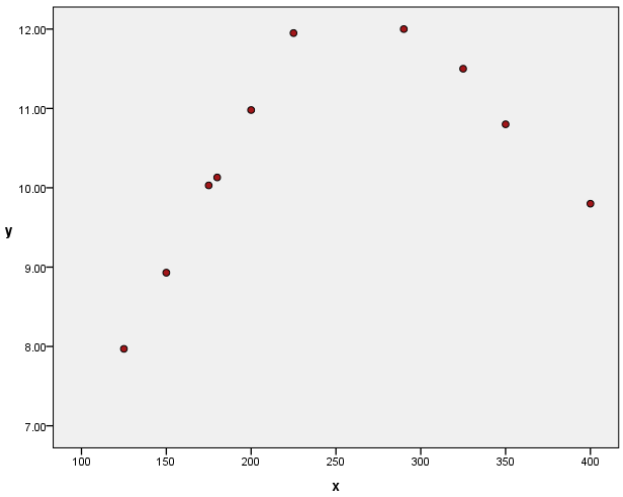
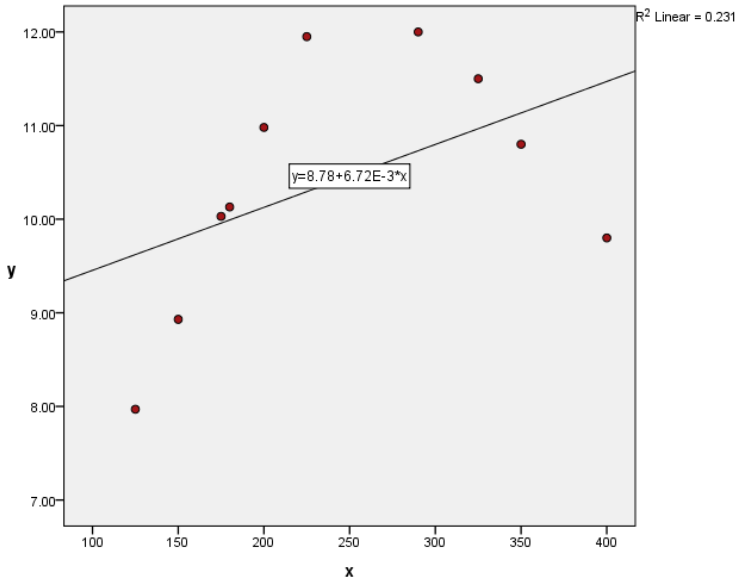
An electronics company periodically imports shipments of a certain large part used as a component in several of its products. The size of the shipment varies depending upon production schedules. For handling and distribution to assembly plants, shipments of size 250 thousand parts or less are sent to warehouse A; larger shipments are sent to warehouse B since this warehouse has specialised equipment that provides greater economies of scale for large shipments.





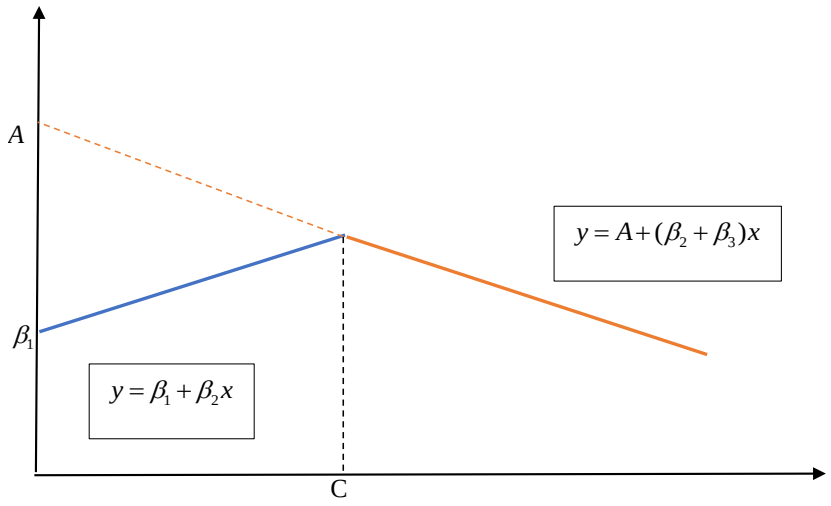
Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	8.782	1.116		7.868	.000
	x	.007	.004	.481	1.552	.159

a. Dependent Variable: y

Suppose that there are two linear regressions here (dropping ε as it is irrelevant to calculations):

$$\begin{cases} y = \beta_1 + \beta_2 x \ ; & x \le C \\ y = A + (\beta_2 + \beta_3) x \ ; & x > C \end{cases}$$



At point *C*:

$$\beta_1 + \beta_2 C = A + (\beta_2 + \beta_3) C$$

Simplify and find *A*

$$A = \beta_1 - \beta_3 C$$

Substitute for *A* in the equations, introducing a dummy variable *D*:

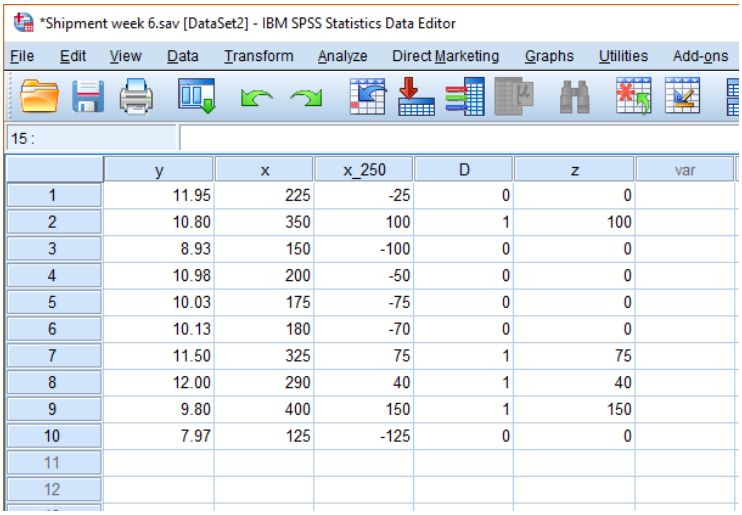
$$\begin{cases} y = \beta_1 + \beta_2 x \ ; & x \le C, D = 0 \\ y = (\beta_1 - \beta_3 C) + (\beta_2 + \beta_3) x \ ; & x > C, D = 1 \end{cases}$$

Now combine these two equations into one by the help of *D:*

$$y = \beta_1 + \beta_2 x + \beta_3 (x - C) D$$

A formulation called **Piecewise Regression**.

Back to the example:



	y	x	x_250	D	z	var
1	11.95	225	-25	0	0	
2	10.80	350	100	1	100	
3	8.93	150	-100	0	0	
4	10.98	200	-50	0	0	
5	10.03	175	-75	0	0	
6	10.13	180	-70	0	0	
7	11.50	325	75	1	75	
8	12.00	290	40	1	40	
9	9.80	400	150	1	150	
10	7.97	125	-125	0	0	
11						
12						

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.999[a]	.998	.997	.07307

a. Predictors: (Constant), z, x

b. Dependent Variable: y

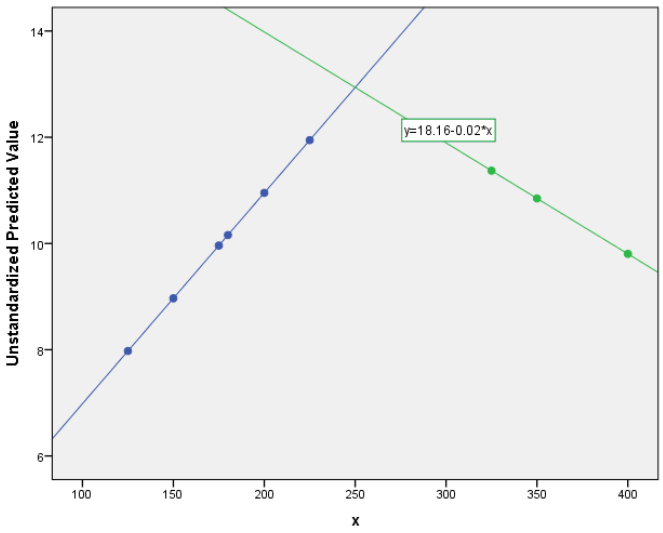
Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	3.014	.140		21.490	.000
x	.040	.001	2.840	52.891	.000
z	-.061	.001	-2.516	-46.857	.000

a. Dependent Variable: y

Therefore, estimated equations are:

$$\begin{cases} \hat{y} = 3.014 + .040x\,; & x \le 250 \\ \hat{y} = (3.014 - 250(-.061)) + (.040 - .061)x = 18.264 - .021x\,; & x > 250 \end{cases}$$


y=18.16-0.02*x
Unstandardized Predicted Value
14
12
10
8
6
100
150
200
250
300
350
400
x