(c) More of retail store and less of Maligai kadai (road corner shop).  
(d) More of Maligai kadai (road corner shop) and less of retail store.

**To find out the significance difference among different income categories on the level of satisfaction towards the services provided by the retail stores**

**2. Monthly Income**

- a) Below 10000                      b) 10000-20000                      c) 20000-30000  
d) 30000-40000                      e) 40000-50000                      f) Above 50000

**2(II).** Kindly state your level of satisfaction towards the following services provided by your frequently visited retail store. [Please tick]

Description	High Satisfaction	Neutral Satisfaction	No Satisfaction
Parking			
Availability of Products			
Staff Co-operation			
Discounts and Offers			

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Home delivery			
Location			

To find out the relationship between the level of satisfaction and frequency of stores visited

Kindly state your level of satisfaction towards the following services provided by your frequently visited retail store. [Please tick]

Description	High Satisfaction	Neutral Satisfaction	No Satisfaction
Parking			
Availability of Products			
Staff Co-operation			
Discounts and Offers			
Home delivery			
Location			

Which organized retail store do you visit :( Kindly select the below)

Description	Most visited	Visited	Least Visited	Never visited
Spencer's daily				

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More				
Heritage Fresh				
Reliance fresh				

To find out the difference between pre and post treatment scores of agility (categorize the pre and post agility scores into two levels)

To find out the difference between pre and post announcement of quarterly results

The population mean of 'average monthly minutes' spoken is 200. Test the hypothesis that sample mean of 'average monthly minutes' does not differ significantly from the population mean.

Gender : (a) Male                      (b) Female

Kindly state your level of satisfaction towards the following services provided by your frequently visited retail store. [Please tick]

Description	High Satisfaction	Neutral Satisfaction	No Satisfaction
Parking			
Availability of Products			
Staff Co-operation			
Discounts and Offers			

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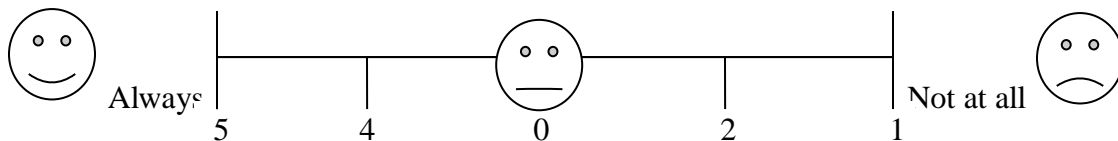
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Home delivery			
Location			

What is your level of satisfaction on products of HUL?

<b>FACTOR</b>	<b>Highly Satisfied</b>	<b>Satisfied</b>	<b>Undecided</b>	<b>Dissatisfied</b>	<b>Highly Dissatisfied</b>
<b>Price</b>					
<b>Features</b>					
<b>Quality</b>					
<b>Product</b>					

How likely have you recommend **HUL products** to others?



*5- Always, 4 – Often, 0 – Can't say, 2 – Never, 1 – Not at all*

Calculate the effects of the following independent variables on propensity to leave:

- Average monthly bill
- Avg monthly minutes
- Pet used for business
- Years using our service
- Household income

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Using the 5 point scale shown below, indicate how uncharacteristic or characteristic each of the following statements is in describing you. Place your rating in the box to the right of the statement.

1 = Strongly Disagree, 2= Disagree, 3 = Undecided, 4 = Agree, 5 = Strongly Agree

Sl. No.	Questionnaire for Bank Employees	Disagree Agree				
		←————→				
1.	Are you satisfied with the current performance evaluation system of your bank?	1	2	3	4	5
2.	When compared to other banks your banking performance level is high.	1	2	3	4	5
3.	Number of Accounts/transactions performed.	1	2	3	4	5
4.	Number of Business generates performed.	1	2	3	4	5
5.	Introducing new financial products or services as a result of customer requirements.	1	2	3	4	5
6.	Achievements of performance evaluation will help in my personal growth.	1	2	3	4	5
7.	Overall, how do you feel about the benefits you receive from this bank?	1	2	3	4	5
8.	Our benefits are as good as or better than the benefits in other banks.	1	2	3	4	5
9.	I am satisfied with the priorities & directions of my department.	1	2	3	4	5
10.	In my opinion, the bank does a good job of promoting the most	1	2	3	4	5

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	competent people.					
11.	Is the bank provides training facility to the customers use the ICT (Information and Communication Technology)	1	2	3	4	5
12.	I am encouraged to think independently.	1	2	3	4	5
13.	I am setting my own Goals.	1	2	3	4	5
14.	I have a better idea of my job responsibilities.	1	2	3	4	5
15.	I am confident I can achieve my personal career objectives with this bank.	1	2	3	4	5
16.	Managers in this organization are held accountable for their performance.	1	2	3	4	5
17.	I feel I have been sufficiently well trained to deal effectively with our customers/investors.	1	2	3	4	5
18.	My working conditions and environment enable me to do my job well.	1	2	3	4	5
19.	Is the bank adopted the latest technology and standards for the banking.	1	2	3	4	5
20.	Do they feel secure when performing transactions through Bank website?	1	2	3	4	5
21.	Are the customers satisfied by the infrastructure of the internet provided to them by the Internet Service Provider?	1	2	3	4	5
22.	Customer is satisfied by the Quality of Services (QoS) provided by the Bank.	1	2	3	4	5
23.	My coworkers care about the quality of services and programs we provide.	1	2	3	4	5

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24.	I am proud that I work in the bank.	1	2	3	4	5
-----	-------------------------------------	---	---	---	---	---

**Cluster**

1. According to me, the Plastic money usage can be improved if Knowledge about usage of Plastic cards is given and it will help in

Actions	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly disagree
Managing instable income					
Reduce malpractices by outlet owners					
Reduce malpractices by bankers					
Using safety measures					
Demanding for low cost cards or zero fee cards.					
Demand for lower interest rates on cards and loans.					
Removing fear about Credit Card usage.					



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S.NO	Variable 1	Variable 2	Tool
1.	Category	Category	Chi Square
2.	Metric (Dependent)	1 Category variable	ANOVA
		2 Category variable	Factorial ANOVA
		1 or More Factor variable 1 or More Controlling	ANCOVA
	More dependent variable	More factor variable	MANOVA
3.	Metric	Category (Only 2 groups)	Independent- samples T test
4.	Metric (Pre)	Metric (Post) Same variable	Paired – Samples T test
5.	Metric	Metric (Repeated many times) Same variable	Repeated measures ANOVA
6.	Metric	Metric	Correlation
7.	Metric (Dependent)	Metric (Independent)	Regression
8.	Dependent variable 1	Many independent variables	Multiple-Regression
9.	1 Dependent	1 or More Independent variables (Panel Data)	Panel data regression
10.	More than one metric variable (Grouping the variables)		Factor Analysis
11.	More than one metric variable (Segmenting the respondents)		Cluster Analysis
12.	Category (1 Dependent)	Metric (many Independent)	Discriminant
13.	Dependent 1 variable (with 2 group)	Many Independent variable	Binary Logistics

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14.	More than 1 dependent variable either Category / Metric	More than 1 independent variable either Category / Metric	Cononical Correlation
15.	To find out the cause and effect relationship		Granger Casuality
16.	To forecast the time series data		ARIMA
17.	To find out the relationship between highly volatile data		ARCH
18.	To find out the efficiency of using input in generating output		DEA
19.	Validity(Item, Construct, Convergent, Divergent) Checking		CFA
20.	To know any number of relationship		SEM
21.	To find out the overall best considering the many criteria		TOPSIS/AHP
22.	To find out the combination of attributes for the products		Conjoint Analysis

SPSS – STATISTICAL PACKAGE OF THE SOCIAL SCIENCES (Practical Notes)

- 1) Generating a Frequency Table
- 2) Generating a Bar Chart
- 3) Generating a Pie Chart
- 4) Generating a Histogram
- 5) Generating Arithmetic Mean, Median,
- 6) Standard Deviation and Range
- 7) Generating Chi – Square Test Correlation Analysis
- 8) Generating Regression Analysis
- 9) Generating Analysis of Variance (ANVO) [One– Way]

**Program - 1**

**GENERATING A FREQUENCY TABLE**

**How to Produce a Frequency Table?**

**SPSS Commands:**

**STEP 1** : Data Entered into a data file in SPSS

**STEP 2** : Click the button **Analyze** on the SPSS menu bar [→ **Descriptive Statistics** → **Frequencies**] and opens the frequencies dialog box.

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**STEP 3** : On the dialog box, select variable(s) for analyze and clicking on the right arrow to send selected variable(s) into **Variable(s) List**.

**STEP 4** : Click OK, the table will appear in the Output Viewer.

Note that in the Frequencies dialog box, variables that have been assigned labels will appear in terms of their variable labels, but those that have not been assigned labels will appear in terms of their variable names. This is a feature of all dialog boxes produced via Analyze and Graphs.

Consider the following set of 15 scores which were obtained by asking a class of students their shoe size, shoe width, and sex (male or female).

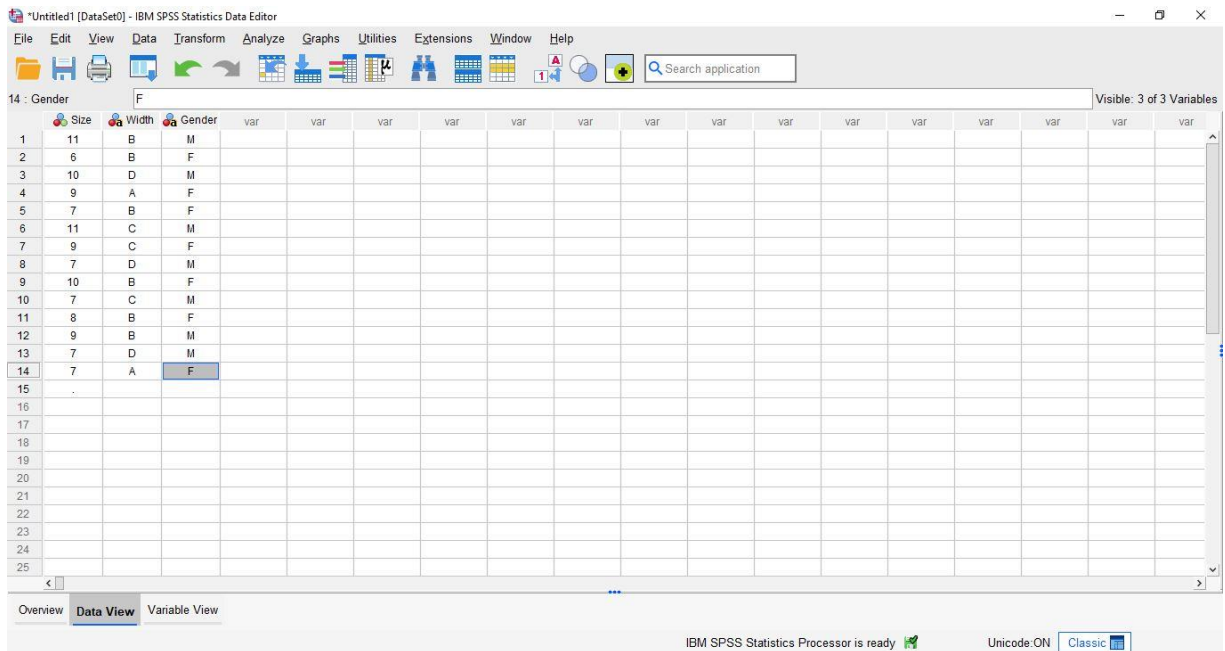
<b>Shoe Size</b>	10.5	6	9.5	8.5	7.5	10.5	8.5	6.5	9.5	7	7.5	9	6.5	7.5
<b>Shoe Width</b>	B	B	D	A	B	C	C	D	B	C	B	B	D	A
<b>Gender</b>	M	F	M	F	F	M	F	M	F	M	F	M	M	F

**Solution:**

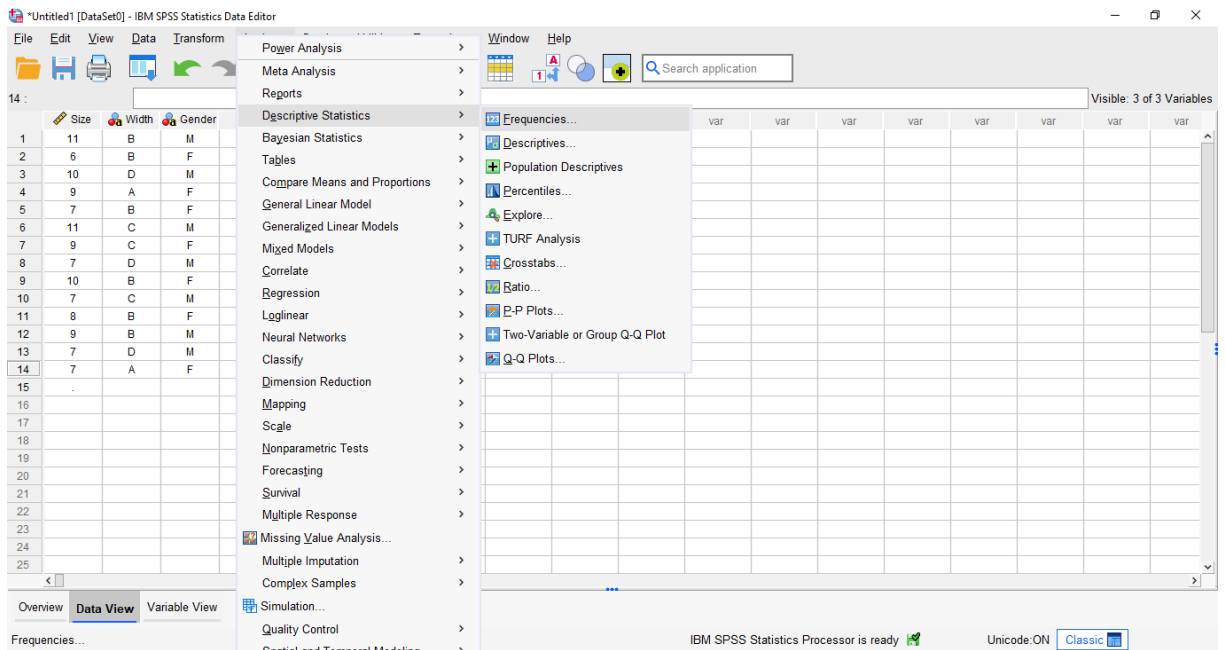
**STEP : 1** Data entered into a data file in SPSS appears as follows:

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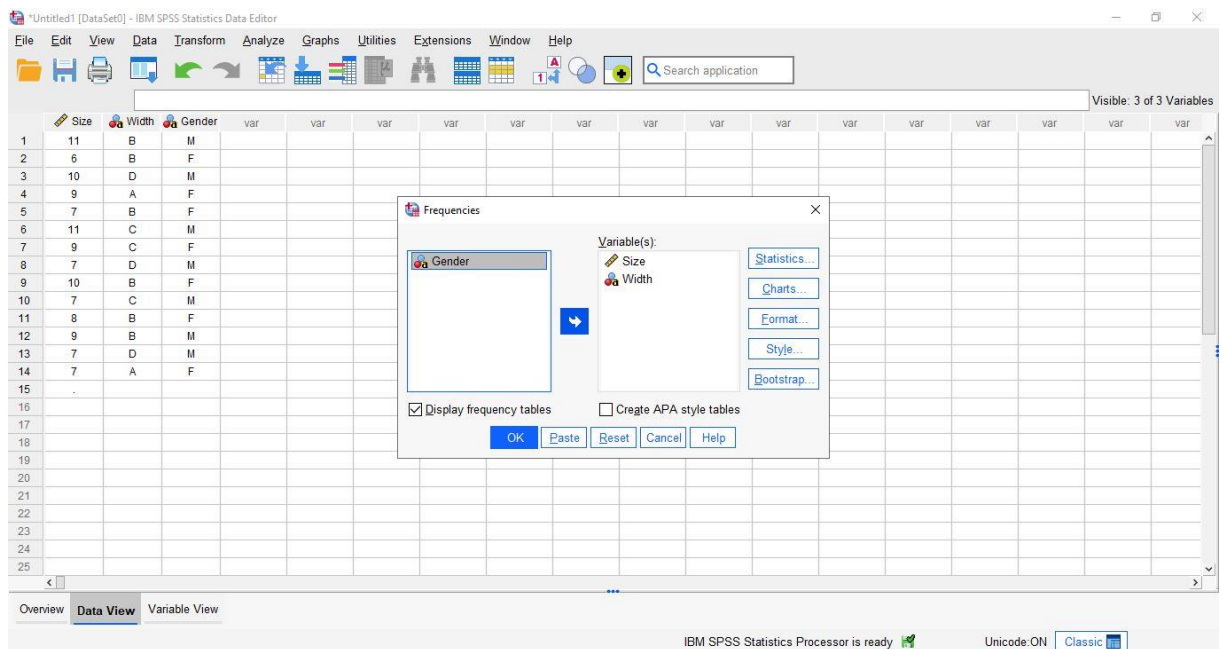
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**STEP : 2** Click the **Analyze** on the SPSS menu bar [**→ Descriptive statistics**  
**→ Frequencies**] and open the frequencies dialog box.



**STEP : 3** On the dialog box, select variable(s) for analyze and clicking on the right arrow to send selected variable(s) into **Variable(s) List**.



**STEP 4** : Click OK, the table will appear in the Output Viewer.

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IBM SPSS Statistics Viewer window showing the output of a frequency analysis. The interface includes a menu bar (File, Edit, View, Data, Transform, Insert, Format, Analyze, Graphs, Utilities, Extensions, Window, Help) and a toolbar. The left pane shows a tree view of the output, with 'Frequencies' expanded to show 'Statistics', 'Frequency Table', 'Size', 'Width', and 'Gender'. The main area displays the following tables:

Statistics

	Size	Width	Gender
N	Valid 14	15	15
	Missing 1	0	0

Frequency Table

Size

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 6	1	6.7	7.1	7.1
7	5	33.3	35.7	42.9
8	1	6.7	7.1	50.0
9	3	20.0	21.4	71.4
10	2	13.3	14.3	85.7
11	2	13.3	14.3	100.0
Total	14	93.3	100.0	
Missing System	1	6.7		
Total	15	100.0		

Width

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	6.7	6.7	6.7

IBM SPSS Statistics Processor is ready Unicode:ON Classic

**Program - 2**

**GENERATING A BAR CHART**

**How to Produce a Bar Diagram?**

**SPSS Commands:**

**STEP 1** : Data Entered into a data file in SPSS → Click the button in Graphs options.

**STEP 2** : Select the Graph → Click **Bar chart**.

**STEP 3** : Select variable(s) for analyze → Clicking on the right arrow to send selected variable(s) into **Variable(s) List**.

**STEP 4** : Clicking the titles button and enter the **Footnotes** and **Head notes**.

**STEP 5** : Click OK, the table will appear in the Output Viewer.

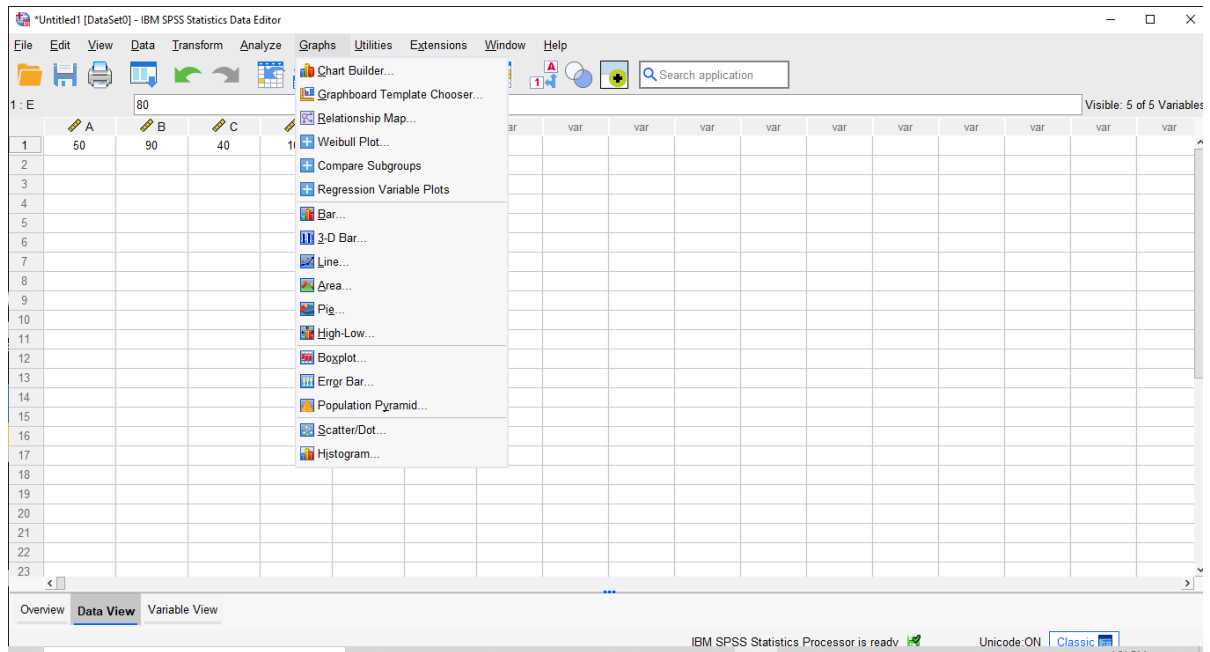
Draw the bar chart from the following data:

Production Units	A	B	C	D	E
Total No. of Production	50	90	40	100	80

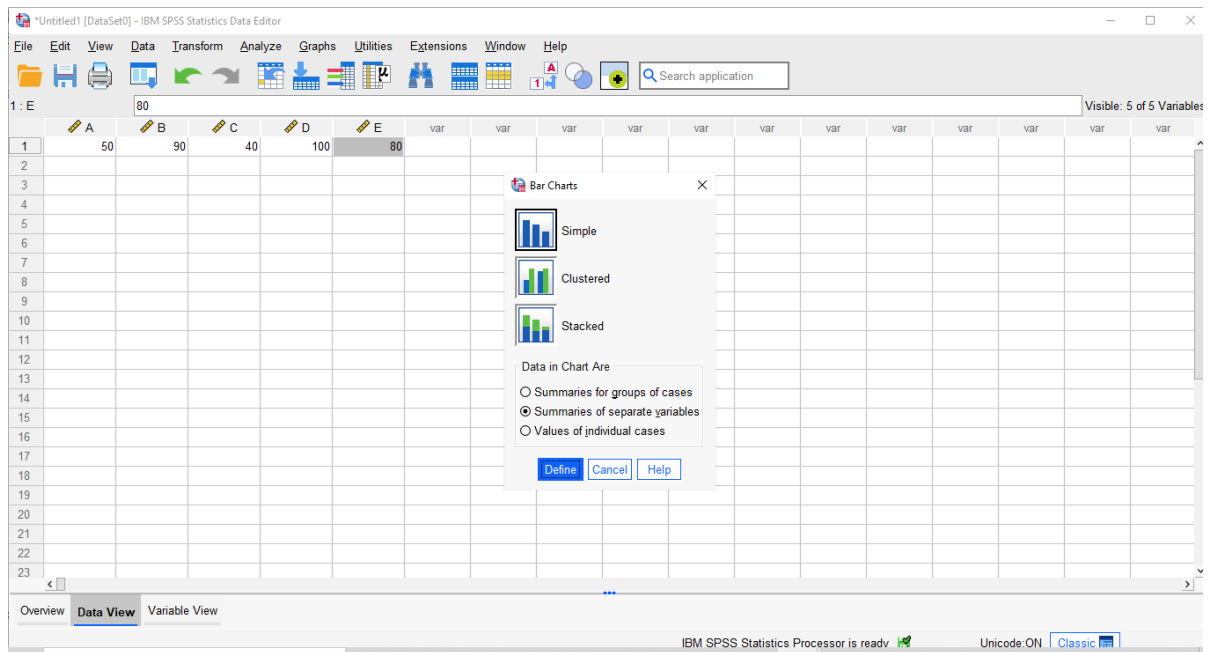
Solution :



**STEP 1** : Data Entered into a data file in SPSS → Click the button in Graphs options.



**STEP 2** : Select the Graph → Click **Bar chart**.



**STEP 3** : Select variable(s) for analyze → Clicking on the right arrow to send selected variable(s) into **Variable(s) List**.

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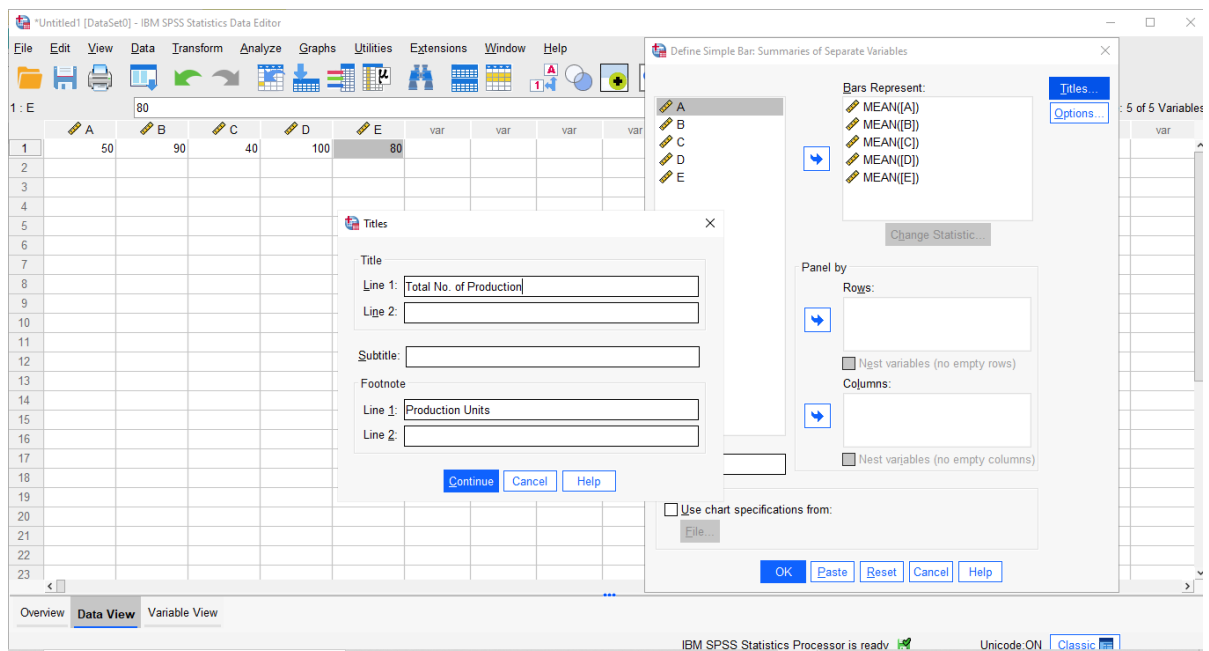
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The screenshot displays the IBM SPSS Statistics Data Editor interface. The main window shows a data table with 23 rows and 5 columns labeled A, B, C, D, and E. The values in row 1 are 50, 90, 40, 100, and 80 respectively. The 'Define Simple Bar: Summaries of Separate Variables' dialog box is open, showing the following configuration:

- Bars Represent:** MEAN(A), MEAN(B), MEAN(C), MEAN(D), MEAN(E)
- Panel by Rows:** (Empty)
- Columns:** (Empty)
- Filter by:** (Empty)
- Template:**  Use chart specifications from: File...

The dialog box also includes buttons for 'Titles...', 'Options...', 'Change Statistic...', 'OK', 'Paste', 'Reset', 'Cancel', and 'Help'. The status bar at the bottom indicates 'IBM SPSS Statistics Processor is ready' and 'Unicode: ON Classic'.

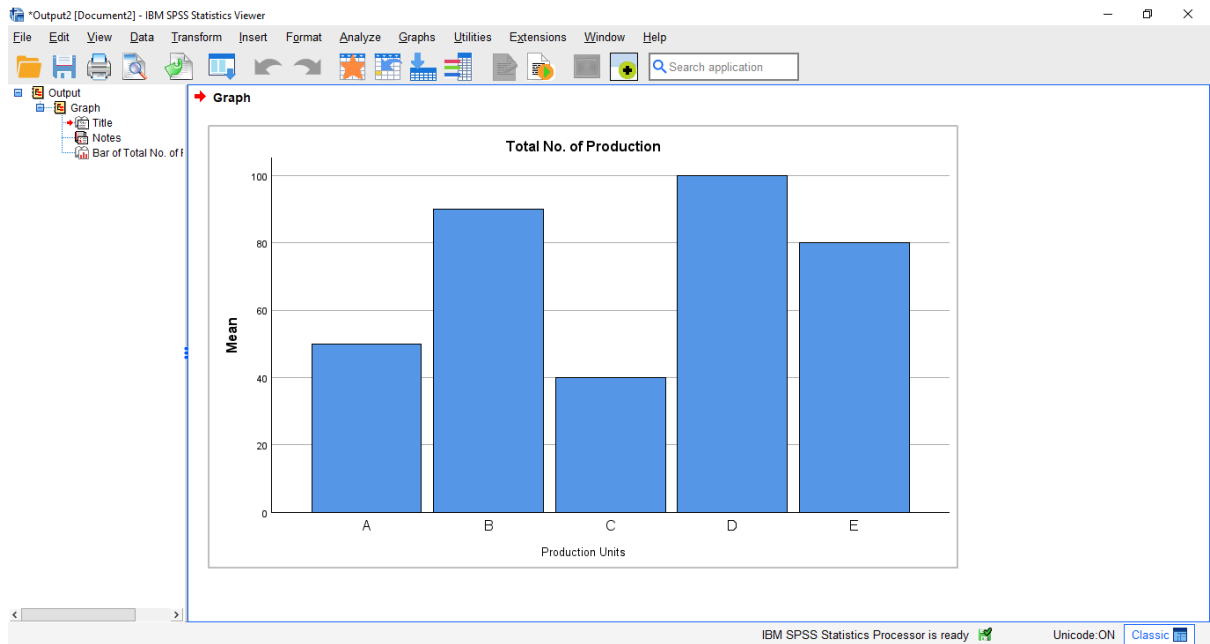
**STEP 4** : Clicking the titles button and enter the **Footnotes** and **Head notes**.



**STEP 5** : Click OK, the table will appear in the Output Viewer.

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**Program - 3**

**GENERATING A PIE CHART**

**How to Produce a Pie chart?**

**SPSS Commands:**

**STEP 1** : Data Entered into a data file in SPSS → Click the button in **Graphs options**.

**STEP 2** : Select pie Button → Click → Choose value of individual cases → Click the Define button.

**STEP 3** : Select the Case Number.

**STEP 4** : Click OK; the table will appear in the Output Viwer

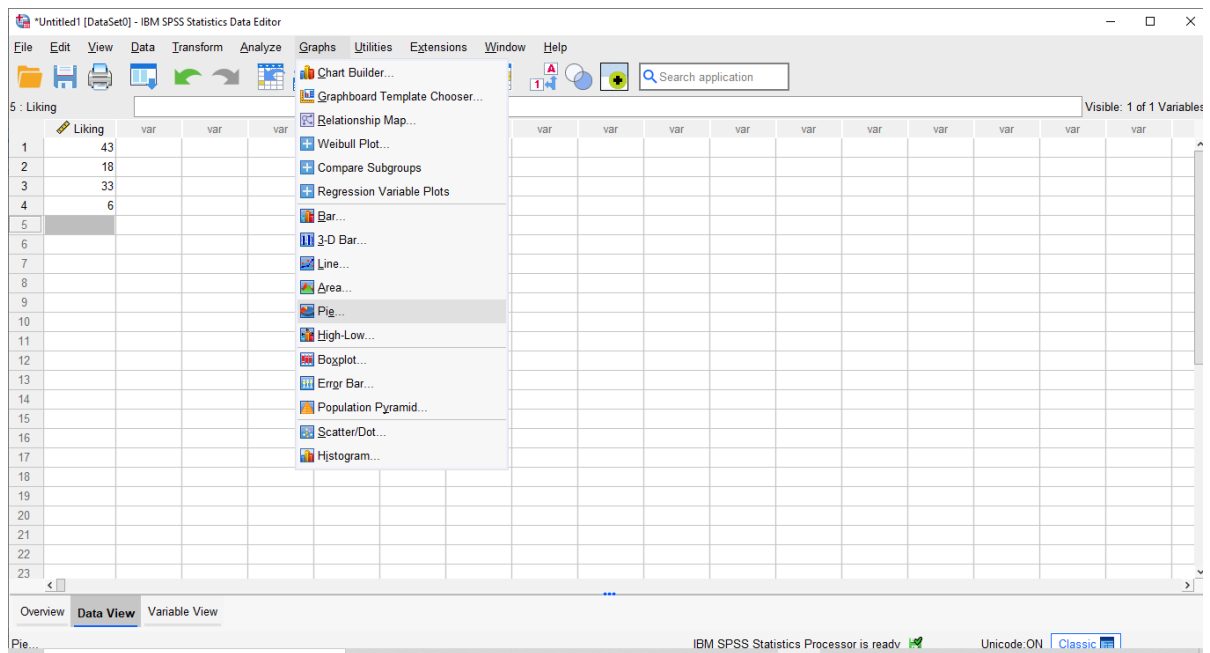
**STEP 5** : Double click above the pie chart and select the element.

**STEP 6** : Click the show data levels.

In a survey 43% People like the flower Rose and 18% People like Jasmine, 33% People like Sunflower and 6% People like Tulips. For this survey information, Draw a pie chart.

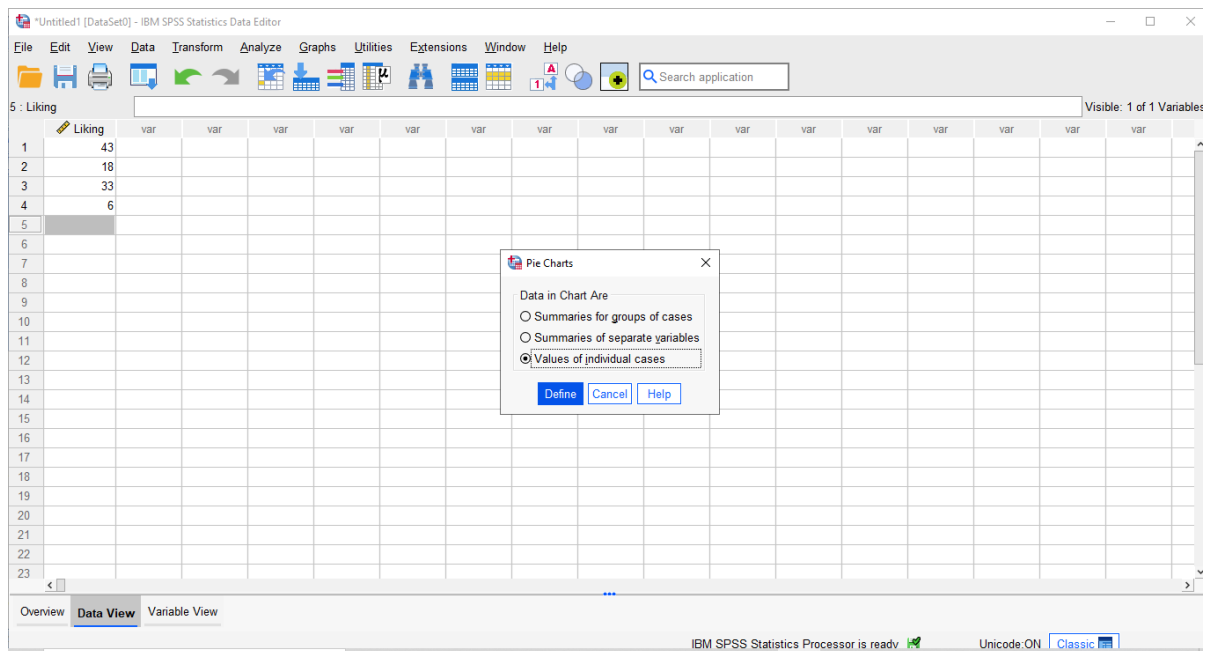
Solution:

**STEP 1** : Data Entered into a data file in SPSS → Click the button in **Graphs** options.



**STEP 2** : Select pie Button → Click → Choose value of individual cases →

Click the Define button.



**STEP 3** : Select the Case Number.



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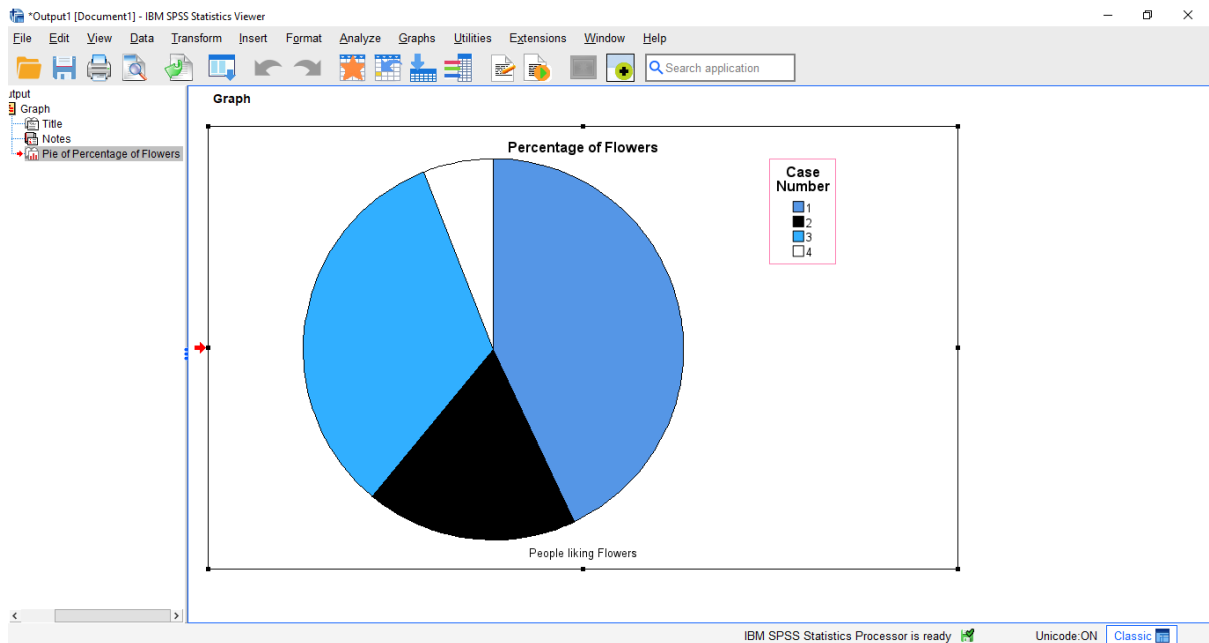
---

The screenshot displays the IBM SPSS Statistics Data Editor interface. On the left, a data list shows the variable 'Liking' with values 43, 18, 33, and 6 for cases 1 through 4. The main window features two dialog boxes:

- Define Pie: Values of Individual Cases:** This dialog is used to configure a pie chart. Under 'Slices Represent:', the variable 'Liking' is selected. Under 'Slice Labels:', the radio button for 'Case Number' is selected. The 'Panel by' section includes 'Rows' and 'Columns' fields, both currently empty. There are checkboxes for 'Nest variables (no empty rows)' and 'Nest variables (no empty columns)', both of which are unchecked. A 'Filter by:' field is also present and empty. At the bottom, there is a 'Template' section with a checkbox for 'Use chart specifications from:' and an 'File...' button. The 'OK', 'Paste', 'Reset', 'Cancel', and 'Help' buttons are visible at the bottom of the dialog.
- Titles:** This dialog is used to add titles and subtitles to the chart. The 'Title' section has 'Line 1' containing 'Percentage of Flowers'. The 'Footnote' section has 'Line 1' containing 'People liking Flowers'. There are also fields for 'Line 2' in both sections, which are currently empty. 'Continue', 'Cancel', and 'Help' buttons are at the bottom.

The status bar at the bottom of the SPSS window indicates 'IBM SPSS Statistics Processor is ready' and 'Unicode: ON'.

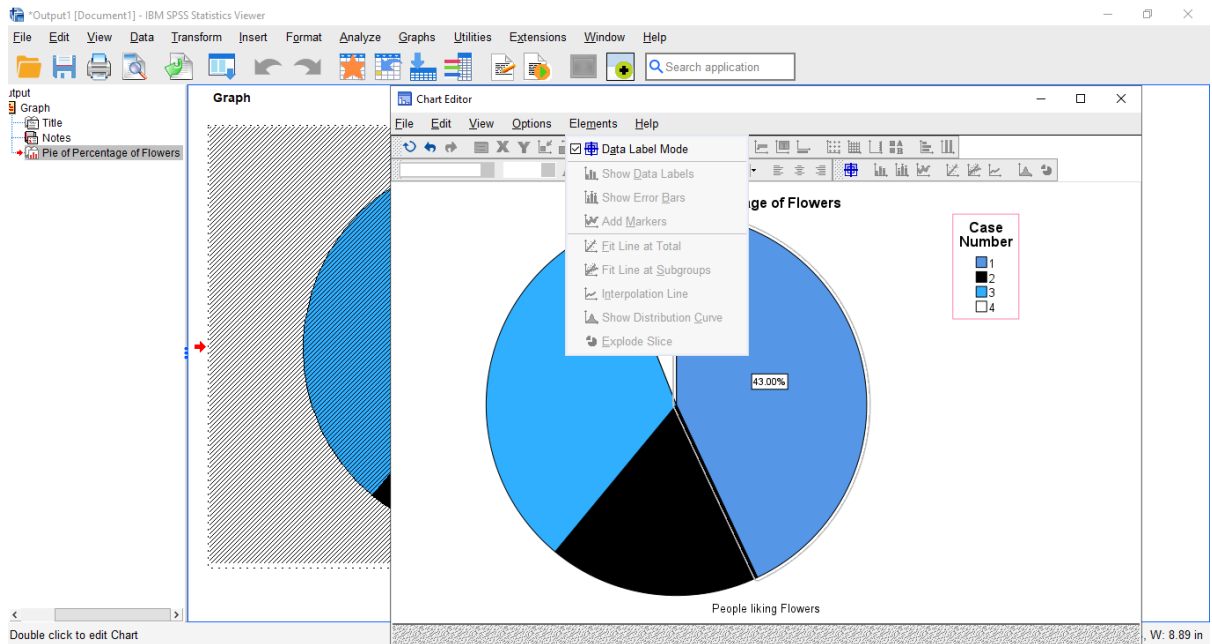
**STEP 4** : Click OK; the table will appear in the Output Viwer.



**STEP 5** : Double click above the pie chart and select the element.

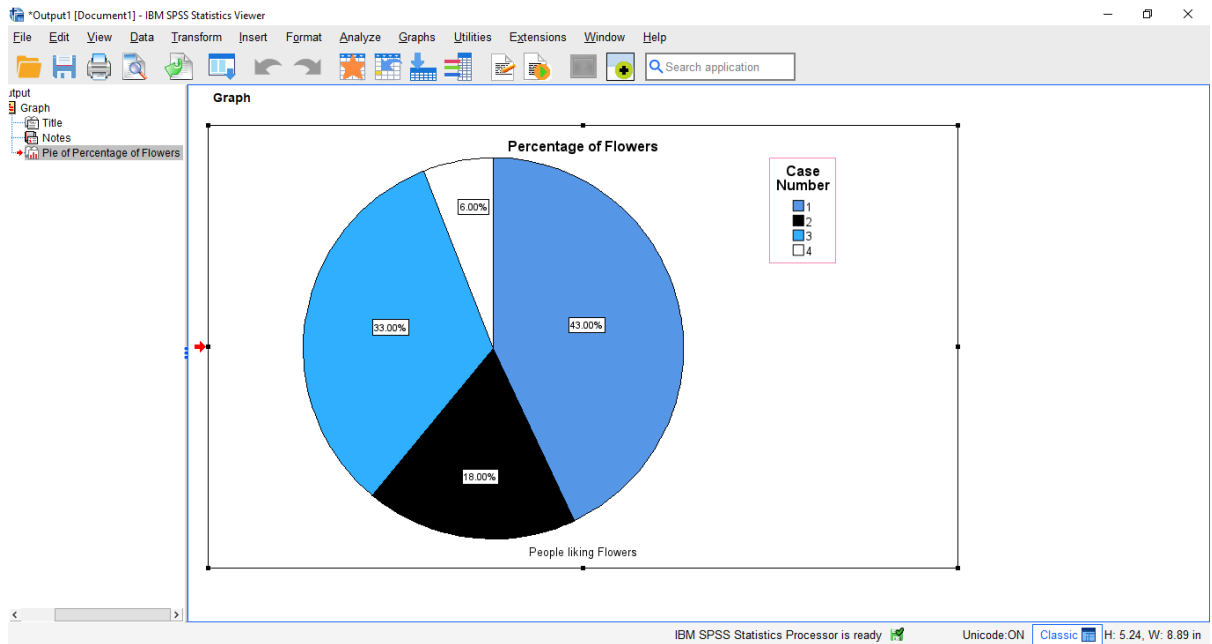
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**STEP 6 :** Click the show data levels.

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**Program - 4**

**GENERATING A HISTOGRAM**

**How to Produce a Histogram?**

**SPSS Commands:**

**STEP 1** : Data entered into a data File in SPSS → Click the button in Graphs.

**STEP 2** : Select the Button Histogram → Click.

**STEP 3** : Select Variable(s) for analyse and click the right to send Selected Variable(s) into variable(s) List.

**STEP 4** : Select the Display normal Curve.

**STEP 5** : Click ok ; the table will appear in the output viewer.

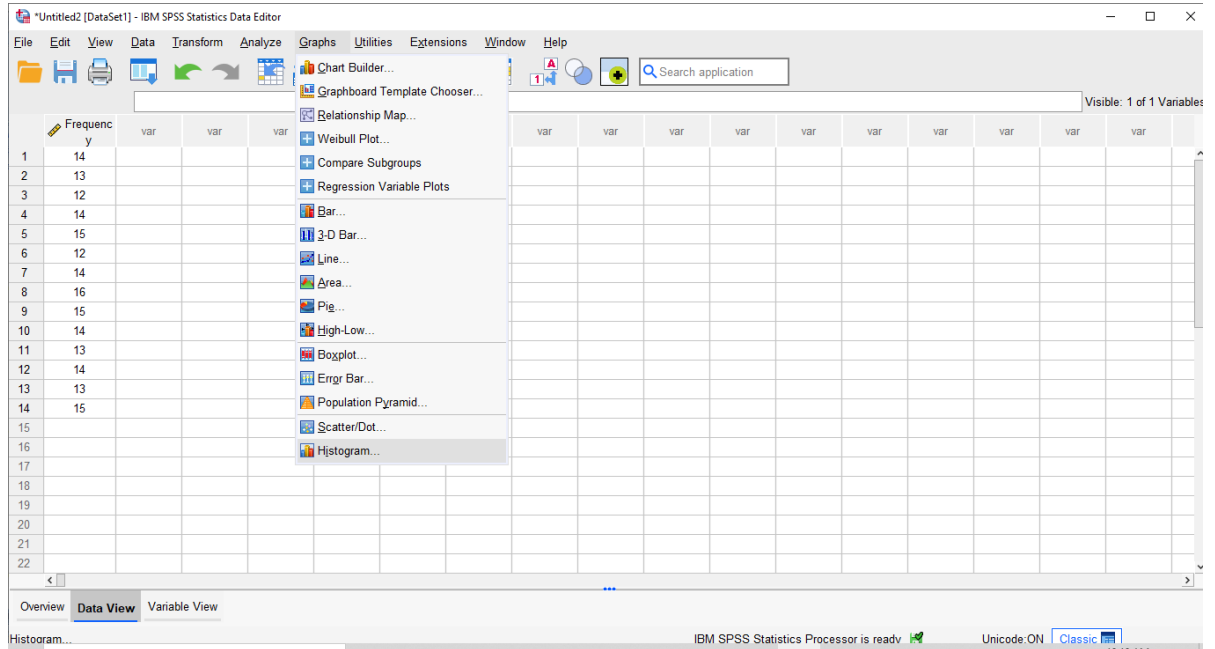
From the following data, Draw the Histogram.

AGE	14	13	12	14	15	12	14	16	15	14	13	14	13	15
-----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Solution :

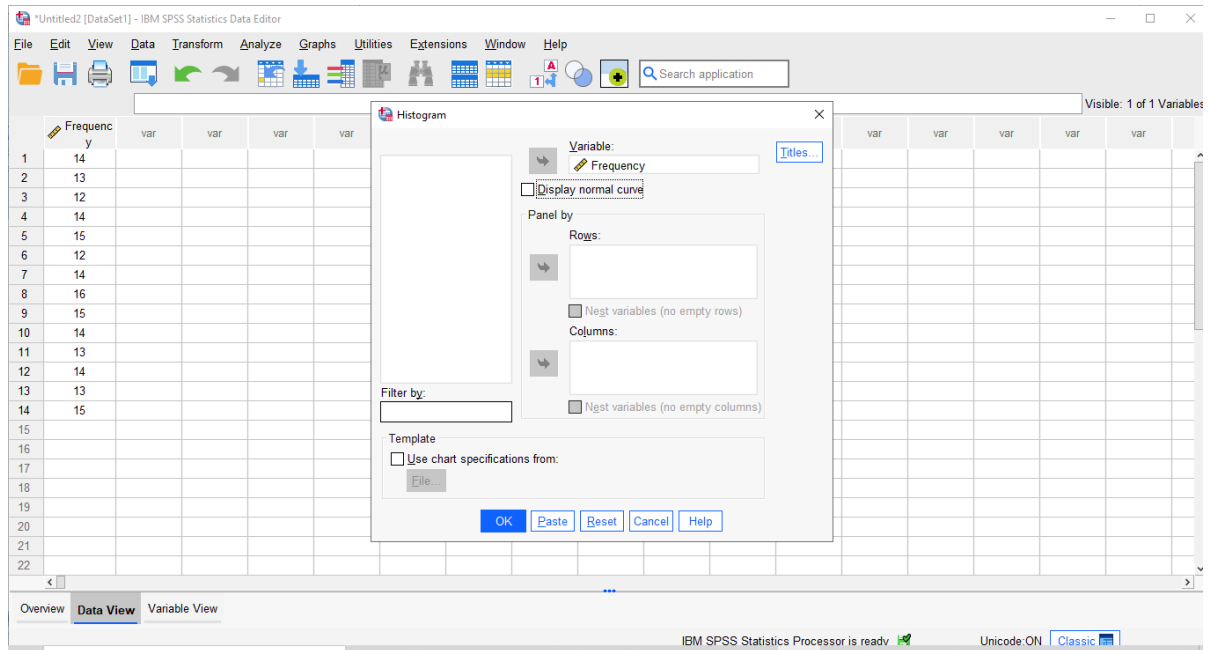
**STEP 1** : Data entered into a data File in SPSS → Click the button in Graphs.

**STEP 2** : Select the Button Histogram → Click.



**STEP 3** : Select Variable(s) for analyse and click the right to send Selected

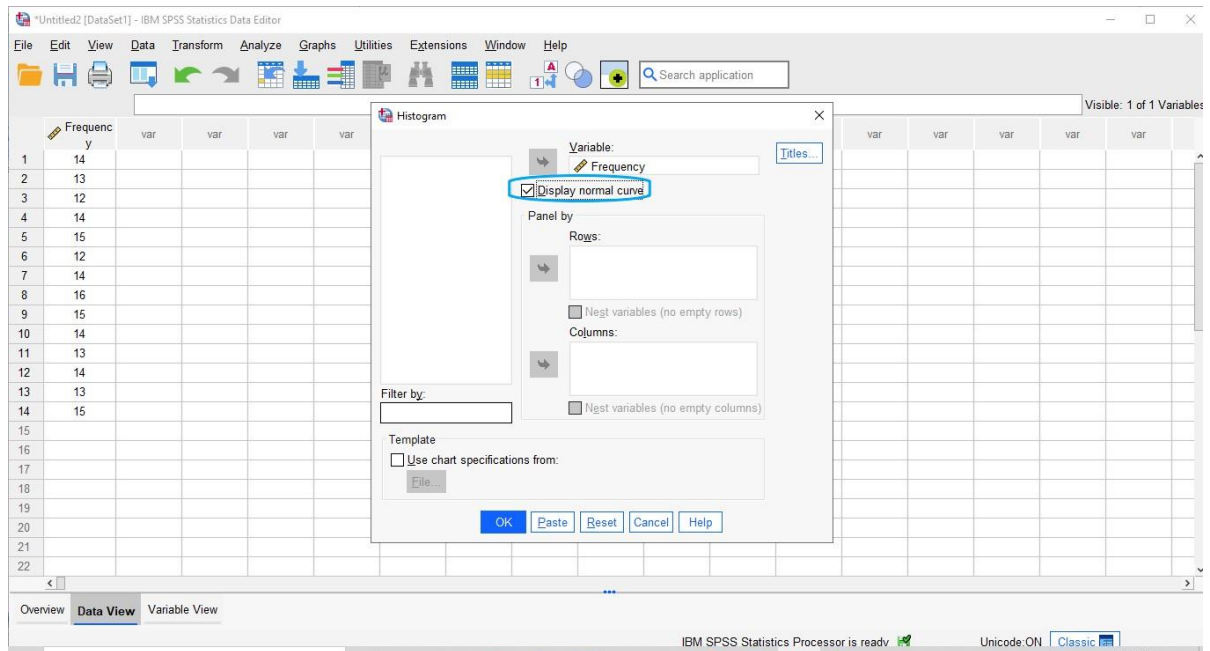
Variable(s) into variable(s) List.



**STEP 4** : Select the Display normal Curve.

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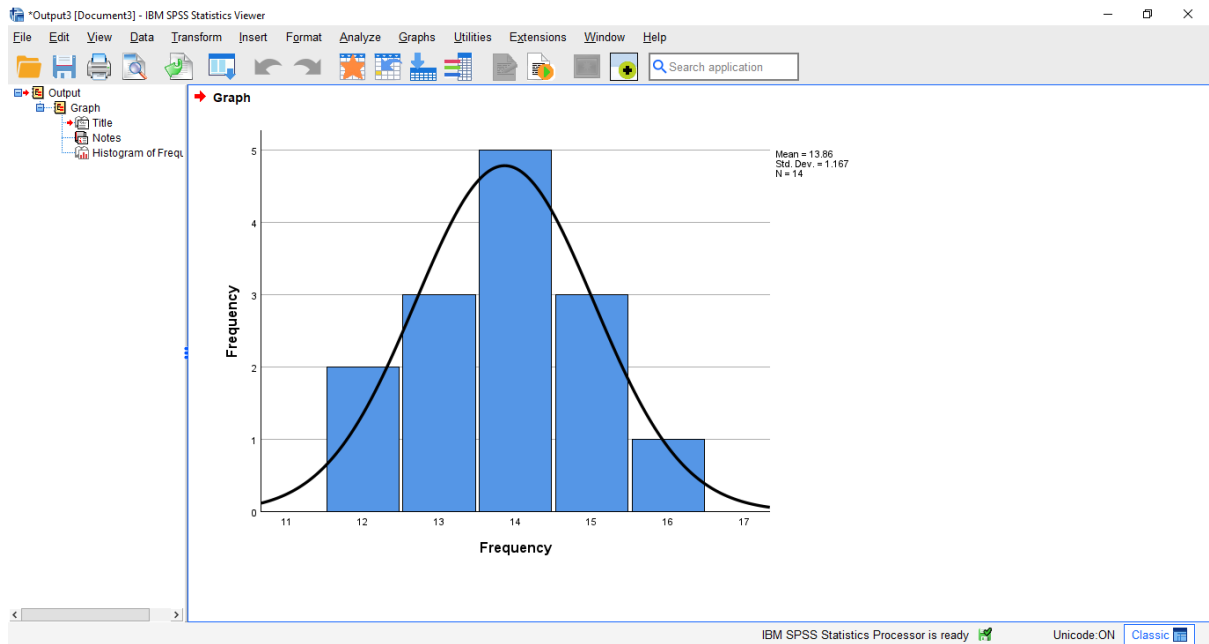


**STEP 5** : Click ok ; the table will appear in the output viewer.



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**Program - 5**

**GENERATING ARITHMETIC MEAN, MEDIAN,**

**STANDARD DEVIATION AND RANGE**

**How to Produce the Mean, Median,  
Standard Deviation and Range?**

**SPSS Commands:**

**STEP 1** : Data Entered into a data file in SPSS → Click the button Analyze.

**STEP 2** : Select Descriptive statistics → Explore [opens the explore dialog box].

**STEP 3** : Select variable(s) for analyse and clicking the right to send selected  
variable(s) into **variable(s) List**.

**STEP 4** : Click OK, the table will appear in the Output Viewer.

Age of the 12 peoples are given. Calculate the arithmetic mean, median,  
standard deviation, and range from the following data:

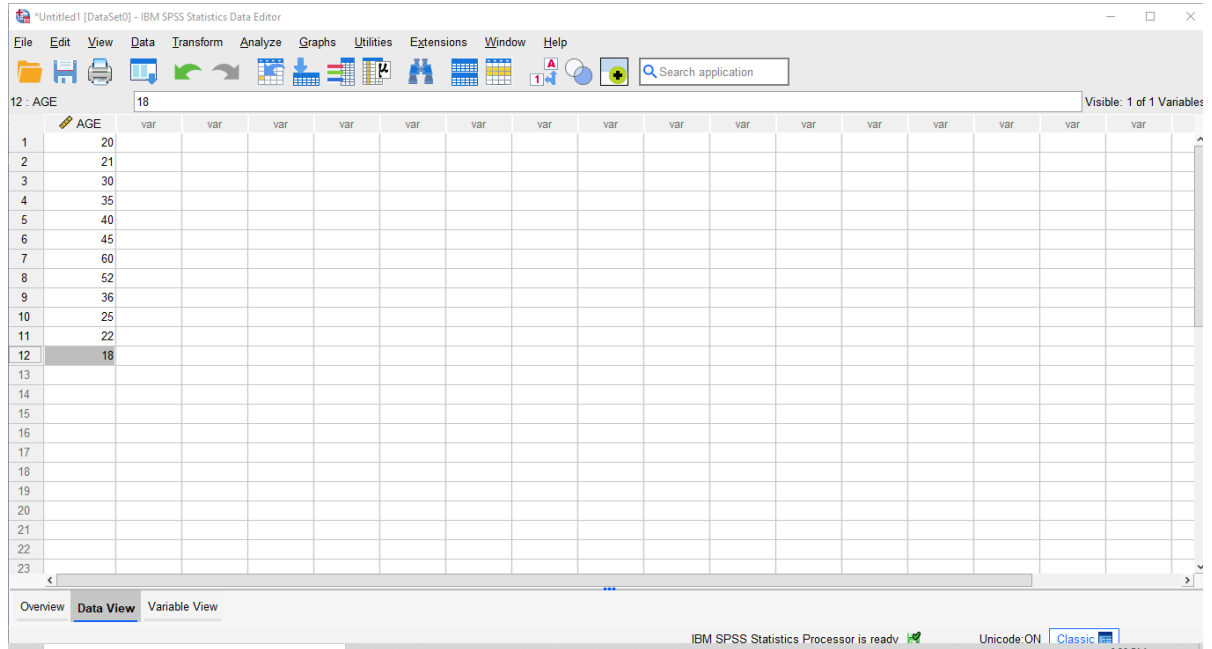
AGE	20	21	30	35	40	45	60	52	36	25	22	18
-----	----	----	----	----	----	----	----	----	----	----	----	----

Solution :

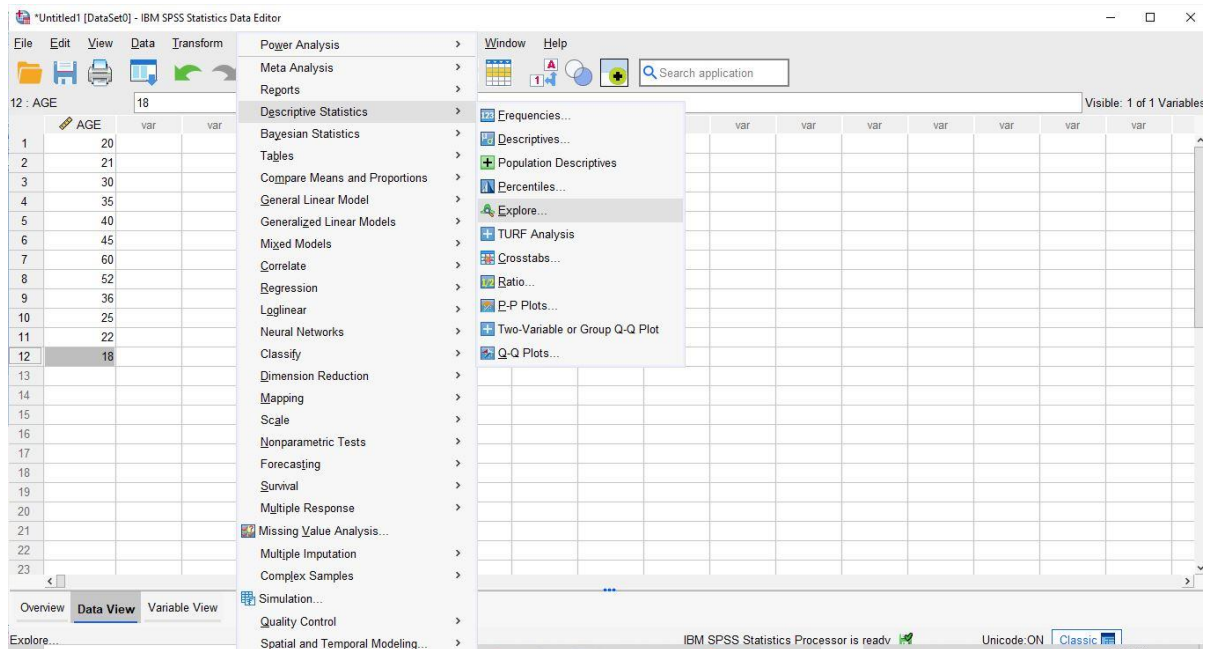
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**STEP 1** : Data Entered into a data file in SPSS → Click the button Analyze.



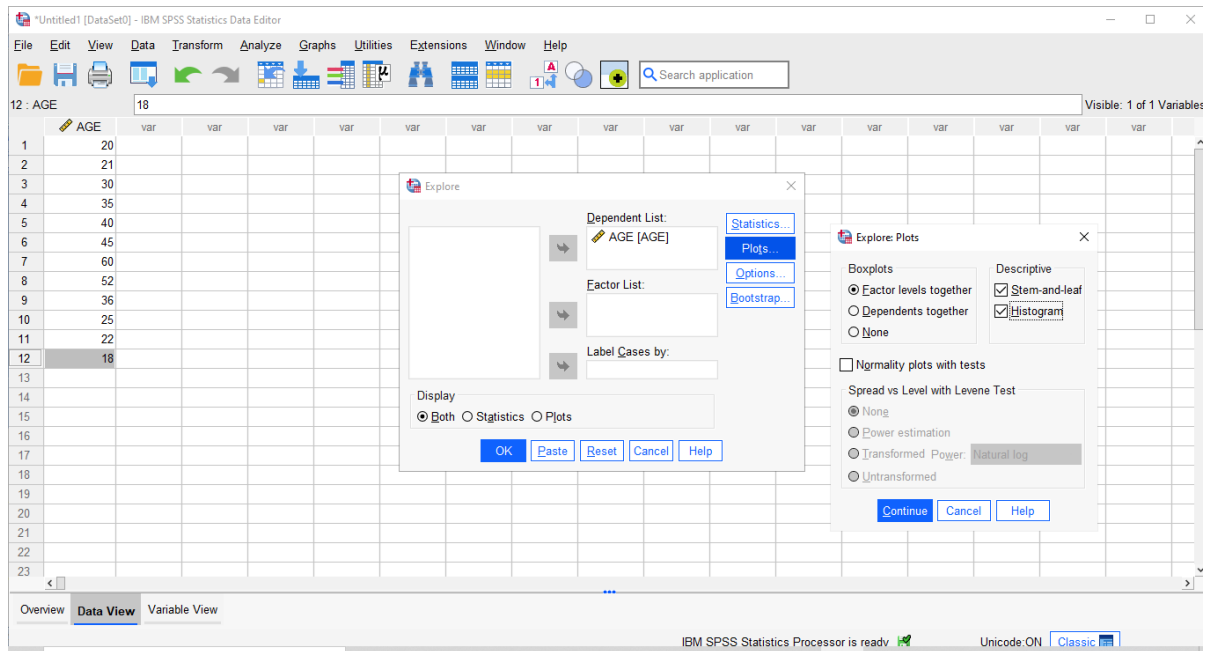
**STEP 2** : Select Descriptive statistics → Explore [opens the explore dialog box].



**STEP 3** : Select variable(s) for analyse and clicking the right to send selected variable(s) into **variable(s) List**.

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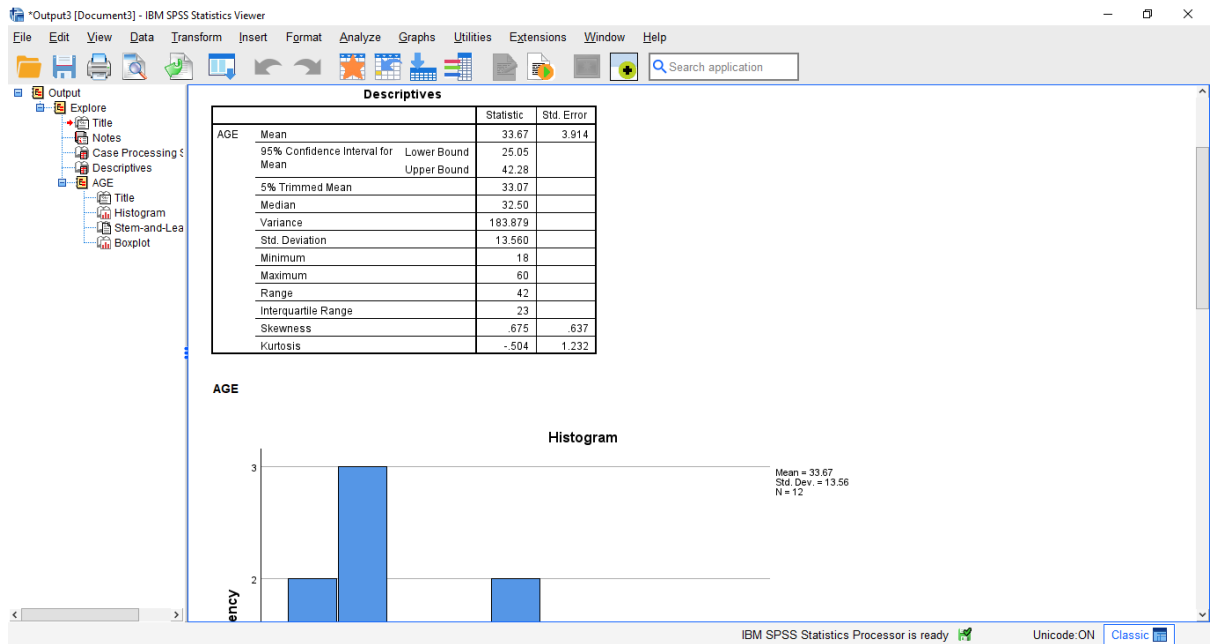
---



**STEP 4** : Click OK, the table will appear in the Output Viewer.

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**Program - 6**

**GENERATING CHI-SQUATE TEST AND**  
**CORRELATION ANALYSIS**

In order to generate a contingency table, along with a Chi-square test and Correlation, the following procedure should be followed:

**How to Generate a Contingency Table?(Chi-square and correlation)**

**SPSS Commands:**

**STEP 1** : Data Entered into a data file in SPSS → Click the button Analyze.

**STEP 2** : Select Descriptive statistics → crosstabs.....[opens the Crosstabs dialog box.

**STEP 3** : Select variable(s) for analyse.

**STEP 4** : Click Statistics button and Select Chi-square and Correlation and Continue

**STEP 5** : Click OK, the table will appear in the Output Viewer.

Find the Chi-square and Correlation from the following data;

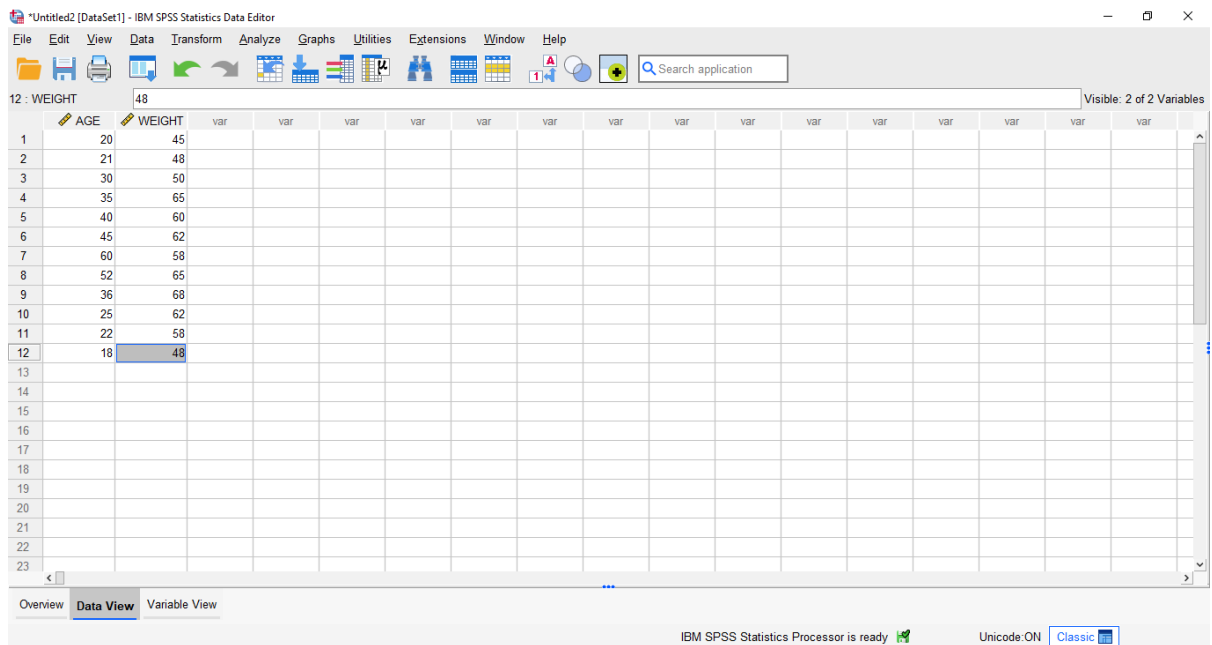
AGE	20	21	30	35	40	45	60	52	36	25	22	18
WEIGHT	45	57	50	65	60	62	58	65	68	62	58	48

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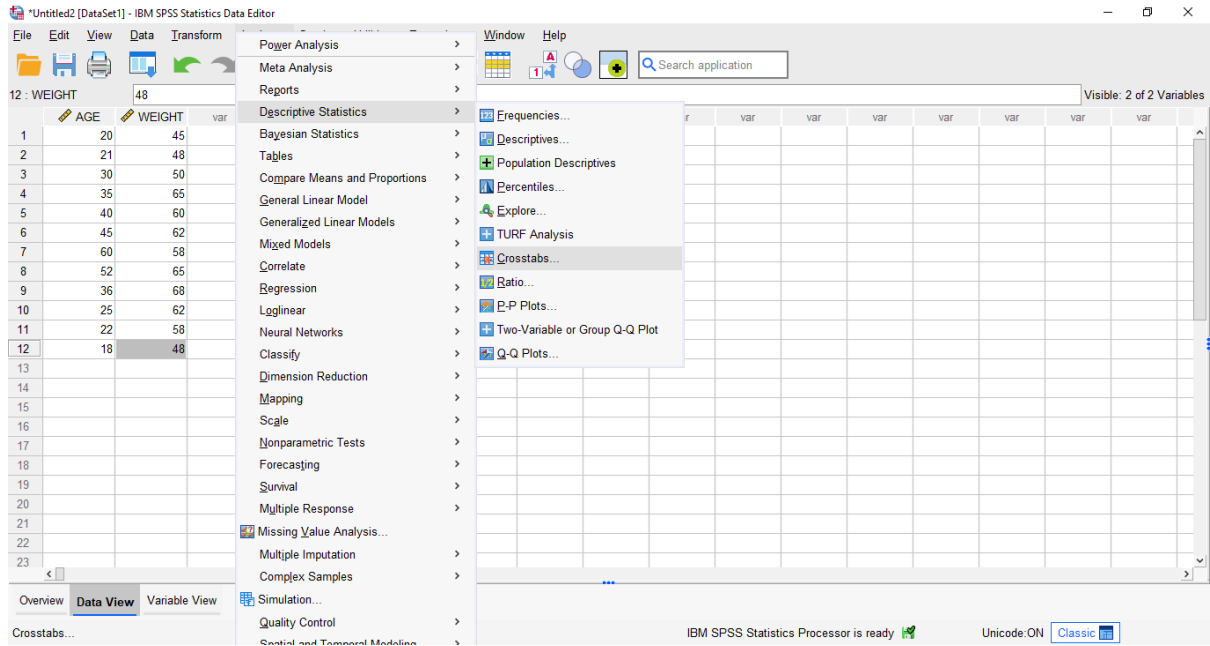
Solution :

**STEP 1** : Data Entered into a data file in SPSS → Click the button Analyze.





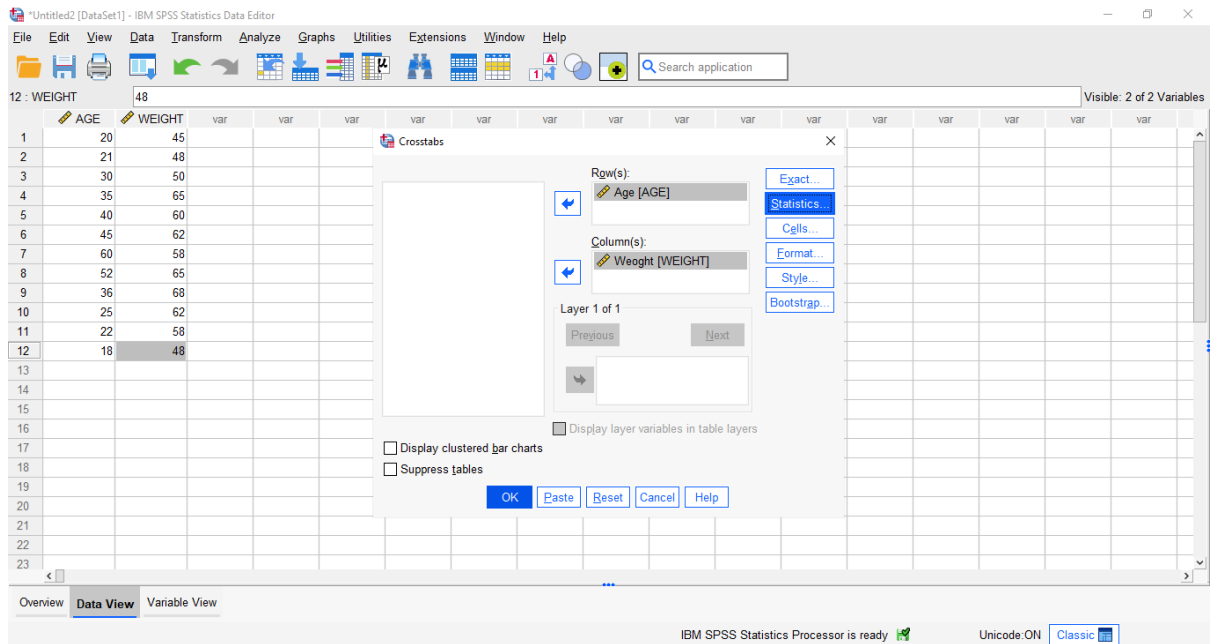
**STEP 2** : Select Descriptive statistics → crosstabs.....[opens the Crosstabs dialog box.



**STEP 3** : Select variable(s) for analyse.

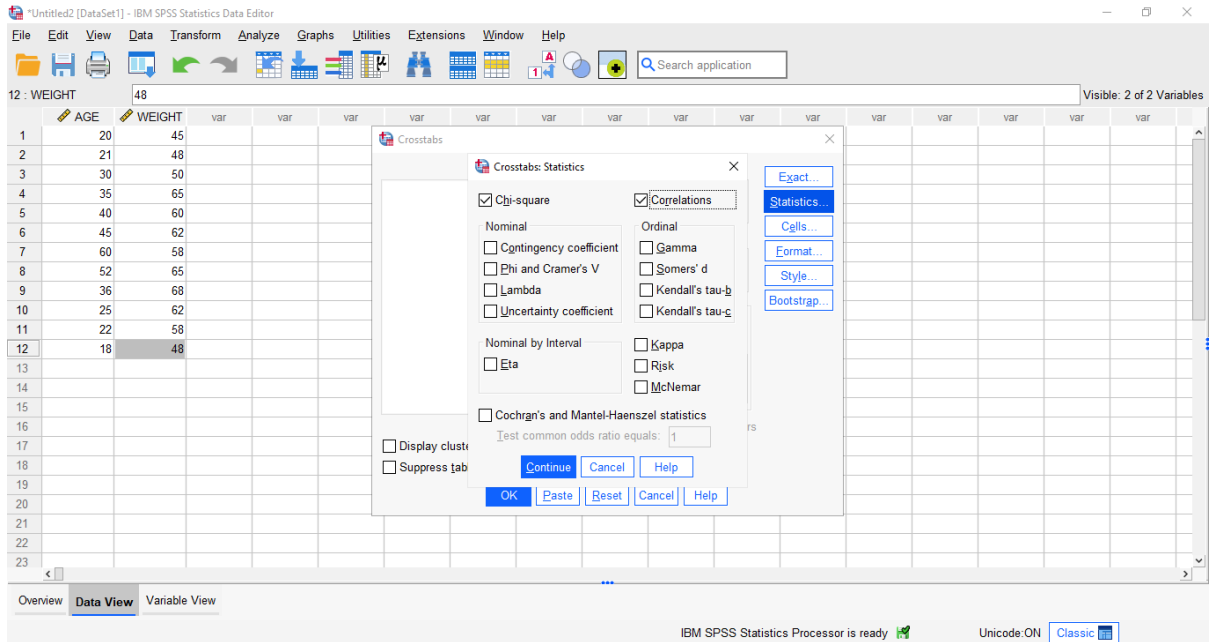
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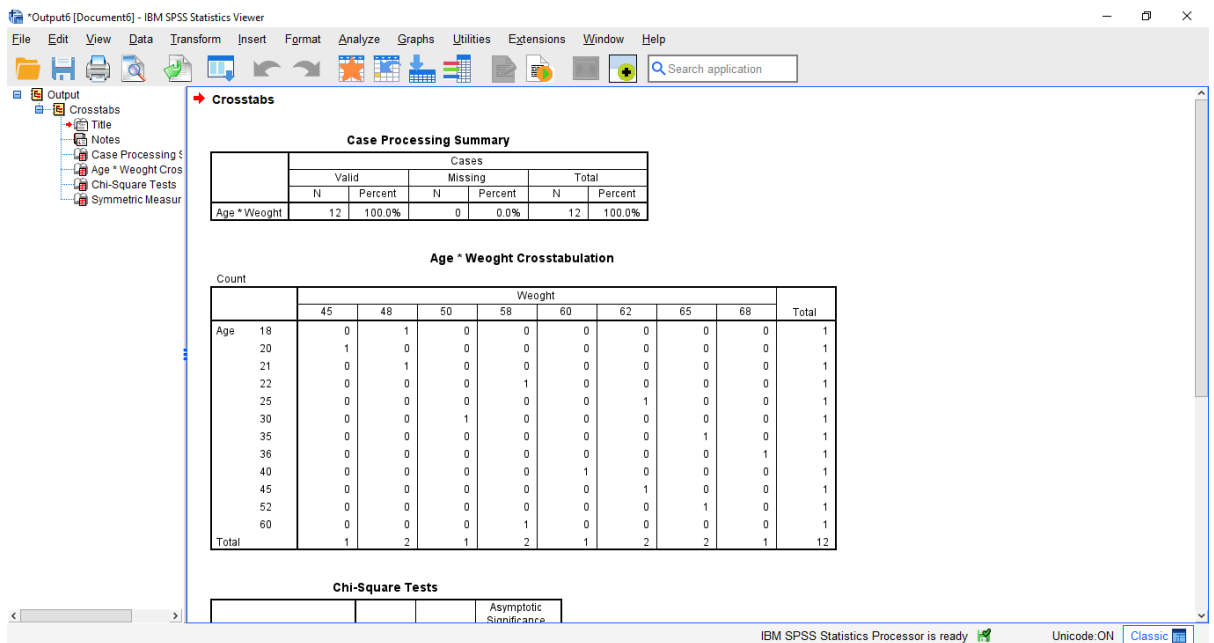


**STEP 4** : Click Statistics button and Select Chi-square and Correlation and Continue.

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**STEP 5 :** Click OK, the table will appear in the Output Viewer.



**Program - 7**

**GENERATING REGRESSION ANALYSIS**

**SPSS Commands:**

**STEP 1** : Data Entered into a data file in SPSS → Click the button Analyze.

**STEP 2** : Click on Regression and followed by linear.

**STEP 3** : Select a dependent variable clicking on the arrow leading to the dependent box after highlighting the appropriate variable from the list of variables on the left side.

**STEP 4** : Select the independent variables to be included in the regression model in the same way, transferring them from left side to the right side box by clicking on the arrow leading to the box called independent variables.

**STEP 5** : Select the METHOD in the same dialog box.

**STEP 6** : Select OPTIONS, if need additional output options.

**STEP 7** : Click OK from the main dialogue box to get the regression output.

Consider the data on the quantity demand and the price of a commodity over a twelve-year period as in the given below:

<b>Year</b>	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011

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<b>Demand</b>	80.0	65.0	70.0	75.0	60.0	65.0	90.0	102.0	108.0	50.0	55.0	75.0
<b>Price</b>	8.0	6.0	7.0	6.0	8.0	7.0	7.0	5.0	4.0	3.0	9.0	6.0

- (a) Find out the correlation coefficient between the quantity demand and price and interpret.
- (b) Compute coefficient of determination ( $r^2$ ) and interpret.
- (c) Estimate the linear regression equation of demand on price and interpret.

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Data for SPSS Format:

<b>Year</b>	<b>Demand</b>	<b>Price</b>
2000	80.00	8.00
2001	65.00	6.00
2002	70.00	7.00
2003	75.00	6.00
2004	60.00	8.00
2005	65.00	7.00
2006	90.00	7.00
2007	102.00	5.00
2008	108.00	4.00
2009	50.00	3.00
2010	55.00	9.00
2011	75.00	6.00

Descriptive Statistics

	<b>Mean</b>	<b>Std. Deviation</b>	<b>N</b>
<b>Demand</b>	74.583	17.9416	12
<b>Price</b>	6.333	1.7233	12

Correlation Matrix

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		Demand	Price
Pearson Correlation	Demand	1.000	-.283
	Price	-.283	1.000
Sig. (1-tailed)	Demand	.	.186
	Price	.186	.
N	Demand	12	12
	Price	12	12

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.283 <sup>a</sup>	.080	-.012	18.0467

a. Predictors: (Constant), Price

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	284.085	1	284.085	.872	.372 <sup>b</sup>
	Residual	3256.832	10	325.683		
	Total	3540.917	11			

a. Dependent Variable: Demand

b. Predictors: (Constant), Price

a. Predictors: ( Constant ), Price

b. Dependent Variable: Demand

Coefficient

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	93.260	20.665		4.513	.001
	Price	-2.949	3.158	-.283	-.934	.372

a. Dependent Variable: Demand

a. Dependent Variable: Demand

a) From Table 7.2 , the result indicates that the correlation between demand and price is .283, which is same as when the problem is solved out manually. The p-value for the correlation coefficient is .186 ( I – tailed ) and assume level of significance.

b) From Table 7.3, the coefficient of determination (  $r^2$  ) is 0.082. This means that 8% of the variations in the quantity demand are explained by price.

c) From = 93.26 - 2.949 Price

The intercept and the slope term are 93.26 and -2.949.



**Program - 8**

**GENERATING ANALYSIS OF VARIANCE (ANOVA) [ONE-WAY]**

**SPSS Commands:**

**STEP 1** : Data Entered into a data file in SPSS → Click the button Analyze.

**STEP 2** : Click on compare means and then One-way ANOVA.

**STEP 3** : Select the appropriate variable as the dependent variable and take it to the right hand side box called DEPENDENT list, then select another appropriate variable, i.e., independent variable appears from the list of the variable on the left hand side of the box and click the arrow to the factor box.

**STEP 4** : Then click OPTION followed by DESCRIPTIVES.

**STEP 5** : Click CONTINUE to return to the main dialog box.

**STEP 6** : Click OK to get output for One-way ANOVA.

The following data represents the numbers of units produced by three operators during three different shifts:

Shifts	Operators		
	A	B	C
I	6	5	5

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II	7	5	4
III	3	3	3
IV	8	7	4

Using 5% level of significance, perform one-way analysis of variance and interpret the result.

**Data for SPSS format:**

SI NO	Operators	Sifts
1	6	1
2	5	1
3	5	1
4	7	2
5	5	2
6	4	2
7	3	3
8	3	3
9	3	3
10	8	4
11	7	4
12	4	4

**Results of One-way ANOVA**

**ANOVA**

OPERATORS

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	18.000	3	6.000	3.429	.073
Within Groups	14.000	8	1.750		
Total	32.000	11			

Interpretation: It could be noted that the results in the above table, the P-Value for the problem is 0.073 which is less than the 0.05, the null hypothesis is rejected. We conclude that there is no significance in the number of units produced by three operators during three different sifts.

**Program - 9**

**GENERATING ANALYSIS OF VARIANCE (ANOVA) [TWO-WAY]**

**SPSS Commands:**

- STEP 1** : Data Entered into a data file in SPSS → Click the button Analyze.
- STEP 2** : Click on GENERAL LINEAR MODEL followed by UNIVERIATE.
- STEP 3** : Take the appropriate variable as the dependent variable box, and then select another appropriate tow variables as FIXED FACTORS.  
The independent variable is the first factor and the block variable is the second factor.
- STEP 4** : Click MODEL, followed by CUSTOM.
- STEP 5** : Take both the factors one by one to the right hand side box called MODEL.
- SETP 6** : Click CONTIONUE to return to the main dialog box.
- STEP 7** : Click OK to get output for Two-way ANOVA.

The following table presents the number of the defective pieces produced by three workmen operating in turn on three different machines:

Workmen	Machines		
	A	B	C

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1	27	34	23
2	29	32	25
3	22	30	22

Conduct a Two-way ANOVA to test at 5% Level of significance, Whether:

- a) The difference among the means obtained for the three workmen can be attributed to chance.
- b) The difference among the means obtained for the three machines can be attributed to chance.

Solution:

**Data for SPSS format:**

<b>SI NO</b>	<b>Operators</b>	<b>Sifts</b>
1	6	1
2	5	1
3	5	1
4	7	2
5	5	2
6	4	2
7	3	3
8	3	3
9	3	3
10	8	4
11	7	4
12	4	4

**Results of One-way ANOVA**

**STEP 1** : Data Entered into a data file in SPSS → Click the button Analyze.

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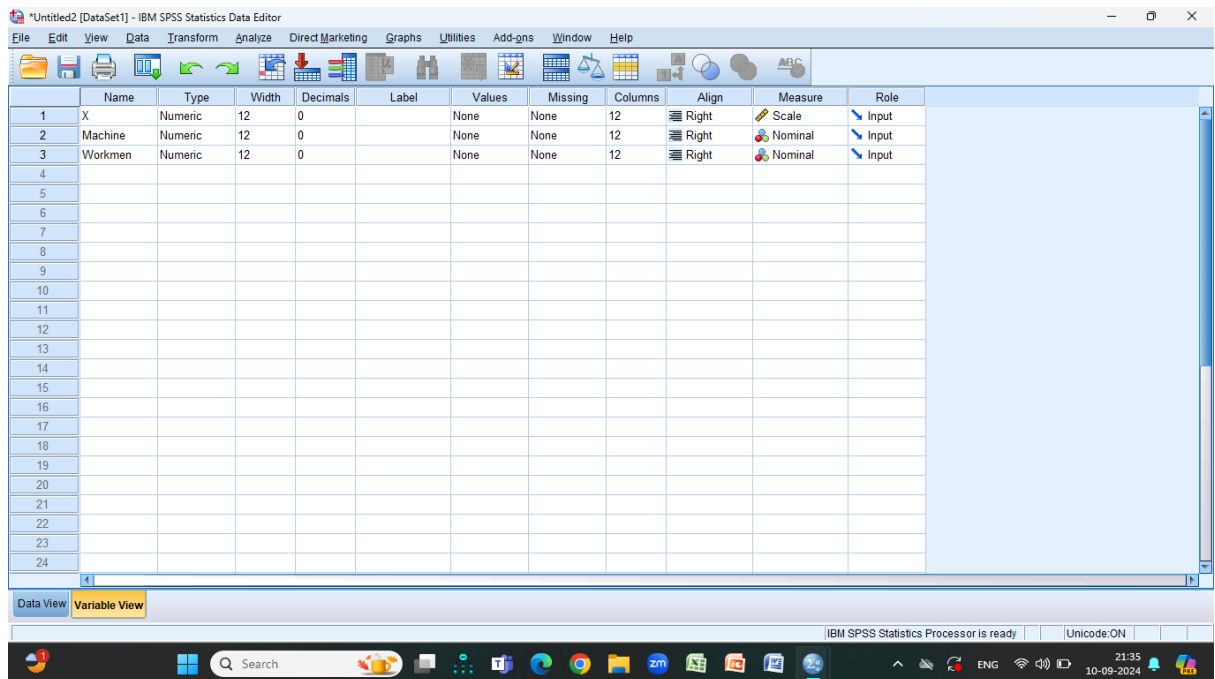
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The screenshot displays the IBM SPSS Statistics Data Editor interface. The title bar reads "Untitled2 [DataSet1] - IBM SPSS Statistics Data Editor". The menu bar includes File, Edit, View, Data, Transform, Analyze, Direct Marketing, Graphs, Utilities, Add-ons, Window, and Help. The toolbar contains various icons for file operations and analysis. The main window shows the Variable View for a dataset with three variables: X, Machine, and Workmen. The table below represents the data shown in the Variable View:

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	X	Numeric	12	0		None	None	12	Right	Scale	Input
2	Machine	Numeric	12	0		None	None	12	Right	Nominal	Input
3	Workmen	Numeric	12	0		None	None	12	Right	Nominal	Input
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											

The bottom of the window shows the "Data View" and "Variable View" tabs, with "Variable View" selected. The status bar at the bottom indicates "IBM SPSS Statistics Processor is ready" and "Unicode: ON". The Windows taskbar at the very bottom shows the search bar, system tray, and the date/time "21:35 10-09-2024".

**STEP 2** : Click on GENERAL LINEAR MODEL followed by UNIVERIATE.

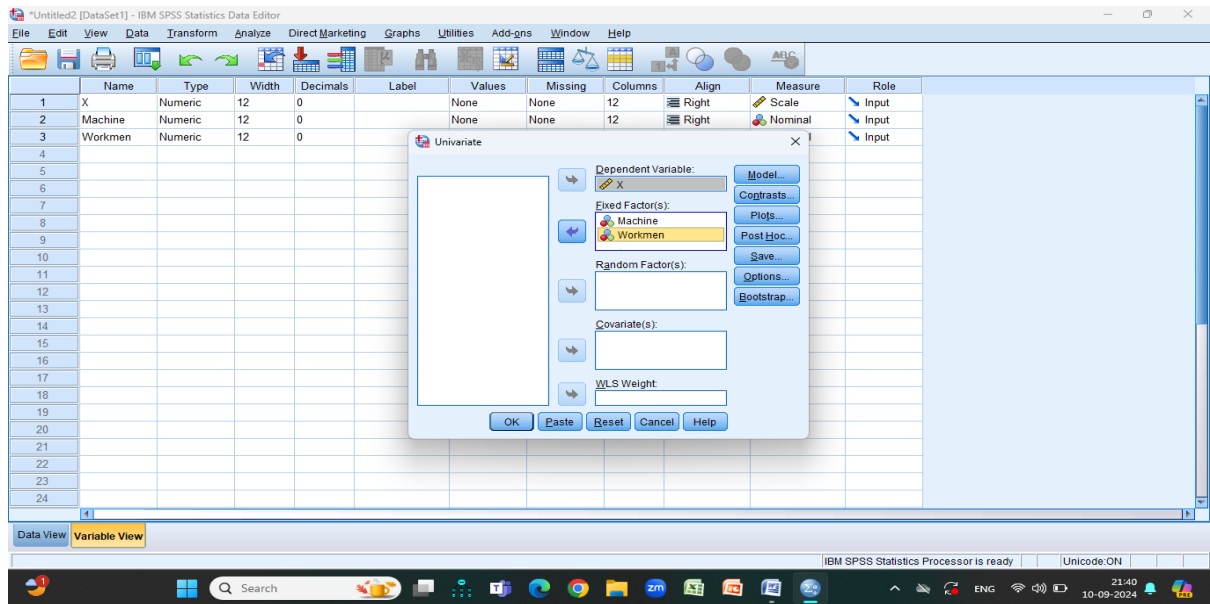


**STEP 3** : Take the appropriate variable as the dependent variable box, and then select another appropriate two variables as FIXED FACTORS. The independent variable is the first factor and the block variable is the second factor.

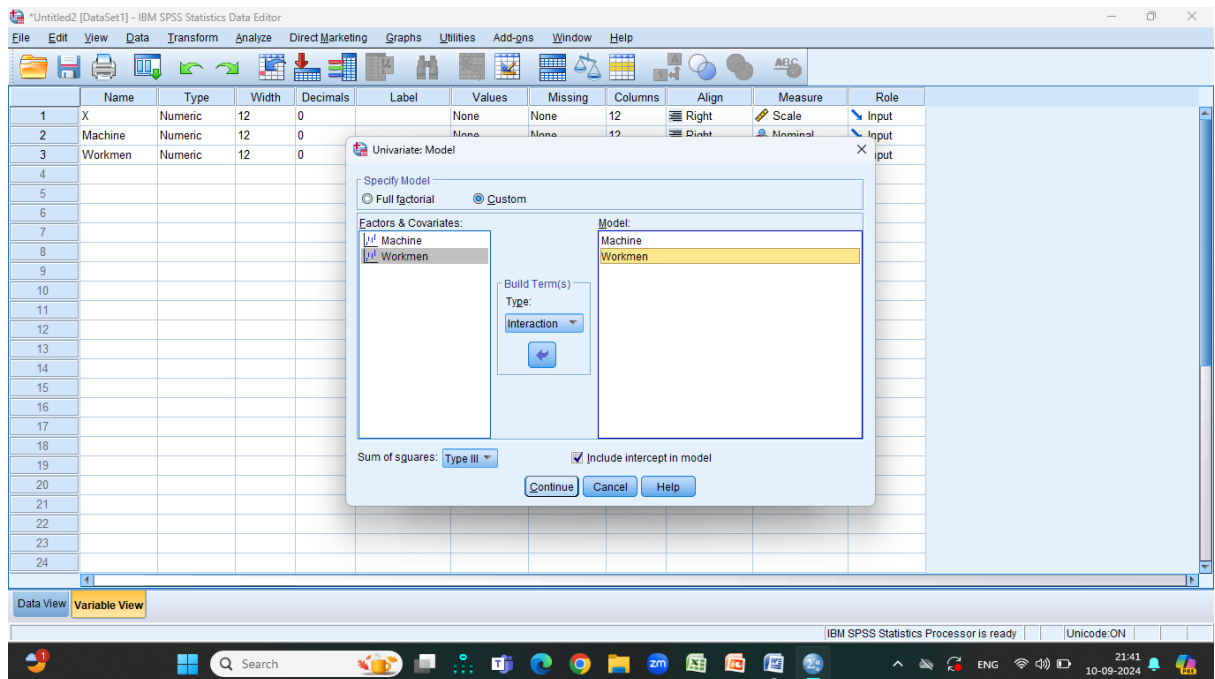


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**STEP 6 :** Click CONTINUE to return to the main dialog box.



**STEP 7 :** Click OK to get output for Two-way ANOVA.

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The screenshot displays the IBM SPSS Statistics Viewer interface. The main window shows the results of a Univariate Analysis of Variance. The dependent variable is 'X'. The analysis includes a table for Between-Subjects Factors and a table for Tests of Between-Subjects Effects. The Between-Subjects Factors table shows the distribution of subjects across different machines and workmen. The Tests of Between-Subjects Effects table provides statistical data for the model, including Type III Sum of Squares, degrees of freedom, Mean Square, F-value, and significance level. The corrected model is highly significant (Sig. = .014).

**Univariate Analysis of Variance**

[DataSet1]

**Between-Subjects Factors**

		N
Machine	1	3
	2	3
	3	3
Workmen	1	3
	2	3
	3	3

**Tests of Between-Subjects Effects**

Dependent Variable: X

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	145.778 <sup>a</sup>	4	36.444	13.120	.014
Intercept	6615.111	1	6615.111	2381.440	.000
Machine	118.222	2	59.111	21.280	.007
Workmen	27.556	2	13.778	4.960	.083
Error	11.111	4	2.778		
Total	6772.000	9			
Corrected Total	156.889	8			

a. R Squared = .929 (Adjusted R Squared = .858)

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X = No.of defective pieces

Between Subject Factors

		N
Machine	1	3
	2	3
	3	3
Workmen	1	3
	2	3
	3	3

Results for Two-way ANOVA Tests of Between Subjects Effects

Dependent Variable: X

Source	Type III Sum of Squares	df	Mean Square	F	Sig
Corrected	145.778	4	36.444	13.120	.014
Model	6615.111	1	6615.111	2.381E3	.000
Intercept	118.222	2	59.111	21.280	.007
Machine	27.556	2	13.778	4.960	.083

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Workmen	11.111	4	2.778		
Error	6772.000	9			
Total	156.889	8			
Corrected Total					

- a. R Squared = .929 (Adjusted R Squared = .858)

From the above table, the P- values corresponding to the hypothesis for the machines and workmen are 0.007 and 0.083 respectively. The assumed level of significance is 5%.

Interpretation:

- a) As the p-value corresponding to the hypothesis for the machines is less than the level of significance, the null hypothesis in such cases is rejected. That means average number of defects for various machines is different.
- b) As the p-value corresponding to the hypothesis for the workmen is more than the level of significance, the null hypothesis in such cases is accepted. We conclude that the average number of defectives items produced by the three workmen does not vary significantly.

# UNIT IV

**UNIT IV Introduction to Tally Prime: Introduction – Starting Tally Prime – Creation of a Company - Selecting company - Shutting a company - Altering company– Creating Accounting groups and ledgers – Vouchers – Practical problems for a new and existing business and not-for profit organization. Accounting reports: Introduction – Displaying Trial balance, Profit and Loss Account, Balance sheet, Day book, Purchase register, Sales register, Cash flow /Funds flow and ratio analysis – Practical problems.**

### **Introduction to Tally Prime**

*Tally Prime* is comprehensive business management software designed by Tally Solutions, aimed at simplifying accounting, inventory, payroll, and tax-related tasks for small to medium-sized businesses. As the latest version of Tally's flagship product, Tally Prime builds upon the functionalities of previous versions (like Tally.ERP 9) and introduces new features to enhance usability, adaptability, and overall efficiency.

Tally Prime is well-suited for businesses looking to streamline their accounting and financial operations. It provides features that simplify complex business processes and ensure accuracy in financial records. From

generating invoices to managing cash flow, tracking inventory, and filing GST returns, Tally Prime is a powerful tool that handles a wide range of business operations within a single platform.

**Here are some core features of Tally Prime:**

**1. User-Friendly Interface**

Tally Prime introduces a more intuitive, user-friendly interface, making it easier for both beginners and experienced users to navigate. The interface supports multi-tasking, allowing users to switch between tasks or access multiple reports without losing progress on any open tasks.

**2. Multi-Tasking Capabilities**

Users can now handle multiple tasks in Tally Prime without having to close windows or lose track of ongoing tasks. This new feature allows for increased productivity and enables quick transitions between different activities, like moving from an invoice to a report with minimal hassle.

**3. Enhanced Reporting and Analytics**

Tally Prime provides real-time insights and customizable reports, giving business owners and accountants the tools to make data-driven decisions.



The reports are designed to be easy to interpret, even for non-finance professionals, and offer deeper insights into areas like sales, purchases, cash flow, and profitability.

#### **4. Inventory Management**

With Tally Prime, businesses can efficiently manage their stock and inventory. This feature provides insights into stock levels, helps reduce wastage, and supports better demand forecasting, ultimately helping businesses keep their inventory balanced and cost-effective.

#### **5. GST and Tax Compliance**

Tally Prime simplifies GST and other tax-related tasks, ensuring compliance with local tax regulations. The software automatically updates to reflect changes in tax laws and helps users generate GST-compliant invoices, file returns, and maintain accurate records for audits.

#### **6. Remote Access and Security**

Tally Prime allows for secure remote access, enabling business owners and employees to access business data from anywhere. This feature is especially

useful for businesses that require flexible work arrangements. Data security is a priority in Tally Prime, ensuring that sensitive information is protected.

## **7. Scalability and Adaptability**

Tally Prime can scale with growing businesses, accommodating new features and add-ons as required. This adaptability makes it a suitable choice for businesses that anticipate growth and the need for more advanced functionalities over time. Overall, Tally Prime is a powerful, flexible, and user-centric solution for managing key business functions. It combines ease of use with robust capabilities, making it an ideal choice for companies looking to optimize their operations and maintain compliance with financial regulations. The latest upgrades in Tally Prime further simplify the complexities of business management, making it an invaluable asset for today's fast-paced business environment.

### **Program – 10**

## **Creating a Company Ledger with Opening Balance and Viewing It in the Trial Balance in Tally Prime**

This guide explains how to create a company ledger with an opening balance in Tally Prime and view it in the Trial Balance. Follow each step carefully for a smooth workflow.

### **Procedure: Creating a Company Ledger with Opening Balance**

#### **1. Open Tally Prime Program**

- Launch *Tally Prime* on your computer.
- Click on **Continue in Educational Mode** to proceed if using the free version.

#### **2. Create a Company**

- Press **ALT + K** to open the *Company Menu*.
- Select **Create** (or press ALT + C) to start creating a new company.

#### **3. Enter Company Details**

- You'll now see the *Company Info* menu.
- Enter all required company details, such as:
  - Company Name
  - Mailing Address
  - Contact Information
  - Financial Year Beginning Date
  - Books Beginning Date

**4. Save the Company**

- Once all details are entered, press **Ctrl + A** to save and create the company.

## **Step-by-Step Guide: Creating Ledgers**

**1. Access the Ledger Menu**

- Go to the **Gateway of Tally**.
- Select **Create** under the *Ledger Menu*.

**2. Choose Between Single Ledger or Multiple Ledgers**

- To create a **Single Ledger**:
  - Select **Ledger** from the *Create* menu.
  - Enter the ledger details, including:
    - Name of the Ledger
    - Group (e.g., Sundry Debtors, Sundry Creditors)
    - Opening Balance (if any)
  - Press **Ctrl + A** to save the single ledger.
- To create **Multiple Ledgers**:
  - Go to **Chart of Accounts**.
  - Select **Ledger** under the *Multi-Master Menu* (press ALT + H).
  - Choose **Multi Create** to create multiple ledgers.

- Enter the details for each ledger, ensuring the correct opening balance if applicable.
- Save all ledgers by pressing **Ctrl + A**.

## Viewing the Trial Balance Report

### 1. Navigate to the Trial Balance

- Return to the **Gateway of Tally**.
- Select **Display More Reports**.
- Choose **Trial Balance** from the list of reports.

### 2. View Ledger and Trial Balance Report

- The *Trial Balance* report will display all created ledgers with their respective balances.
- Review the report to ensure all ledgers and balances are correctly entered.

By following these steps, you've successfully created ledgers with opening balances and viewed them in the Trial Balance report in Tally Prime. This process is essential for maintaining accurate financial records and ensuring that all accounts are balanced.

### Problem :

**Prepare a Trial Balance from Bakya company**

S.No.	Particulars	Amount
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1	Capital	50,000
2	Cash	15,760
3	Bank	12,000
4	Purchase	27,100
5	Sales	27,000
6	Furniture	15,000
7	Stock in hand	1,800
8	Brokerage paid	40
9	Typewriter	2,100
10	Rent paid	1,000
11	Salary	1,500
12	Return inward	100
13	Return outwards	1,100
14	Debtors	4,400
15	Travelling expenses	100
16	Sundry creditors	4,200
17	Discount allowed	100
18	Telephone charges	500
19	Interest allowed	2,600

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**Output:-**

**Ledger report on Bakya Company**

S.No.	Name of Ledger	Under	Opening Balance	Dr	Cr
1.	Bank	Bank Accounts	12,000.00	Dr	
2.	Brokerage Paid	Indirect Expenses	40.00	Dr	
3.	Capital	Capital Account	50,000.00	Cr	
4.	Cash	Cash-in-Hand	15,760.00	Dr	
5.	Debtors	Current Assets	4,400.00	Dr	
6.	Discount Allowed	Indirect Expenses	100.00	Dr	
7.	Furniture	Fixed Assets	15,000.00	Dr	
8.	Interest Allowed	Indirect Expenses	2,600.00	Dr	
9.	Profit & Loss A/c	Primary			
10.	Purchase	Purchase Accounts	27,100.00	Dr	
11.	Rent Paid	Indirect Expenses	1,000.00	Dr	
12.	Return Inwards	Sales Accounts	100.00	Dr	
13.	Returns Outwards	Purchase Accounts	1,100.00	Cr	
14.	Salary Paid	Indirect Expenses	1,500.00	Dr	
15.	Sales	Sales Accounts	27,000.00	Cr	
16.	Stock in Hand	Stock-in-Hand	1,800.00	Dr	
17.	Sundry Creditors	Current Liabilities	4,200.00	Cr	
18.	Telephone Charges	Indirect Expenses	500.00	Dr	
19.	Travelling Expenses	Indirect Expenses	100.00	Dr	
20.	Typewriter	Fixed Assets	2,100.00	Dr	

**Trial balance on Bakya company**

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Particulars	Bakya For 1-Apr-24 Closing Balance	
	Debit	Credit
Capital Account		50,000.00
Current Liabilities		4,200.00
Fixed Assets	17,100.00	
Current Assets	32,160.00	
Sales Accounts	100.00	27,000.00
Purchase Accounts	27,100.00	1,100.00
Indirect Expenses	5,840.00	
<b>Grand Total</b>	<b>82,300.00</b>	<b>82,300.00</b>

**Result:-**



Trial Balance Total amount is Rs.82,300.

### Program – 11

#### **Creating a Ledger and Voucher in Tally Prime and Viewing Results in Trading, Profit and Loss Account, and Balance Sheet**

This guide provides a detailed process for creating ledgers and vouchers in Tally Prime and displaying the results in the Trading Account, Profit and Loss Account, and Balance Sheet.



## **Aim**

To create a ledger and voucher in Tally Prime and view the results in the Trading Account, Profit and Loss Account, and Balance Sheet.

## **Procedure: Creating a Ledger and Voucher in Tally Prime**

### **1. Open Tally Prime Program**

- Start *Tally Prime* on your computer.
- Click on **Continue in Educational Mode** if using the free version.

### **2. Create a Company**

- Press **ALT + K** to access the *Company Menu*.
- Select **Create** (or press ALT + C) to create a new company.

### **3. Enter Company Information**

- The *Company Info* menu will open.
- Fill in the required details for the company, including:
  - Company Name
  - Mailing Address
  - Contact Information
  - Financial Year Beginning Date
  - Books Beginning Date

### **4. Save the Company**

- Press **Ctrl + A** to save and create the company.

## **Step-by-Step Guide: Creating Ledgers**

### **1. Access the Ledger Menu**

- Go to the **Gateway of Tally**.
- Choose **Create** under the *Ledger Menu*.

### **2. Create Ledgers**

- To create a **Single Ledger**:
  - Select **Ledger** from the *Create* menu.
  - Enter the necessary ledger details, such as:
    - Name of the Ledger
    - Group (e.g., Purchases, Sales, Sundry Debtors, etc.)
    - Opening Balance (if applicable)
  - Press **Ctrl + A** to save the single ledger.
- To create **Multiple Ledgers**:
  - Go to **Chart of Accounts**.
  - Select **Ledger** under *Multi-Master Menu* (press ALT + H).
  - Choose **Multi Create** to enter multiple ledgers at once.
  - Fill in the ledger details and press **Ctrl + A** to save.

## **Creating Vouchers for Adjustment Entries**

### **1. Access Voucher Creation**

- From the **Gateway of Tally**, go to **Voucher Entry**.

### **2. Create Different Types of Vouchers**

- Use the following types of vouchers to record various transactions:
  - **Purchase Voucher:** For recording purchases.
  - **Sales Voucher:** For recording sales.
  - **Payment Voucher:** For recording expenses or payments.
  - **Receipt Voucher:** For recording income or received funds.
  - **Journal Voucher:** For recording adjustments and transfers.

### **3. Enter Adjustment Entries**

- Fill in the required information for each voucher, such as the account, amount, date, and narration.
- Press **Ctrl + A** to save each voucher entry.

## **Viewing the Profit and Loss Account and Balance Sheet**

### **1. Display Profit and Loss Account**

- From the **Gateway of Tally**, select **Profit and Loss Account**.
- This report will show the overall profit or loss of the company based on the transactions recorded.

### **2. Display Balance Sheet**

- Return to the **Gateway of Tally** and select **Balance Sheet**.
- The Balance Sheet will show the company's assets, liabilities, and equity.

**3. Change Period (Optional)**

- To view the report for a specific period, press **F2** and enter the desired date range.

**4. Review Results in the Profit and Loss Account and Balance Sheet**

- Analyze the *Profit and Loss Account* to see the company's income and expenses.
- Check the *Balance Sheet* to ensure assets and liabilities are balanced.

By following these steps, you've successfully created ledgers, entered vouchers, and viewed the results in the Trading Account, Profit and Loss Account, and Balance Sheet in Tally Prime. This process is essential for maintaining accurate financial records and understanding the financial health of your business.

**Problem:**

Prepare a Trading, Profit and loss account and balance sheet of Bharathi Company as on 31-03-2025.

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<b>S. No.</b>	<b>Particulars</b>	<b>Amount</b>
1	Opening stock as on 01.04.2024	70,000
2	Capital	80,000
3	Wages	14,000
4	Cash in hand	20,000
5	Purchase	27,500
6	Sales	89,000
7	Carriage inwards	2,000
8	Carriage outward	2,000
9	Brokerage paid	400
10	Printing and Stationery	2,000
11	Rent paid	3,000
12	Salary	13,000
13	Return inward	2,100
14	Return outwards	5,100
15	Discount received	4,400
16	Travelling expenses	100
17	Discount allowed	900
18	Telephone charges	800
19	Interest received	22,000
20	Bad debts	1,600
21	Furniture	20,000

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22	Plant and machinery	30,000
23	Unsecured loan	8,900

**Additional information:-**

- Outstanding wages Rs.2000.
- Prepaid salary Rs.1000.
- Depreciation on furniture @ 10% and Plant and machinery @ 5%
- Closing stock as on 31-03-2025 Rs.40,000.

**Output:-**

**Trading and profit and loss account on Bharathi company as on 31-03-2025**

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Bharathi 1-Apr-24 to 31-Mar-25		Bharathi 1-Apr-24 to 31-Mar-25	
Particulars		Particulars	
Opening Stock	50,000.00	Sales Accounts	86,900.00
Purchase Accounts	32,600.00	Closing Stock	40,000.00
Direct Expenses	18,000.00		
Gross Profit c/o	26,300.00		
	1,26,900.00		1,26,900.00
Indirect Expenses	30,700.00	Gross Profit b/f	26,300.00
Nett Profit	17,600.00	Indirect Incomes	22,000.00
<b>Total</b>	<b>48,300.00</b>	<b>Total</b>	<b>48,300.00</b>

**Balance sheet of Bharathi company as on 31-03-2025**

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Liabilities		Assets	
Bharathi as at 31-Mar-25		Bharathi as at 31-Mar-25	
Capital Account	80,000.00	Fixed Assets	46,500.00
Loans (Liability)	10,900.00	Current Assets	61,000.00
Profit & Loss A/c	17,600.00	Difference in opening balances	1,000.00
Opening Balance			
Current Period	17,600.00		
<b>Total</b>	<b>1,08,500.00</b>	<b>Total</b>	<b>1,08,500.00</b>

**Result:-**

- Trading account balance on Gross Profit Rs.26,300
- Profit and loss account balance on Net Profit Rs.17,600
- Balance sheet Total Rs.1,08,500



## **Program – 12**

### **Creating an Income and Expenditure Account for a Non-Profit Organization in Tally Prime**

This guide provides step-by-step instructions for setting up an Income and Expenditure Account for a non-profit organization in Tally Prime.

#### **Aim**

To create an Income and Expenditure Account for a non-profit organization.

#### **Procedure: Setting Up the Income and Expenditure Account**

##### **1. Open Tally Prime Program**

- Launch *Tally Prime* on your computer.
- Click on **Continue in Educational Mode** if using the free version.

##### **2. Create a Company**

- Press **ALT + K** to open the *Company Menu*.
- Select **Create** (or press **ALT + C**) to create a new company.

##### **3. Enter Company Information**

- In the *Company Info* menu, fill in the necessary details for the non-profit organization, including:
  - Organization Name
  - Mailing Address

- Contact Information
- Financial Year Beginning Date
- Books Beginning Date

**4. Save the Company**

- After entering all the required details, press **Ctrl + A** to save and create the organization in Tally Prime.

## **Step-by-Step Guide: Creating Ledgers for Income and Expenditure**

**1. Access the Ledger Menu**

- Go to the **Gateway of Tally**.
- Select **Create** under the *Ledger Menu*.

**2. Create Ledgers for Income and Expenditure**

- To create a **Single Ledger**:
  - Select **Ledger** from the *Create* menu.
  - Create ledgers for all income and expenditure accounts, such as:
    - **Income Ledgers**: Donations, Grants, Membership Fees, Event Income, etc.
    - **Expenditure Ledgers**: Salaries, Rent, Utilities, Stationery, Event Expenses, etc.
  - For each ledger, enter the following:
    - Name of the Ledger

- Group (e.g., Income or Expenditure)
- Opening Balance (if applicable)
- Press **Ctrl + A** to save each ledger.
- To create **Multiple Ledgers** at once:
  - Go to **Chart of Accounts**.
  - Select **Ledger** under *Multi-Master Menu* (press ALT + H).
  - Choose **Multi Create** to enter multiple ledgers at once.
  - Fill in the ledger details, ensuring they are grouped correctly under Income or Expenditure.
  - Save all ledgers by pressing **Ctrl + A**.

## **Viewing the Income and Expenditure Account**

### **1. Display Profit and Loss Account as Income and Expenditure Account**

- Go to the **Gateway of Tally**.
- Select **Alter** from the main menu.
- Choose **Profit and Loss Account**.

### **2. Configure Profit and Loss as Income and Expenditure Account**

- When viewing the Profit and Loss Account, Tally Prime allows you to configure it as an Income and Expenditure Account.
- Tally may prompt you to convert it—select **Yes** if prompted.

### **3. View Income and Expenditure Account**

- The Profit and Loss Account will now display as an *Income and Expenditure Account*, showing all income and expenditure entries for the non-profit organization.

**4. Review the Income and Expenditure Report**

- Analyze the report to understand the financial health of the organization, showing total income, total expenditure, and net surplus or deficit.

By following these steps, you have successfully set up and displayed an Income and Expenditure Account for a non-profit organization in Tally Prime. This process allows the organization to track all income and expenditure transactions, ensuring accurate financial records and clear financial reporting.

**Problem:**

From the following prepare an income and expenditure account for the year ended 31<sup>st</sup> March.

Particulars	Amount	Particulars	Amount
To Subscription Received	30,000	By salaries	36,000
To Subscription received in advance	2,000	By rent	6,000
To Interest on investment	15,000	By printing and stationery	1,450
To bank interest	100	By postage	250

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To Sale proceeds of car	2,500		
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**Output:-**

**Income and Expenditure account**

Particulars		IE COMPANY For 1-Apr-24	Particulars		IE COMPANY For 1-Apr-24
<b>Indirect Expenses</b>		<b>43,700.00</b>	<b>Indirect Incomes</b>		<b>45,600.00</b>
Postage	250.00		Bank Interest	100.00	
Printing and Stationery	1,450.00		Interest on Investment	15,000.00	
Rent	6,000.00		Saleproceeds of Car	2,500.00	
Salaries	36,000.00		Subscription Received	28,000.00	
<b>Excess of income over expenditure</b>		<b>1,900.00</b>			
<b>Total</b>		<b>45,600.00</b>	<b>Total</b>		<b>45,600.00</b>

**Result:-**

- To successfully created in income and expenditure account for non-profit organization.

### **Program – 13**

#### **Creating a Voucher and Viewing the Report in the Day Book in Tally Prime**

This guide explains the steps to create vouchers in Tally Prime and view them in the Day Book, which provides a chronological summary of all daily transactions.

#### **Aim**

To create a voucher and display the report in the Day Book.

#### **Procedure: Creating a Voucher and Viewing in the Day Book**

##### **1. Open Tally Prime Program**

- Launch *Tally Prime* on your computer.
- Click on **Continue in Educational Mode** if using the free version.

##### **2. Create a Company**

- Press **ALT + K** to access the *Company Menu*.
- Select **Create** (or press ALT + C) to start creating a new company.

##### **3. Enter Company Details**

- In the *Company Info* menu, enter the required company details:
  - Company Name

- Mailing Address
  - Contact Information
  - Financial Year Beginning Date
  - Books Beginning Date
4. **Save the Company**
- Once all details are filled in, press **Ctrl + A** to save the company.

## **Step-by-Step Guide: Creating Ledgers**

### **1. Access the Ledger Menu**

- Go to the **Gateway of Tally**.
- Select **Create** under the *Ledger Menu*.

### **2. Create Ledgers for Voucher Entries**

- You can create **Single Ledger** or **Multiple Ledgers**:
  - For a **Single Ledger**:
    - Select **Ledger** from the *Create* menu.
    - Enter the details such as:
      - Ledger Name
      - Group (e.g., Sales, Purchases, Expenses)
      - Opening Balance (if applicable)
    - Press **Ctrl + A** to save.
  - For **Multiple Ledgers**:

- Go to **Chart of Accounts**.
- Select **Ledger** under *Multi-Master Menu* (press ALT + H).
- Choose **Multi Create** to enter multiple ledger details at once.
- Press **Ctrl + A** to save all ledgers.

## **Creating Vouchers for Transactions**

### **1. Access Voucher Creation**

- From the **Gateway of Tally**, select **Voucher Entry**.

### **2. Select Voucher Type**

- In the *Voucher Entry* screen, press **Ctrl + H** to change the mode, then select **As Voucher**.

### **3. Adjust Debit/Credit Display Mode (Optional)**

- To toggle between Dr/Cr and By/To display modes, press **F12** for *Configuration* options.

### **4. Enter Voucher Details**

- Choose the voucher type based on the transaction:
  - **Sales Voucher**: for sales transactions.
  - **Purchase Voucher**: for purchase transactions.
  - **Payment Voucher**: for recording payments.
  - **Receipt Voucher**: for recording receipts.



- Enter the details such as:
  - Date
  - Ledger Account
  - Amount
  - Narration
- Press **Ctrl + A** to save each voucher entry.

## **Viewing the Day Book**

### **1. Open the Day Book**

- From the **Gateway of Tally**, select **Display More Reports**.
- Click on **Day Book** to open the daily transactions report.

### **2. Change Period (Optional)**

- To view a specific date range, press **F2** and enter the desired period.

### **3. Review the Day Book Report**

- The *Day Book* will display all transactions chronologically, showing all vouchers recorded on each day.

By following these steps, you've successfully created vouchers and viewed them in the Day Book in Tally Prime. The Day Book provides a detailed, chronological view of daily transactions, essential for verifying and reviewing entries made each day.

**Problem :**

**Enter the following transaction in appropriate accounting vouchers**

1. Mohan started business with cash Rs. 20,000
2. Bought goods for cash Rs.10,000
3. Sold to Lal Rs.12,000
4. Bought goods from Arun Rs.5,000
5. Sold goods for cashRs.8,000
6. Paid into BankRs.8,000
7. Received from Lal Rs.7,000
8. Paid to Arun Rs.3,000
9. Paid to stationery Rs.200
10. Bought furniture for office use Rs.1,750
11. Paid for postage Rs.20
12. Paid for General expenses Rs.50
13. Paid for salary Rs.2,500
14. Paid for Rent Rs.750

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**Output:-**

Date	Particulars	Vch Type	Vch No.	Debit Amount Inwards Qty	Credit Amount Outwards Qty
1-Apr-24	Arun	Payment	1	3,000.00	
1-Apr-24	Stationery	Payment	2	200.00	
1-Apr-24	Furniture	Payment	3	1,750.00	
1-Apr-24	Postage	Payment	4	20.00	
1-Apr-24	General Expenses	Payment	5	50.00	
1-Apr-24	Salary	Payment	6	2,500.00	
1-Apr-24	Rent	Payment	7	750.00	
1-Apr-24	Capital	Receipt	1		20,000.00
1-Apr-24	Lal	Receipt	2		7,000.00
1-Apr-24	Bank	Journal	1	8,000.00	
1-Apr-24	Lal	Sales	1	12,000.00	
1-Apr-24	Cash	Purchase	1		10,000.00
1-Apr-24	Arun	Purchase	2		5,000.00

**Result:-**

- The Day book is created in Tally Prime.

## **Program – 14**

### **Creating a Purchase Register and Sales Register in Tally Prime**

This guide provides detailed steps to create a Purchase Register and Sales Register in Tally Prime, allowing you to view all purchase and sales transactions in one place.

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#### **Aim**

To create a Purchase Register and Sales Register for a company in Tally Prime.

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#### **Procedure: Creating Purchase and Sales Registers**

##### **1. Open Tally Prime Program**

- Launch *Tally Prime* on your computer.
- Click on **Continue in Educational Mode** if using the free version.

##### **2. Create a Company**

- Press **ALT + K** to open the *Company Menu*.
- Select **Create** (or press ALT + C) to start creating a new company.

##### **3. Enter Company Information**

- In the *Company Info* menu, fill in all necessary company details:

- Company Name
- Address and Contact Information
- Financial Year Beginning Date
- Books Beginning Date

#### 4. Save the Company

- After entering the details, press **Ctrl + A** to save the company.
- 

## Step-by-Step Guide: Creating Purchase and Sales Vouchers

### 1. Create Purchase and Sales Vouchers

- Go to the **Gateway of Tally**.
- Select **Voucher Entry** to create purchase and sales vouchers for both cash and credit transactions.

### 2. Create Purchase Vouchers

- In *Voucher Entry*, select **Purchase Voucher** from the list.
- Enter the following details for each purchase transaction:
  - Date (press **F2** to change the date as needed)
  - Supplier's Ledger (e.g., under Sundry Creditors or Cash/Bank if cash purchase)
  - Item details, Quantity, and Rate
  - Total Amount and applicable taxes (if any)
- Press **Ctrl + A** to save each purchase voucher.

### 3. Create Sales Vouchers

- Go back to *Voucher Entry* and select **Sales Voucher**.
  - Enter details for each sales transaction, including:
    - Date (use **F2** to adjust)
    - Customer's Ledger (e.g., under Sundry Debtors or Cash/Bank for cash sales)
    - Item details, Quantity, and Rate
    - Total Amount and applicable taxes (if any)
  - Press **Ctrl + A** to save each sales voucher.
- 

## Viewing the Purchase and Sales Registers

### 1. Access the Registers from Gateway of Tally

- From the **Gateway of Tally**, select **Display More Reports**.

### 2. View Purchase Register

- Under *Display More Reports*, go to **Accounts Books**.
- Select **Purchase Register** to view all recorded purchase transactions.
- The Purchase Register shows details of all purchases within the specified period.

### 3. View Sales Register

- In *Accounts Books*, select **Sales Register** to see all recorded sales transactions.

- The Sales Register provides a summary of all sales entries for the chosen period.

**4. Adjust the Period (Optional)**

- Press **F2** to change the date range if you want to view transactions for a specific period.

By following these steps, you have successfully created and displayed the Purchase Register and Sales Register in Tally Prime. These registers provide an organized view of all purchase and sales transactions, helping with transaction tracking and financial analysis.

**Problem :**

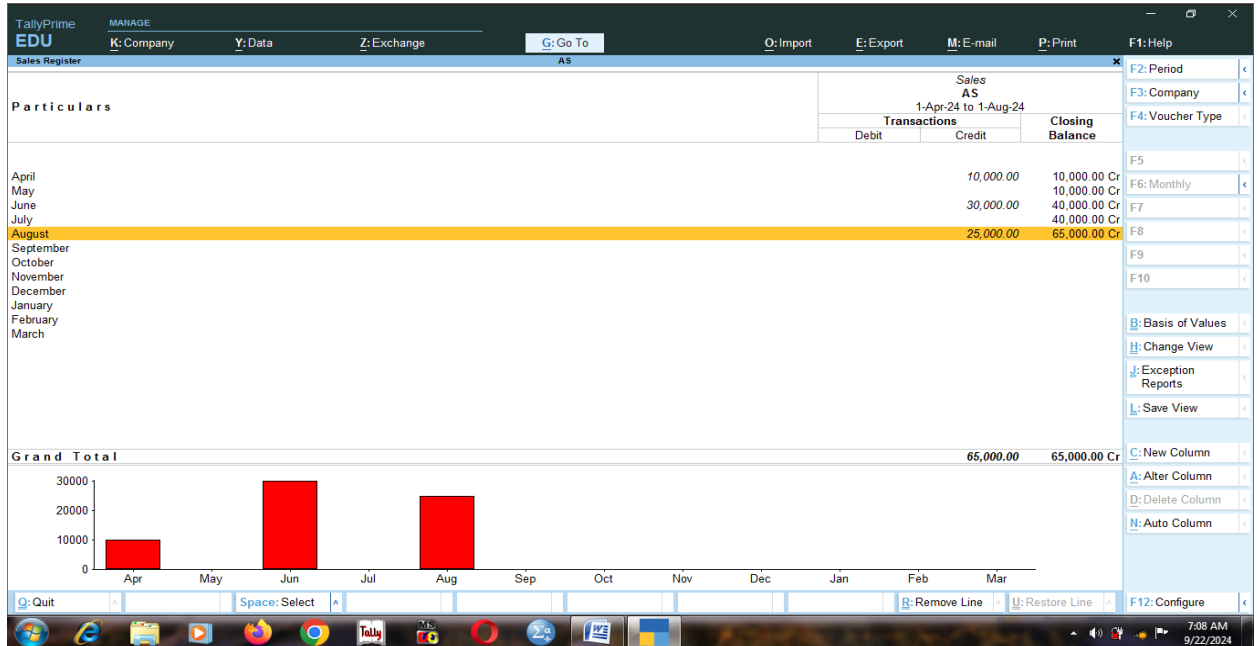
**Create in Purchase register/Sales register AS company**

1. Sold goods to Anand Rs.10,000 as on 02.04.2024
2. Sold goods to Muthu Rs.30,000 as on 02.06.3024
3. Sold goods to cash Rs.25000 as on 02.08.2024
4. Purchase goods from Ram Rs.20000 dated on 02.10.2024
5. Purchase goods from cash Rs.10000 as on 02.12.2024
6. Purchase goods from amutha Rs.30000 dated on 01.01.2025

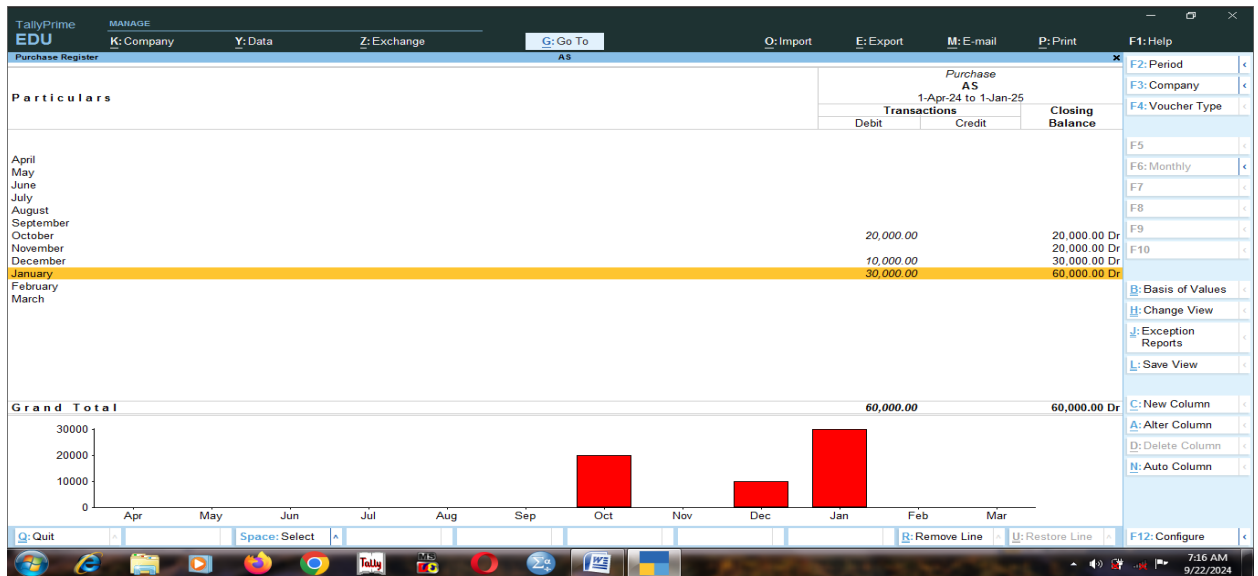
**Output:-**

**Sales register from AS company**

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**Purchase register from AS company**



**Result:-**

- To successfully create in Purchase register and sales register.



**Program – 15**

**Creating Cash Flow, Fund Flow, and Ratio Analysis Reports in Tally Prime**

This guide provides step-by-step instructions for generating Cash Flow, Fund Flow, and Ratio Analysis reports in Tally Prime, essential for financial analysis of a company.

---

**Aim**

To create Cash Flow, Fund Flow, and Ratio Analysis reports for CF company in Tally Prime.

---

**Procedure: Setting Up Cash Flow, Fund Flow, and Ratio Analysis**

**1. Open Tally Prime Program**

- Start *Tally Prime* on your computer.
- Click on **Continue in Educational Mode** if using the free version.

**2. Create a Company**

- Press **ALT + K** to open the *Company Menu*.
- Select **Create** (or press **ALT + C**) to create a new company.

**3. Enter Company Information**

- In the *Company Info* menu, fill in the required company details:
  - Company Name
  - Mailing Address
  - Contact Information
  - Financial Year Beginning Date
  - Books Beginning Date

#### 4. Save the Company

- After entering all details, press **Ctrl + A** to save the company.
- 

## Creating Vouchers for Cash Transactions

### 1. Create Cash Vouchers Only

- Go to the **Gateway of Tally**.
- Select **Voucher Entry** to create vouchers for cash transactions only, as these will affect cash flow and fund flow.

### 2. Enter Details for Cash Transactions

- Choose **Payment Voucher** for cash payments or **Receipt Voucher** for cash inflows.
- Enter the following for each transaction:
  - Date (use **F2** to adjust the date)
  - Ledger Account (e.g., Expenses, Sales, etc.)
  - Cash account details

- Amount and any applicable narration
  - Press **Ctrl + A** to save each cash transaction voucher.
- 

## Viewing the Cash Flow, Fund Flow, and Ratio Analysis Reports

### 1. Access Cash Flow and Fund Flow Reports

- From the **Gateway of Tally**, go to **Display More Reports**.
- Under *Accounts Books*, select **Cash Flow** to view all cash-related transactions for the period.
- Similarly, select **Fund Flow** to see the fund movement, highlighting sources and uses of funds.

### 2. Access Ratio Analysis

- From the **Gateway of Tally**, select **Ratio Analysis**.
- This report provides key financial ratios, including:
  - **Current Ratio**: Measures liquidity.
  - **Debt-to-Equity Ratio**: Indicates the leverage level.
  - **Net Profit Ratio**: Shows profitability.
  - **Return on Capital Employed (ROCE)**: Gauges efficiency of capital use.
- These ratios give insights into the company's financial health and performance.

### 3. Adjust the Period (Optional)

- Press **F2** to change the date range for viewing reports within a specific period.

---

By following these steps, you've successfully created and displayed the Cash Flow, Fund Flow, and Ratio Analysis reports for CF company in Tally Prime. These reports provide valuable insights for managing cash flow, tracking fund sources and uses, and evaluating financial health through key ratios.

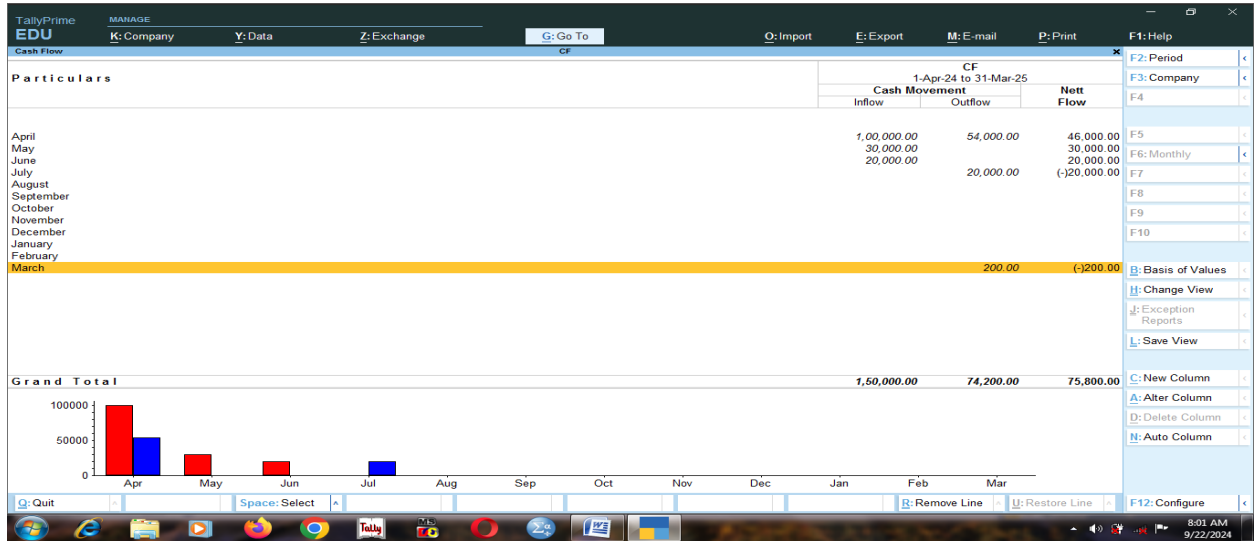
**Problem :**

1. Starting in CF company into capital Rs.1,00,000 as on 01.04.2024
2. Purchas in plant and machinery as on 01.07.2024 Rs.20,000
3. Purchase in goods as on 02.04.2024 Rs.50,000
4. Sales to goods as on 01.05.2024 Rs.20,000
5. Discount received as on 06.06.2024 Rs.20,000
6. Interest received as on 01.05.2024 Rs.10,000
7. Paid rent as on 02.04.2024 Rs.1000
8. Paid salary 02-04-2024 Rs.3000
9. Cash deposited into bank as on 01.08.2024 Rs.50,000
10. Cash withdraw from bank as on 01.10.2024 Rs.10000
11. Paid to general expenses as 31.03.2025 Rs.200

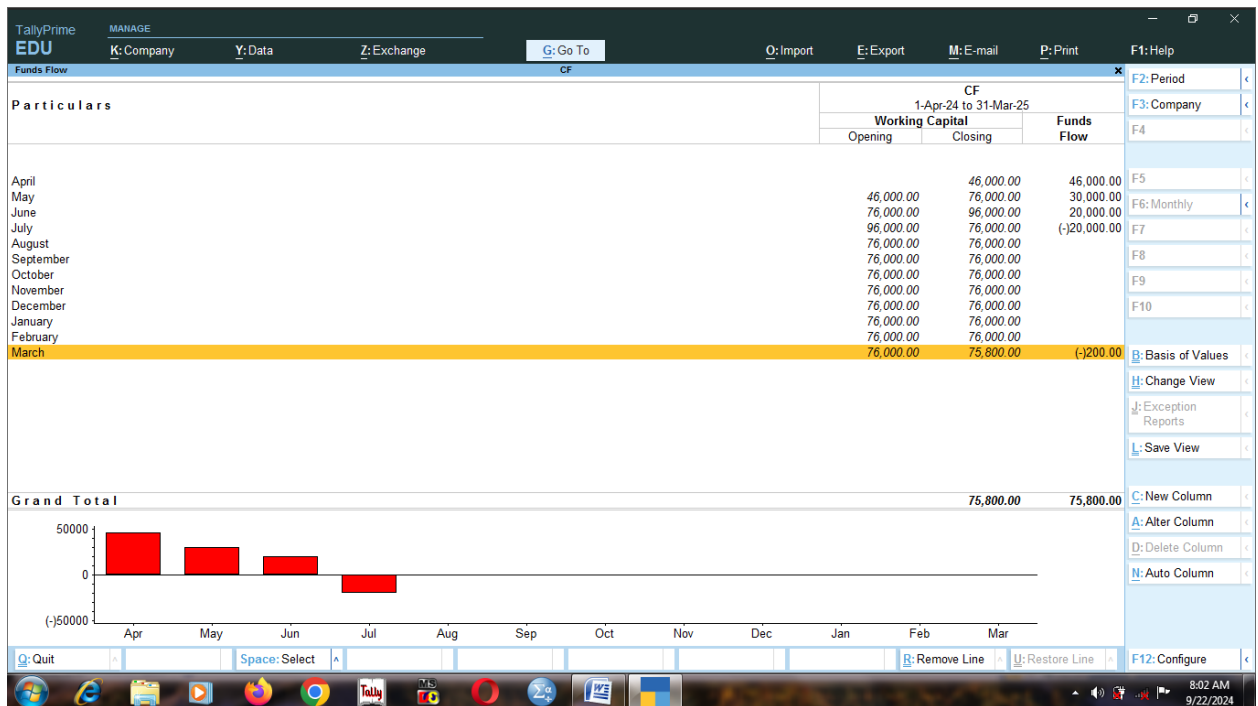
**Output:-**

**Cash flow statement**

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**Fund flow statement**



**Ratio analysis**

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Principal Groups		CF	Principal Ratios		CF
		1-Apr-24 to 31-Mar-25			1-Apr-24 to 31-Mar-25
<b>Working Capital</b>		75,800.00 Dr	<b>Current Ratio</b>		0.00 : 1
(Current Assets-Current Liabilities)			(Current Assets : Current Liabilities)		
<b>Cash-in-Hand</b>		35,800.00 Dr	<b>Quick Ratio</b>		0.00 : 1
<b>Bank Accounts</b>		40,000.00 Dr	(Current Assets-Stock-in-Hand : Current Liabilities)		
<b>Bank OD A/c</b>			<b>Debt/Equity Ratio</b>		0.00 : 1
<b>Sundry Debtors</b>			(Loans (Liability) : Capital Account + Nett Profit)		
(due till today)			<b>Gross Profit %</b>		(-)250.00 %
<b>Sundry Creditors</b>			<b>Nett Profit %</b>		(-)121.00 %
(due till today)			<b>Operating Cost %</b>		221.00 %
<b>Sales Accounts</b>		20,000.00 Cr	(as percentage of Sales Accounts)		
<b>Purchase Accounts</b>		70,000.00 Dr	<b>Recv. Turnover in days</b>		days
<b>Stock-in-Hand</b>			(payment performance of Debtors)		
<b>Nett Loss</b>		24,200.00 Dr	<b>Return on Investment %</b>		(-)31.93 %
<b>Wkg. Capital Turnover</b>		0.26	(Nett Profit / Capital Account + Nett Profit)		
(Sales Accounts / Working Capital)			<b>Return on Wkg. Capital %</b>		(-)31.93 %
<b>Inventory Turnover</b>		0.00	(Nett Profit / Working Capital) %		
(Sales Accounts / Closing Stock)					

**Result:-**

- Cash Flow statement is created.
- Fund Flow statement is created.
- Ratio analysis is created in tally prime.

# UNIT V

**UNIT V Inventory and GST in Tally Prime Inventory: Introduction to Inventory Masters – Creation of stock group – Creation of Godown – Creation of unit of measurement – Creation of stock item – Entering inventory details in Accounting vouchers – Practical problems. GST: Introduction – Enabling GST – Defining tax details – Entries in Accounting vouchers – View invoice report – Practical problems.**

**Program – 16**

**Creating an Inventory Voucher and Displaying the Stock Summary Report in Tally Prime**

This guide provides the steps to create an inventory voucher in Tally Prime and view it in the Stock Summary report, which shows the inventory details of items.

---

**Aim**

To create an inventory voucher and display it in the Stock Summary report in Tally Prime.



## **Procedure: Setting Up and Displaying Inventory in Tally Prime**

### **1. Open Tally Prime Program**

- Launch *Tally Prime* on your computer.
- Click on **Continue in Educational Mode** if using the free version.

### **2. Create a Company**

- Press **ALT + K** to open the *Company Menu*.
- Select **Create** (or press ALT + C) to start creating a new company.

### **3. Enter Company Details**

- In the *Company Info* menu, fill in all required details:
  - Company Name
  - Address and Contact Information
  - Financial Year Beginning Date
  - Books Beginning Date

### **4. Save the Company**

- After entering all details, press **Ctrl + A** to save the company.

---

## **Step-by-Step Guide: Setting Up Inventory in Tally Prime**

### **1. Create Stock Group**

- Go to the **Gateway of Tally**.
- Select **Create** and then **Stock Group**.

- Enter the Stock Group name and relevant details, grouping similar items under one category.
- Press **Ctrl + A** to save the Stock Group.

## 2. Create Stock Items

- From the **Gateway of Tally**, select **Create** and choose **Stock Item**.
- For each stock item, enter details like:
  - Item Name
  - Stock Group
  - Unit of Measure
  - Opening Quantity and Rate (if applicable)
- Press **Ctrl + A** to save each stock item.

## 3. Create Unit of Measure

- Return to **Gateway of Tally**, select **Create** and then **Unit**.
- Define units like "pcs" (pieces), "kg" (kilogram), etc., based on inventory requirements.
- Press **Ctrl + A** to save the unit.

---

## Creating an Inventory Voucher

### 1. Access Inventory Voucher Creation

- From the **Gateway of Tally**, go to **Voucher Entry**.

### 2. Change to Item Invoice Mode

- In the *Voucher Entry* screen, press **Ctrl + H** to switch to **Item Invoice** mode.

### 3. Enter Inventory Details in Voucher

- Select the appropriate voucher type (e.g., **Purchase Voucher** or **Sales Voucher**).
- Enter details such as:
  - Date (use **F2** to change as needed)
  - Stock Item Name
  - Quantity and Rate
  - Total Amount
- Press **Ctrl + A** to save the voucher.

---

## Viewing the Stock Summary Report

### 1. Access Stock Summary

- From the **Gateway of Tally**, go to **Stock Summary** under *Display More Reports*.

### 2. Review Stock Summary Report

- The Stock Summary report provides an overview of all stock items, showing:
  - Closing Stock
  - Inward and Outward Quantities

- Opening Balances (if any)

**3. Adjust the Period (Optional)**

- Press **F2** to set a specific date range for the report.
- 

By following these steps, you have successfully created an inventory voucher and viewed the Stock Summary report in Tally Prime. This report helps you monitor stock levels, view incoming and outgoing stock, and manage inventory efficiently.

**Problem:**

**Enter the following transaction in appropriate inventory vouchers**

1. Purchase shirt from Madura Coats Companies

- a) Cotton shirt 15 nos @ Rs.130
- b) Formal shirt 23 nos @ Rs.190

2. Purchase Saree from Lakshmi Mills

- a) Punam saree 18 nos @ Rs.350
- b) Silk sarees 18 nos @ Rs.2,500

3. Purchase kids wear from Mangal Deep Company

- a) Frocks 15 nos @ Rs.370
- b) Chudidhar 12 nos @ Rs.420

4. Sold shirt to Jayachandran Textiles

- a) Cotton shirt 12 nos @ Rs.170
- b) Formal shirts 15 nos @ Rs.220

5. Sold saree to RMKV silks

- a) Punam sarees 14 nos @ Rs.430
- b) Silk sarees 12 nos @ Rs. 3,800

6. Sold kids wear to life style

- a) Focks 12 nos @ Rs.450
- b) Chudidhars 10 nos @ Rs.540

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---

**Output:-**

The screenshot shows the TallyPrime Stock Summary window. The window title is 'TallyPrime MANAGE EDU'. The menu bar includes 'K: Company', 'Y: Data', 'Z: Exchange', 'G: Go To', 'O: Import', 'E: Export', 'M: E-mail', 'P: Print', and 'F1: Help'. The window displays a table with the following data:

Particulars	NS For 1-Apr-24 Closing Balance		
	Quantity	Rate	Value
Chudidhars	2.00 nos	420.00	840.00
Cotton Shirt	3.00 nos	130.00	390.00
Formal Shirt	8.00 nos	190.00	1,520.00
Frocks	3.00 nos	370.00	1,110.00
Punam Saree	4.00 nos	350.00	1,400.00
Silk Saree	6.00 nos	2,500.00	15,000.00
<b>Grand Total</b>	<b>26.00 nos</b>		<b>20,260.00</b>

The window also features a right-hand pane with various function keys (F2-F12) and a bottom toolbar with options like 'Quit', 'Space: Select', 'Remove Line', and 'Restore Line'. The system tray at the bottom shows the time as 9:26 AM on 9/22/2024.

**Result:-**

- The stock entries are successfully created.

### **Program – 17**

## **Creating an Inventory Voucher with Discount and Displaying in Trial**

### **Balance in Tally Prime**

This guide provides comprehensive steps to create an inventory voucher with discounts in Tally Prime and view it in the Trial Balance report, which helps assess the financial position of a company.

---

### **Aim**

To create an inventory voucher using discount methods and display the resulting balances in the Trial Balance report.

---

### **Procedure: Step-by-Step Guide**

#### **1. Open Tally Prime Program**

- Start the *Tally Prime* software on your computer.
- Click on **Continue in Educational Mode** if you are using the free version for practice.

#### **2. Create a Company**

- Press **ALT + K** to open the *Company Menu*.
- Select **Create** (or press **ALT + C**) to initiate the creation of a new company.

### 3. Enter Company Information

- In the *Company Info* menu, fill in all necessary company details:
  - **Company Name:** Enter the name of the company.
  - **Address:** Input the mailing address.
  - **Contact Information:** Provide phone numbers or email.
  - **Financial Year Beginning Date:** Set the start date of the financial year.
  - **Books Beginning Date:** Specify the date from which you want to maintain the accounts.

### 4. Save the Company

- After entering all details, press **Ctrl + A** to save the company.

---

## Setting Up Inventory

### 1. Create Stock Group

- From the **Gateway of Tally**, select **Create** and then **Stock Group**.
- Enter a name for the stock group (e.g., "Electronics").
- Press **Ctrl + A** to save the Stock Group.

### 2. Create Stock Items



- From the **Gateway of Tally**, go to **Create** and select **Stock Item**.
- For each stock item, fill in the following:
  - **Item Name**: Enter the name of the stock item (e.g., "Laptop").
  - **Stock Group**: Select the relevant stock group created earlier.
  - **Unit of Measure**: Specify the unit (e.g., "nos" for number of items).
  - **Opening Balance**: Enter the quantity and rate if applicable.
- Press **Ctrl + A** to save each stock item.

### 3. Create Units of Measure

- Navigate to the **Gateway of Tally**, select **Create**, and then **Unit**.
- Define units such as "pcs" (pieces), "kg" (kilograms), etc.
- Press **Ctrl + A** to save the unit.

---

## Creating an Inventory Voucher with Discount

### 1. Access Voucher Entry

- From the **Gateway of Tally**, go to **Voucher Entry**.

### 2. Change to Item Invoice Mode

- In the *Voucher Entry* screen, press **Ctrl + H** to switch to **Item Invoice** mode.

### 3. Configure Discount Settings

- Press **F12** to open the *Features Configuration*.

- Look for the option **Use Discount Column in Invoice** and set it to **Yes**.  
This allows you to apply discounts directly in the invoice.
- Save changes and return to the voucher entry screen.

#### 4. Enter Inventory Details in Voucher

- Choose the appropriate voucher type (e.g., **Sales Voucher**).
- Fill in the required details:
  - **Date:** Change the date if needed (use **F2**).
  - **Stock Item:** Select the stock item (e.g., "Laptop").
  - **Quantity:** Enter the number of items sold or purchased.
  - **Rate:** Input the rate per item.
  - **Discount:** Enter the discount percentage or amount as applicable.
- Press **Ctrl + A** to save the voucher.

---

## Viewing the Trial Balance Report

### 1. Access the Trial Balance Report

- From the **Gateway of Tally**, select **Display More Reports**.
- Choose **Trial Balance** from the list.

### 2. View Trial Balance

- The Trial Balance report will display all ledgers along with their debit and credit balances.

- To view in ledger-wise format, press **Ctrl + H** to toggle the report format and select **Ledger-wise** or press **F5** for detailed view.

### 3. Adjust the Period (Optional)

- Use **F2** to change the date range for the report, allowing you to see transactions for a specific period.

---

By following these steps, you have successfully created an inventory voucher with a discount and displayed it in the Trial Balance report in Tally Prime. This process helps you keep track of inventory transactions and assess the overall financial position of the company through the Trial Balance.

---

#### **Problem:**

**Enter the transaction in inventory voucher and display the result in trial balance report.**

1. Purchase goods from Samsung Company
  - a) Samsung TV 11 nos @ Rs.11,000 @ discount 10%
2. Purchase goods from videocon Company
  - a) Videocon Washing Machine 4 nos @ Rs.6,000 discount 5%
  - b) Videocon TV 14 nos @ Rs.7,000 discount 2%
3. Sold goods to Mr. Ram
  - a) Samsung TV 5 nos @ Rs.13,000 discount 5%

b) Videocon TV 6 nos @ Rs.9,000 discount 4 %

c) Videocon Washing Machine 2 nos @ Rs.8,000 discount 10%

4. Sold Goods from Arun

a) Samsung TV 1 nos @ Rs.14,000 discount 10%

b) Videocon TV 2 nos @ Rs.10,000 discount 10%

5. Purchase Return to Videocon Company

a) Videocon Washing Machine 1 nos @ Rs.8,000

6. Sales Return from Mr. Ram

a) Samsung TV 1 nos @ Rs.10,000

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---

**Output:-**

The screenshot displays the TallyPrime interface for a Trial Balance report. The report is for 'Samsung Company' for the period '1-Apr-24'. The table shows the following data:

Particulars	Closing Balance	
	Debit	Credit
<b>Opening Stock</b>		
Anun	30,600.00	
Cash		1,08,900.00
Mr. Ram	1,17,990.00	
Purchase	2,19,740.00	
Sales		1,48,590.00
Vedicoon Company		1,10,840.00
<b>Grand Total</b>	<b>3,68,330.00</b>	<b>3,68,330.00</b>

**Result:-**

- Successfully created inventory voucher and display trial balance report.

## **Program – 18**

### **Creating a Purchase Invoice Bill with GST in Tally Prime**

This guide outlines the steps to create a purchase invoice with GST in Tally Prime, ensuring that all GST details are accurately captured for compliance and reporting.

---

#### **Aim**

To create a purchase invoice bill that includes GST.

---

#### **Procedure: Step-by-Step Instructions**

##### **1. Open Tally Prime Program**

- Launch the *Tally Prime* software on your computer.
- Click on **Continue in Educational Mode** if you're using the educational version.

##### **2. Create a Company**

- Press **ALT + K** to access the *Company Menu*.
- Select **Create** (or press **ALT + C**) to start creating a new company.

##### **3. Enter Company Information**

- In the *Company Info* menu, fill in the necessary company details:
  - **Company Name:** Enter the name of your business.
  - **Address:** Input the full mailing address.
  - **Contact Information:** Provide phone numbers and email if needed.
  - **Financial Year Beginning Date:** Set the starting date of your financial year.
  - **Books Beginning Date:** Specify the date from which you want to maintain your books of accounts.

#### 4. Save the Company

- After entering all details, press **Ctrl + A** to save the company.

---

## Setting Up Ledgers for GST

### 1. Alter Menu to Create Ledgers

- Go to the **Gateway of Tally** and select **Alter**.
- Click on **Ledger** to create or modify existing ledgers.

### 2. Create Necessary Ledgers

- Create ledgers required for purchases, including:
  - **Purchase Account:** This will capture the total purchase amount.

- **GST Input (CGST/SGST/IGST):** Create separate ledgers for input GST, categorized based on applicable rates (e.g., 5%, 12%, 18%, 28%).
  - While creating ledgers, ensure to select the correct group:
    - **Purchases Account** under **Purchase Accounts** for the purchase account.
    - **Duties & Taxes** for GST input ledgers.
  - Press **Ctrl + A** to save each ledger.
- 

## Setting Up Stock for Purchases

### 1. Create Stock Group

- From the **Gateway of Tally**, select **Create** and then **Stock Group**.
- Enter the name of the stock group (e.g., "Electronics").
- Press **Ctrl + A** to save the Stock Group.

### 2. Create Stock Items

- Select **Create** and choose **Stock Item** from the *Gateway of Tally*.
- For each stock item, enter the following:
  - **Item Name:** Specify the name of the stock item (e.g., "Laptop").
  - **Stock Group:** Select the relevant stock group created earlier.
  - **Unit of Measure:** Specify the unit (e.g., "nos" for number of items).



- **Opening Balance:** If applicable, input the opening balance.
  - Press **Ctrl + A** to save each stock item.
3. **Create Units of Measure**
- From the **Gateway of Tally**, select **Create** and then **Unit**.
  - Define the unit of measure such as "pcs" (pieces), "kg" (kilograms), etc.
  - Press **Ctrl + A** to save the unit.
- 

### **Creating a Purchase Invoice with GST**

1. **Access Purchase Voucher Entry**
  - From the **Gateway of Tally**, navigate to **Voucher Entry**.
2. **Change to Item Invoice Mode**
  - In the *Voucher Entry* screen, press **Ctrl + H** to switch to **Item Invoice** mode.
3. **Enter Purchase Invoice Details**
  - Select **Purchase Voucher**.
  - Fill in the following details:
    - **Date:** Adjust the date as needed (use **F2**).
    - **Party Name:** Select or create the ledger for the supplier from whom you are purchasing.
    - **Item Details:**
      - Select the stock item (e.g., "Laptop").

- Enter the **Quantity**.
  - Enter the **Rate**.
  - The system will automatically calculate the **Amount**.
  - **GST Details:** Ensure to enter the applicable GST percentage (CGST/SGST/IGST) in the appropriate columns. The system will compute the GST amount automatically.
4. **Save the Purchase Voucher**
- After entering all necessary details, press **Ctrl + A** to save the purchase invoice.

---

## **Viewing the Purchase Invoice Bill**

1. **Access the Day Book**
  - From the **Gateway of Tally**, select **Display More Reports**.
  - Choose **Day Book** to view all transactions, including the purchase invoice.
2. **Show the Purchase Invoice Bill**
  - In the Day Book, use **Ctrl + P** to print or view the purchase invoice details.
  - You can filter the date range if necessary to display the specific invoice.

By following these steps, you have successfully created a purchase invoice bill with GST in Tally Prime. This process helps in maintaining accurate records for GST compliance and provides a detailed view of purchases for better financial management.

**Problem:**

1. Purchased on 10 Tv @ Rs.15,000
2. Purchased on 12 Radio @ Rs.1000
3. Purchase on 2 Fan @ Rs.875
4. Purchased on 1 Washing machine @Rs.18,000
5. Purchased on 1 Fridge @ Rs.15,000
6. Purchased on 2 Sealing fan @ Rs.2,500
7. Purchased on 2 cooker @ Rs.1,200
8. Purchased on 2 cuttle @ Rs.18,000
9. Purchase on 1 Bed @Rs.1000

You are required prepare for purchase invoice bill with GST

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**Output:-**

**Ledger Report for Ram company**

**Purchase Invoice Bill for Ram Company**

Name of Item	Quantity	Rate per	Amount
Tv	10.00 nos	15,000.00 nos	1,50,000.00
Radio	12.00 nos	1,000.00 nos	12,000.00
Fan	2.00 nos	875.00 nos	1,750.00
Washing Machine	1.00 nos	18,000.00 nos	18,000.00
Fridge	1.00 nos	15,000.00 nos	15,000.00
Sealing Fan	2.00 nos	2,500.00 nos	5,000.00
Cooker	2.00 nos	1,200.00 nos	2,400.00
Cuttle	2.00 nos	18,000.00 nos	36,000.00
Bed	1.00 nos	1,000.00 nos	1,000.00
			2,41,150.00
CGST		9 %	3,996.00
SGST		9 %	2,196.00
<b>Total</b>	<b>33.00 nos</b>		<b>2,49,142.00</b>

Provide GST/e-Way Bill details : Yes

Narration: 33.00 nos 2,49,142.00

**Purchase invoice bill for Ram Company**

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e-Way Bill No:  
 Invoice No. 1  
 Ref. No. 1234 dt. 1-Apr-24

Dated: 1-Apr-24

**Ram**  
 GSTIN/UIN : 33ARUP45415H22M  
 State Name : Tamil Nadu, Code : 33

**INVOICE**

Party : Purchase with GST  
 Anuppukottai  
 State Name : Tamil Nadu, Code : 33

Sl. No.	Description of Goods	Quantity	Rate	per	Amount
1	Tv	10.00 nos	15,000.00	nos	1,50,000.00
2	Radio	12.00 nos	1,000.00	nos	12,000.00
3	Fan	2.00 nos	875.00	nos	1,750.00
4	Washing Machine	1.00 nos	18,000.00	nos	18,000.00
5	Fridge	1.00 nos	15,000.00	nos	15,000.00
6	Sealing Fan	2.00 nos	2,500.00	nos	5,000.00
7	Cooker	2.00 nos	1,200.00	nos	2,400.00
8	Cuttle	2.00 nos	18,000.00	nos	36,000.00
9	Bed	1.00 nos	1,000.00	nos	1,000.00
					2,41,750.00
	CGST			9 %	3,986.00
	SGST			9 %	3,986.00
	<b>Total</b>	<b>33.00 nos</b>			<b>₹ 2,49,142.00</b>

Amount Chargeable (in words)  
 INR Two Lakh Forty Nine Thousand One Hundred Forty Two Only

E & O E  
 for Ram

**Result:-**

- To successfully generated in purchase invoice bill.

## **Program – 19**

### **Creating a Sales Invoice Bill with GST in Tally Prime**

This guide outlines the steps to create a sales invoice with GST in Tally Prime, ensuring that all GST details are correctly captured for compliance and reporting.

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#### **Aim**

To create a sales invoice bill that includes GST.

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#### **Procedure: Step-by-Step Instructions**

##### **1. Open Tally Prime Program**

- Launch the *Tally Prime* software on your computer.
- Click on **Continue in Educational Mode** if you are using the educational version.

##### **2. Create a Company**

- Press **ALT + K** to access the *Company Menu*.
- Select **Create** (or press **ALT + C**) to start creating a new company.

##### **3. Enter Company Information**

- In the *Company Info* menu, fill in the necessary company details:
  - **Company Name:** Enter the name of your business.
  - **Address:** Input the full mailing address.
  - **Contact Information:** Provide phone numbers and email if needed.
  - **Financial Year Beginning Date:** Set the starting date of your financial year.
  - **Books Beginning Date:** Specify the date from which you want to maintain your books of accounts.

#### 4. Save the Company

- After entering all details, press **Ctrl + A** to save the company.
- 

## Setting Up Ledgers for GST

### 1. Alter Menu to Create Ledgers

- Go to the **Gateway of Tally** and select **Alter**.
- Click on **Ledger** to create or modify existing ledgers.

### 2. Create Necessary Ledgers

- Create ledgers required for sales, including:
  - **Sales Account:** This will capture the total sales amount.

- **GST Output (CGST/SGST/IGST):** Create separate ledgers for output GST, categorized based on applicable rates (e.g., 5%, 12%, 18%, 28%).
  - While creating ledgers, ensure to select the correct group:
    - **Sales Account** under **Sales Accounts** for the sales account.
    - **Duties & Taxes** for GST output ledgers.
  - Press **Ctrl + A** to save each ledger.
- 

## Setting Up Stock for Sales

### 1. Create Stock Group

- From the **Gateway of Tally**, select **Create** and then **Stock Group**.
- Enter the name of the stock group (e.g., "Electronics").
- Press **Ctrl + A** to save the Stock Group.

### 2. Create Stock Items

- Select **Create** and choose **Stock Item** from the *Gateway of Tally*.
- For each stock item, enter the following:
  - **Item Name:** Specify the name of the stock item (e.g., "Laptop").
  - **Stock Group:** Select the relevant stock group created earlier.
  - **Unit of Measure:** Specify the unit (e.g., "nos" for number of items).
  - **Opening Balance:** If applicable, input the opening balance.



- Press **Ctrl + A** to save each stock item.

### 3. Create Units of Measure

- From the **Gateway of Tally**, select **Create** and then **Unit**.
  - Define the unit of measure such as "pcs" (pieces), "kg" (kilograms), etc.
  - Press **Ctrl + A** to save the unit.
- 

## Creating a Sales Invoice with GST

### 1. Access Sales Voucher Entry

- From the **Gateway of Tally**, navigate to **Voucher Entry**.

### 2. Change to Item Invoice Mode

- In the *Voucher Entry* screen, press **Ctrl + H** to switch to **Item Invoice** mode.

### 3. Enter Sales Invoice Details

- Select **Sales Voucher**.
- Fill in the following details:
  - **Date:** Adjust the date as needed (use **F2**).
  - **Party Name:** Select or create the ledger for the customer to whom you are selling.
  - **Item Details:**
    - Select the stock item (e.g., "Laptop").
    - Enter the **Quantity**.

- Enter the **Rate**.
  - The system will automatically calculate the **Amount**.
  - **GST Details:** Ensure to enter the applicable GST percentage (CGST/SGST/IGST) in the appropriate columns. The system will compute the GST amount automatically.
4. **Save the Sales Voucher**
- After entering all necessary details, press **Ctrl + A** to save the sales invoice.
- 

## **Viewing the Sales Invoice Bill**

1. **Access the Day Book**
    - From the **Gateway of Tally**, select **Display More Reports**.
    - Choose **Day Book** to view all transactions, including the sales invoice.
  2. **Show the Sales Invoice Bill**
    - In the Day Book, use **Ctrl + P** to print or view the sales invoice details.
    - You can filter the date range if necessary to display the specific invoice.
- 

By following these steps, you have successfully created a sales invoice bill with GST in Tally Prime. This process helps in maintaining accurate records for GST compliance and provides a detailed view of sales for better financial management.

**Problem:**

1. Sales for 5 Tv @ Rs.20,000
2. Sales for 6 Radio @ Rs.1200
3. Sales for 1 Fan @ Rs.900
4. Sales for 1 Washing machine @ Rs.19,000
5. Sales for 1 Fridge @ Rs.16,000
6. Sales for 1 Sealing fan @ Rs.3000
7. Sales for 1 cooker @ Rs.1,500
8. Sales for 2 cuttle @ Rs.20,000
9. Sales for 1 Bed @ Rs.1,200

You are required prepare for Sales invoice bill with GST

**Output:-**

**Ledger Report for Ram company**

**Accounting Voucher Creation**  
**Sales** No. 1  
 Date: 1-Apr-24 Monday  
 Party A/c name: Muthu  
 Current balance: Sales ledger: Sales  
 Purchase with GST

Name of Item	Quantity	Rate per	Amount
Tv	5.00 nos	20,000.00 nos	1,00,000.00
Radio	6.00 nos	1,200.00 nos	7,200.00
Fan	1.00 nos	900.00 nos	900.00
Washing Machine	1.00 nos	19,000.00 nos	19,000.00
Fridge	1.00 nos	16,000.00 nos	16,000.00
Sealing Fan	1.00 nos	3,000.00 nos	3,000.00
Cooker	1.00 nos	1,500.00 nos	1,500.00
Cuttle	2.00 nos	20,000.00 nos	40,000.00
Bed	1.00 nos	1,200.00 nos	1,200.00
			1,88,800.00
CGST		9 %	4,113.00
SGST		9 %	4,113.00
			1,97,026.00

Provide GST/e-Way Bill details : Yes  
 Narration: 19.00 nos 1,97,026.00

**Sales invoice bill with GST**

# DIRECTORATE OF DISTANCE AND CONTINUING EDUCATION Manonmaniam Sundaranar University, Tirunelveli

The screenshot shows a two-page tax invoice in XPS Viewer. The invoice is for a purchase with GST, dated 1-Apr-24, and issued to Muthu in Tamil Nadu. It lists various household appliances with their quantities, rates, and amounts. The total invoice amount is ₹ 1,97,026.00. The tax amount is ₹ 2,226.00, making the total payable ₹ 2,00,000.00.

Sl No	Description of Goods	HSN/SAC	Quantity	Rate	per	Amount
1	TV		5.00 nos	20,000.00	nos	1,00,000.00
2	Refrac		5.00 nos	1,200.00	nos	7,200.00
3	Fan		1.00 nos	900.00	nos	900.00
4	Washing Machine		1.00 nos	18,000.00	nos	18,000.00
5	Fridge		1.00 nos	16,000.00	nos	16,000.00
6	Sealing Fan		1.00 nos	3,000.00	nos	3,000.00
7	Cooker		1.00 nos	1,500.00	nos	1,500.00
8	Cutlery		2.00 nos	20,000.00	nos	40,000.00
9	Bed		1.00 nos	1,200.00	nos	1,200.00
Total						1,97,026.00

**Tax Invoice (Page 2)**

Sl No	Description of Goods	HSN/SAC	Quantity	Rate	per	Amount
	CGST			9%		4,110.00
	SGST			9%		4,110.00
Total						8,226.00

**Amount in words:** INR One Lakh Ninety Seven Thousand Twenty Six Only

HSN/SAC	Y taxable	Rate	Y taxable	Rate	Y taxable	Total
	1,43,100.00	9%	12,879.00	9%	11,181.00	2,226.00
	48,700.00	9%	4,383.00	9%	3,945.00	8,226.00
	Total		1,91,800.00		1,91,800.00	2,226.00

**Tax Amount in words:** INR Eight Thousand Two Hundred Twenty Six Only

This is a Computer Generated Invoice

## Result:-

➤ To successfully created in Sales invoice bills.