

R-CODE:

```
install.packages("psych")

library(psych)

install.packages("car")

library(car)

getwd()

setwd('C:/Users/Admin/Desktop/Folders/EDUCTION/course material/MATPMD1/Project')

investment<- Investment_Data

str(investment)

clean<-na.omit(investment)

str(clean)

summary(clean)

boxplot(clean$`Share Price (p)`)

cor(clean)

fitAll<-lm(`Share Price (p)`~ . ,data=clean1)

plot(backward)

fitAllf<-lm(`Share Price (p)`~ 1 ,data=clean1)

forward<-step(fitAllf,direction = 'forward',scope =formula(fitAll) )

formula(forward)

best1<-lm(`Share Price (p)`~Dividend + Yield ,data=clean1[-c(40,48),])

summary(best1)

hist(best1)

plot(backward)

fitAllB<-lm(`Share Price (p)`~ . ,data=clean1[-c(40,48,49),])

backward1<-step(fitAllB,direction = 'backward')

bestbackward<-lm(`Share Price (p)` ~ `EPS(Current)` + `P/E` + MktCap + Dividend +
  Yield + Beta ,data=clean1[-c(40,48,49),])

plot(bestbackward)

hist(bestbackward$residuals)
```

Correlation :

Share Price (p)	Avg Vol	EPS(Current)	P/E	MktCap
Dividend	Yield			
Share Price (p)	1.00000000	-0.42475618	0.69655176	0.081766341
0.32565319	0.697058756	-0.161920477		
Avg Vol	-0.42475618	1.00000000	-0.29588324	-0.026055258
0.48199795	-0.307772864	0.123686389		
EPS(Current)	0.69655176	-0.29588324	1.00000000	-0.382697511
0.26014033	0.685737942	0.135058443		
P/E	0.08176634	-0.02605526	-0.38269751	1.000000000
0.05896163	-0.045745062	-0.164174612		
MktCap	0.32565319	0.48199795	0.26014033	0.058961633
1.00000000	0.293508608	0.017541472		
Dividend	0.69705876	-0.30777286	0.68573794	-0.045745062
0.29350861	1.000000000	0.531069805		
Yield	-0.16192048	0.12368639	0.13505844	-0.164174612
0.01754147	0.531069805	1.000000000		
Alpha	0.18739542	-0.20483094	0.01730195	0.104673984 -
0.17110123	-0.235608745	-0.543356305		
Beta	-0.21073019	0.28988215	-0.27575250	0.136110415
0.08998794	-0.277127797	-0.084169356		
Employees	-0.16839290	0.43709220	-0.12987412	-0.043284418
0.32445761	-0.138283464	-0.005394998		
EPS(2016)	0.51202883	-0.21900435	0.60240793	-0.014578627
0.23162195	0.557921811	0.104597424		
EPS(2017)	0.42192514	0.03220214	0.55321478	-0.094728070
0.32590104	0.496302511	0.126009128		
Net Revenue(2016)	-0.03984661	0.54856668	-0.01104441	0.057844413
0.54110235	-0.007632055	0.040947401		
Net Revenue(2017)	-0.02408245	0.53503884	0.02960828	0.008952284
0.54025170	0.022268890	0.057136807		
Net Profit(2016)	0.30611958	0.40223603	0.35394719	0.043915249
0.86777649	0.349875152	0.074771143		
Net Profit(2017)	0.27105516	0.37182268	0.26285861	0.031957660
0.80096447	0.356192414	0.153212757		
	Alpha	Beta	Employees	EPS(2016)
EPS(2017)	Net Revenue(2016)			
Share Price (p)	0.187395423	-0.21073019	-0.168392898	0.51202883
0.42192514	-0.039846613			
Avg Vol	-0.204830938	0.28988215	0.437092205	-0.21900435
0.03220214	0.548566681			
EPS(Current)	0.017301949	-0.27575250	-0.129874117	0.60240793
0.55321478	-0.011044410			
P/E	0.104673984	0.13611041	-0.043284418	-0.01457863 -
0.09472807	0.057844413			
MktCap	-0.171101227	0.08998794	0.324457615	0.23162195
0.32590104	0.541102348			
Dividend	-0.235608745	-0.27712780	-0.138283464	0.55792181
0.49630251	-0.007632055			
Yield	-0.543356305	-0.08416936	-0.005394998	0.10459742
0.12600913	0.040947401			
Alpha	1.000000000	0.07419701	0.008634598	-0.05654057 -
0.01787016	-0.074571475			
Beta	0.074197010	1.00000000	0.085194042	-0.16102114 -
0.12150814	0.071888055			
Employees	0.008634598	0.08519404	1.000000000	-0.02873662 -
0.06871327	0.581327533			

EPS(2016)	-0.056540566	-0.16102114	-0.028736623	1.00000000
0.48978108	0.045553987			
EPS(2017)	-0.017870156	-0.12150814	-0.068713271	0.48978108
1.00000000	0.085472982			
Net Revenue(2016)	-0.074571475	0.07188806	0.581327533	0.04555399
0.08547298	1.000000000			
Net Revenue(2017)	-0.082519705	0.02882222	0.606948430	0.06631871
0.10028528	0.985385153			
Net Profit(2016)	-0.179058065	0.10726674	0.312198810	0.55736398
0.43529361	0.523943651			
Net Profit(2017)	-0.202225811	0.06962731	0.222632660	0.34352232
0.53927491	0.309200126			
	Net Revenue(2017)	Net Profit(2016)	Net Profit(2017)	
Share Price (p)	-0.024082452	0.30611958	0.27105516	
Avg Vol	0.535038843	0.40223603	0.37182268	
EPS(Current)	0.029608285	0.35394719	0.26285861	
P/E	0.008952284	0.04391525	0.03195766	
MktCap	0.540251702	0.86777649	0.80096447	
Dividend	0.022268890	0.34987515	0.35619241	
Yield	0.057136807	0.07477114	0.15321276	
Alpha	-0.082519705	-0.17905807	-0.20222581	
Beta	0.028822225	0.10726674	0.06962731	
Employees	0.606948430	0.31219881	0.22263266	
EPS(2016)	0.066318710	0.55736398	0.34352232	
EPS(2017)	0.100285280	0.43529361	0.53927491	
Net Revenue(2016)	0.985385153	0.52394365	0.30920013	
Net Revenue(2017)	1.000000000	0.52829108	0.31693430	
Net Profit(2016)	0.528291084	1.00000000	0.78239876	
Net Profit(2017)	0.316934297	0.78239876	1.00000000	

Backward step :

```
fitAllB<-lm(`Share Price (p)`~ . ,data=clean1[-c(40,48,49),])
> backward1<-step(fitAllB,direction = 'backward')
Start: AIC=606.44
`Share Price (p)` ~ X__1 + `Avg Vol` + `EPS(Current)` + `P/E` +
  MktCap + Dividend + Yield + Alpha + Beta + Employees + `EPS(2016)` +
  `EPS(2017)` + `Net Revenue(2016)` + `Net Revenue(2017)` +
  `Net Profit(2016)` + `Net Profit(2017)`
```

	Df	Sum of Sq	RSS	AIC
- X__1	1	14	344059	604.44
- `Net Revenue(2017)`	1	251	344296	604.49
- `EPS(2016)`	1	700	344744	604.57
- `Net Revenue(2016)`	1	1403	345448	604.71
- Employees	1	2174	346219	604.86
- Alpha	1	3042	347087	605.03
- `Avg Vol`	1	4990	349034	605.40
- `Net Profit(2017)`	1	6070	350115	605.61
- `P/E`	1	9715	353760	606.30
<none>			344045	606.44
- MktCap	1	13890	357935	607.09
- `EPS(2017)`	1	18889	362934	608.02
- `Net Profit(2016)`	1	19488	363533	608.13
- `EPS(Current)`	1	44205	388250	612.54
- Beta	1	53561	397606	614.13
- Yield	1	678751	1022796	677.43
- Dividend	1	863489	1207533	688.56

```
Step: AIC=604.44
`Share Price (p)` ~ `Avg Vol` + `EPS(Current)` + `P/E` + MktCap +
  Dividend + Yield + Alpha + Beta + Employees + `EPS(2016)` +
  `EPS(2017)` + `Net Revenue(2016)` + `Net Revenue(2017)` +
  `Net Profit(2016)` + `Net Profit(2017)`
```

	Df	Sum of Sq	RSS	AIC
- `Net Revenue(2017)`	1	350	344409	602.51
- `EPS(2016)`	1	707	344765	602.58
- `Net Revenue(2016)`	1	1811	345869	602.79
- Employees	1	2163	346222	602.86
- Alpha	1	3523	347581	603.12
- `Avg Vol`	1	4976	349035	603.40
- `Net Profit(2017)`	1	6527	350586	603.70
- `P/E`	1	10209	354268	604.40
<none>			344059	604.44
- MktCap	1	13971	358029	605.11
- `Net Profit(2016)`	1	19490	363549	606.13
- `EPS(2017)`	1	20225	364283	606.27
- `EPS(Current)`	1	44668	388726	610.62
- Beta	1	55321	399380	612.43
- Yield	1	682700	1026759	675.69
- Dividend	1	906304	1250362	688.89

```
Step: AIC=602.51
`Share Price (p)` ~ `Avg Vol` + `EPS(Current)` + `P/E` + MktCap +
```

Dividend + Yield + Alpha + Beta + Employees + `EPS(2016)` +
`EPS(2017)` + `Net Revenue(2016)` + `Net Profit(2016)` +
`Net Profit(2017)`

	Df	Sum of Sq	RSS	AIC
- `EPS(2016)`	1	667	345076	600.64
- Employees	1	2839	347247	601.06
- Alpha	1	3492	347901	601.18
- `Avg Vol`	1	5166	349575	601.51
- `Net Profit(2017)`	1	6423	350832	601.75
- `Net Revenue(2016)`	1	10152	354561	602.45
<none>			344409	602.51
- `P/E`	1	10975	355384	602.61
- MktCap	1	14410	358819	603.25
- `Net Profit(2016)`	1	19834	364243	604.26
- `EPS(2017)`	1	20000	364409	604.29
- `EPS(Current)`	1	44318	388727	608.62
- Beta	1	59740	404148	611.22
- Yield	1	682479	1026888	673.70
- Dividend	1	908375	1252784	687.02

Step: AIC=600.64

`Share Price (p)` ~ `Avg Vol` + `EPS(Current)` + `P/E` + MktCap +
Dividend + Yield + Alpha + Beta + Employees + `EPS(2017)` +
`Net Revenue(2016)` + `Net Profit(2016)` + `Net Profit(2017)`

	Df	Sum of Sq	RSS	AIC
- Employees	1	3011	348087	599.22
- Alpha	1	3719	348795	599.36
- `Avg Vol`	1	4940	350016	599.59
- `Net Profit(2017)`	1	6207	351283	599.83
<none>			345076	600.64
- `P/E`	1	10467	355543	600.64
- `Net Revenue(2016)`	1	10719	355795	600.69
- `EPS(2017)`	1	19827	364903	602.38
- MktCap	1	29871	374947	604.20
- `EPS(Current)`	1	44282	389358	606.73
- Beta	1	61251	406327	609.58
- `Net Profit(2016)`	1	61376	406452	609.61
- Yield	1	691631	1036707	672.34
- Dividend	1	938021	1283097	686.63

Step: AIC=599.22

`Share Price (p)` ~ `Avg Vol` + `EPS(Current)` + `P/E` + MktCap +
Dividend + Yield + Alpha + Beta + `EPS(2017)` + `Net Revenue(2016)` +
`Net Profit(2016)` + `Net Profit(2017)`

	Df	Sum of Sq	RSS	AIC
- Alpha	1	2941	351028	597.78
- `Net Profit(2017)`	1	5169	353256	598.21
- `Avg Vol`	1	5717	353804	598.31
- `Net Revenue(2016)`	1	7844	355931	598.71
<none>			348087	599.22
- `P/E`	1	12470	360557	599.58
- `EPS(2017)`	1	17860	365947	600.57
- MktCap	1	32012	380099	603.11
- `EPS(Current)`	1	46258	394345	605.58
- Beta	1	62684	410771	608.31
- `Net Profit(2016)`	1	63780	411867	608.49
- Yield	1	690193	1038280	670.44
- Dividend	1	935707	1283794	684.66

Step: AIC=597.78

`Share Price (p)` ~ `Avg Vol` + `EPS(Current)` + `P/E` + MktCap +

Dividend + Yield + Beta + `EPS(2017)` + `Net Revenue(2016)` +
`Net Profit(2016)` + `Net Profit(2017)`

	Df	Sum of Sq	RSS	AIC
- `Net Profit(2017)`	1	5218	356246	596.77
- `Avg Vol`	1	6047	357075	596.93
- `Net Revenue(2016)`	1	9137	360165	597.50
<none>			351028	597.78
- `P/E`	1	13181	364209	598.25
- `EPS(2017)`	1	17001	368028	598.95
- MktCap	1	30851	381879	601.43
- `EPS(Current)`	1	46894	397922	604.18
- `Net Profit(2016)`	1	67126	418154	607.51
- Beta	1	68661	419689	607.75
- Yield	1	861408	1212436	678.83
- Dividend	1	943986	1295014	683.25

Step: AIC=596.77

`Share Price (p)` ~ `Avg Vol` + `EPS(Current)` + `P/E` + MktCap +
Dividend + Yield + Beta + `EPS(2017)` + `Net Revenue(2016)` +
`Net Profit(2016)`

	Df	Sum of Sq	RSS	AIC
- `Net Revenue(2016)`	1	6013	362260	595.89
- `Avg Vol`	1	6974	363220	596.07
<none>			356246	596.77
- `EPS(2017)`	1	11838	368085	596.96
- `P/E`	1	11949	368196	596.98
- `EPS(Current)`	1	41985	398231	602.24
- `Net Profit(2016)`	1	61918	418165	605.51
- MktCap	1	62428	418675	605.59
- Beta	1	68099	424346	606.49
- Yield	1	861768	1218014	677.14
- Dividend	1	942127	1298374	681.42

Step: AIC=595.89

`Share Price (p)` ~ `Avg Vol` + `EPS(Current)` + `P/E` + MktCap +
Dividend + Yield + Beta + `EPS(2017)` + `Net Profit(2016)`

	Df	Sum of Sq	RSS	AIC
- `Avg Vol`	1	3775	366034	594.59
<none>			362260	595.89
- `P/E`	1	13802	376062	596.40
- `EPS(2017)`	1	14588	376847	596.54
- `EPS(Current)`	1	44411	406671	601.64
- `Net Profit(2016)`	1	56938	419197	603.67
- Beta	1	63512	425771	604.72
- MktCap	1	64003	426262	604.79
- Yield	1	869884	1232144	675.91
- Dividend	1	942085	1304345	679.73

Step: AIC=594.59

`Share Price (p)` ~ `EPS(Current)` + `P/E` + MktCap + Dividend +
Yield + Beta + `EPS(2017)` + `Net Profit(2016)`

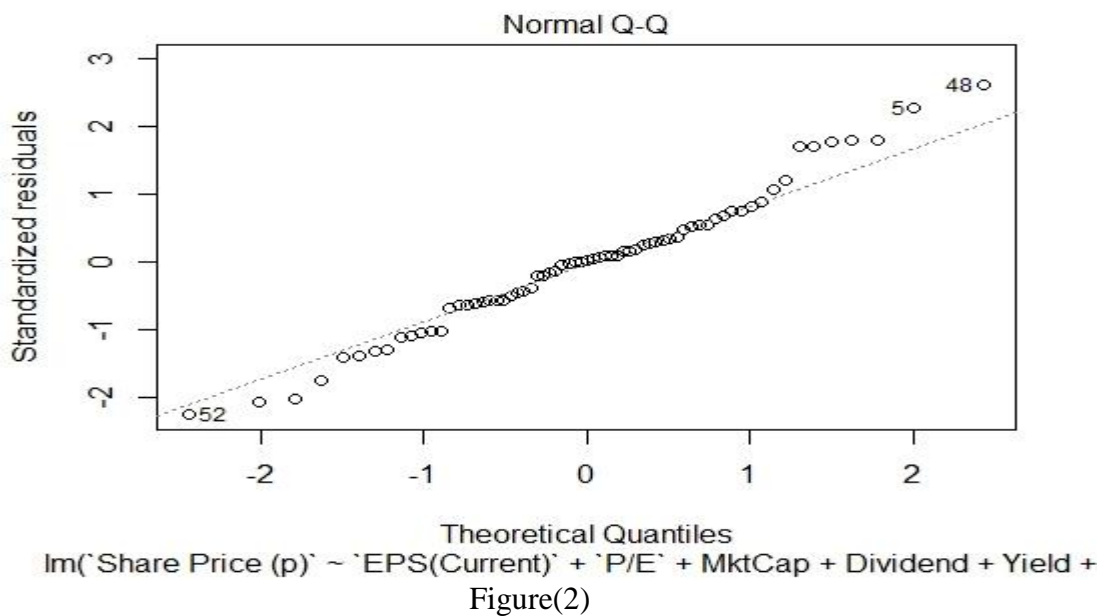
	Df	Sum of Sq	RSS	AIC
<none>			366034	594.59
- `P/E`	1	15575	381610	595.38
- `EPS(2017)`	1	20452	386486	596.23
- `EPS(Current)`	1	49912	415947	601.15
- `Net Profit(2016)`	1	58485	424519	602.52
- Beta	1	60929	426963	602.90
- MktCap	1	64846	430881	603.52
- Yield	1	1279307	1645341	693.29

- **VIF(backward)**

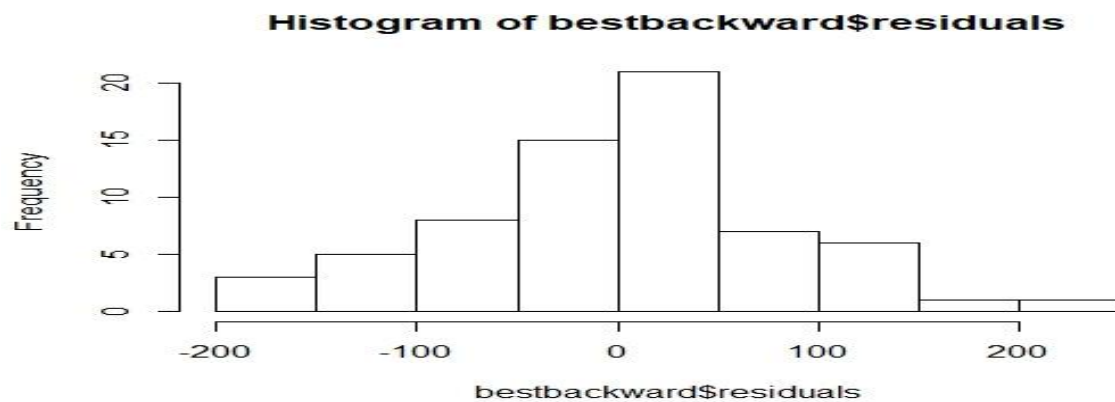
`EPS(Current)`	`P/E`	MktCap	Dividend	Yield
3.632316	1.642572	4.235289	4.151520	2.032999

plots

a. residual scatter plot without outliers :



b. Histogram plot of residuals :



Figure(3)

Forward-step:

```
fitAllf<-lm(`Share Price (p)`~ 1 ,data=clean1)
```

```
forward<-step(fitAllf,direction = 'forward',scope =formula(fitAll) )
```

```
Start: AIC=812.5
```

```
`Share Price (p)` ~ 1
```

	Df	Sum of Sq	RSS	AIC
+ Dividend	1	3631849	3842769	767.92
+ `EPS(Current)`	1	3626568	3848051	768.02
+ `EPS(2016)`	1	1959647	5514972	793.21
+ `Avg Vol`	1	1348554	6126064	800.57
+ `EPS(2017)`	1	1330638	6143981	800.77
+ MktCap	1	792683	6681935	806.65
+ `Net Profit(2016)`	1	700440	6774178	807.61
+ `Net Profit(2017)`	1	549167	6925452	809.16
+ Beta	1	331927	7142692	811.32
+ Alpha	1	262487	7212132	811.99
+ Employees	1	211952	7262667	812.48
<none>			7474619	812.50
+ Yield	1	195971	7278647	812.64
+ `P/E`	1	49973	7424645	814.03
+ `Net Revenue(2016)`	1	11868	7462751	814.39
+ `Net Revenue(2017)`	1	4335	7470284	814.46
+ X__1	1	1001	7473618	814.49

```
Step: AIC=767.92
```

```
`Share Price (p)` ~ Dividend
```

	Df	Sum of Sq	RSS	AIC
+ Yield	1	2947707	895062	667.93
+ Alpha	1	978500	2864270	749.35
+ `EPS(Current)`	1	673934	3168836	756.43
+ `Avg Vol`	1	364887	3477883	762.94
+ `EPS(2016)`	1	164526	3678244	766.86
+ MktCap	1	119872	3722897	767.71
<none>			3842769	767.92
+ `P/E`	1	96753	3746017	768.14
+ `EPS(2017)`	1	57243	3785527	768.87
+ Employees	1	39505	3803264	769.20
+ `Net Profit(2016)`	1	32990	3809779	769.32
+ X__1	1	27669	3815101	769.42
+ `Net Revenue(2017)`	1	11730	3831039	769.71
+ `Net Revenue(2016)`	1	8911	3833858	769.76
+ `Net Profit(2017)`	1	4438	3838332	769.84
+ Beta	1	2495	3840274	769.88

```
Step: AIC=667.93
```

```
`Share Price (p)` ~ Dividend + Yield
```

	Df	Sum of Sq	RSS	AIC
+ `EPS(Current)`	1	38895	856167	666.82
<none>			895062	667.93
+ Alpha	1	18513	876550	668.47
+ `EPS(2017)`	1	6936	888126	669.39
+ Beta	1	6916	888146	669.39
+ X__1	1	5108	889955	669.53
+ `EPS(2016)`	1	4210	890852	669.60
+ Employees	1	3570	891493	669.65
+ `Net Profit(2016)`	1	3495	891567	669.66
+ MktCap	1	2895	892167	669.70

+ `P/E`	1	767	894295	669.87
+ `Net Revenue(2017)`	1	272	894790	669.91
+ `Net Profit(2017)`	1	129	894933	669.92
+ `Avg Vol`	1	63	894999	669.93
+ `Net Revenue(2016)`	1	10	895052	669.93

Step: AIC=666.82

`Share Price (p)` ~ Dividend + Yield + `EPS(Current)`

	Df	Sum of Sq	RSS	AIC
+ `P/E`	1	32532	823635	666.11
<none>			856167	666.82
+ `EPS(2017)`	1	21785	834383	667.02
+ `EPS(2016)`	1	16526	839641	667.46
+ Alpha	1	14550	841617	667.62
+ Beta	1	10751	845417	667.94
+ X__1	1	9875	846292	668.01
+ `Net Profit(2016)`	1	7142	849025	668.23
+ Employees	1	3115	853052	668.57
+ MktCap	1	2426	853741	668.62
+ `Net Revenue(2017)`	1	622	855545	668.77
+ `Net Profit(2017)`	1	184	855983	668.81
+ `Avg Vol`	1	33	856134	668.82
+ `Net Revenue(2016)`	1	33	856134	668.82

Step: AIC=666.11

`Share Price (p)` ~ Dividend + Yield + `EPS(Current)` + `P/E`

	Df	Sum of Sq	RSS	AIC
+ `EPS(2016)`	1	27069.5	796565	665.77
+ `EPS(2017)`	1	26037.1	797598	665.86
<none>			823635	666.11
+ X__1	1	17405.4	806229	666.61
+ `Net Profit(2016)`	1	12555.2	811080	667.03
+ Alpha	1	11410.4	812224	667.13
+ Beta	1	7279.1	816356	667.49
+ Employees	1	2011.0	821624	667.94
+ MktCap	1	1245.4	822389	668.00
+ `Net Revenue(2017)`	1	1224.0	822411	668.00
+ `Net Profit(2017)`	1	635.4	822999	668.06
+ `Net Revenue(2016)`	1	511.6	823123	668.07
+ `Avg vol`	1	0.0	823635	668.11

Step: AIC=665.77

`Share Price (p)` ~ Dividend + Yield + `EPS(Current)` + `P/E` +
`EPS(2016)`

	Df	Sum of Sq	RSS	AIC
<none>			796565	665.77
+ `EPS(2017)`	1	17988.0	778577	666.17
+ X__1	1	15880.5	780685	666.36
+ Alpha	1	8280.4	788285	667.04
+ Beta	1	8064.7	788501	667.06
+ `Net Profit(2016)`	1	2250.1	794315	667.57
+ MktCap	1	1514.8	795050	667.64
+ Employees	1	742.9	795822	667.70
+ `Net Revenue(2017)`	1	596.1	795969	667.72
+ `Net Revenue(2016)`	1	157.2	796408	667.76
+ `Avg Vol`	1	34.6	796531	667.77
+ `Net Profit(2017)`	1	17.1	796548	667.77

Best forward :

`best1<-lm(Share Price (p) ~Dividend + Yield ,data=clean1[-c(40,48),])`

Plots:

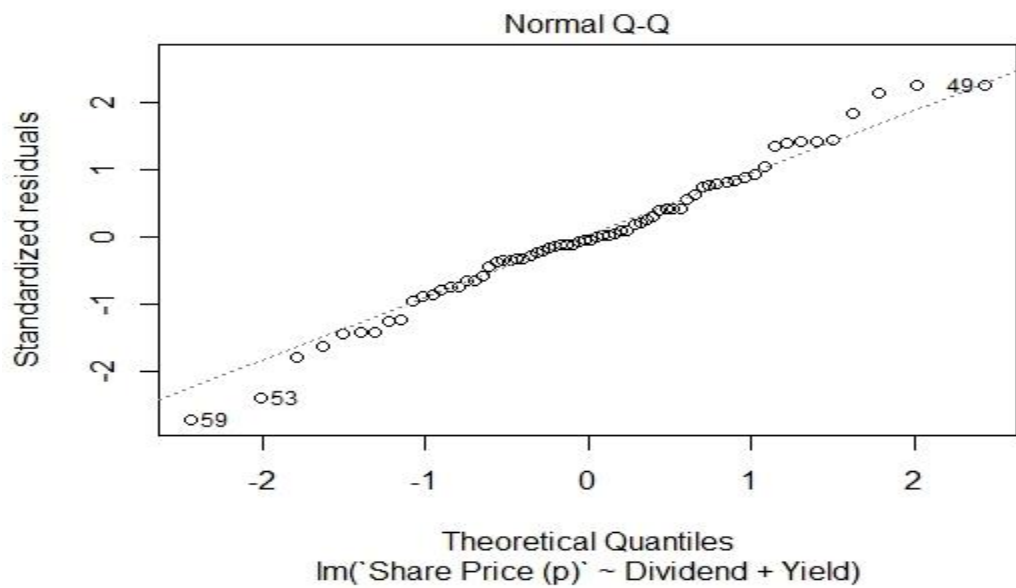
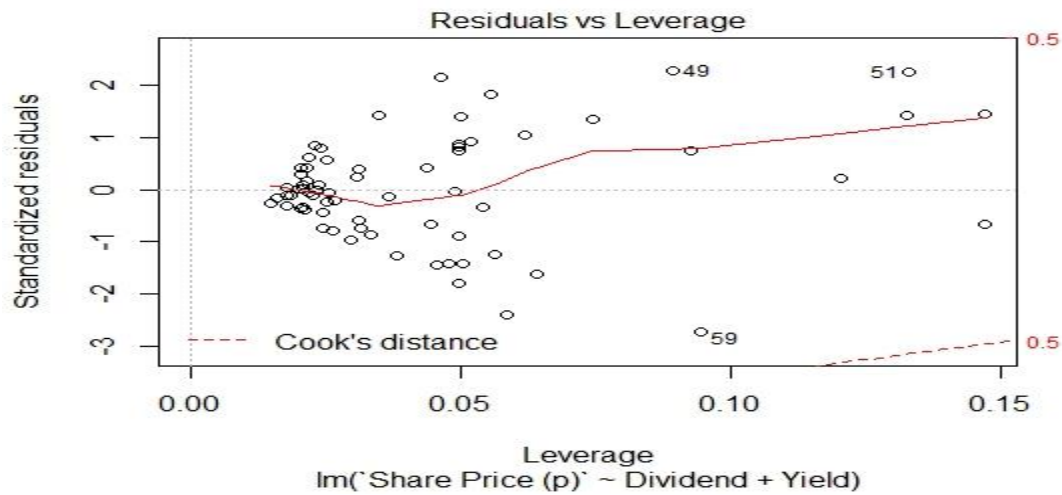


Figure (4)



Figure(5)

