Exponential Trend

(Non-linear Trend)

$Y = ab^x$ ... (1)

a, b = Constant

$\log Y = \log(ab^x)$

$\log mn = \log m + \log n$

$\log m^n = n \log m$

$\log Y = \log a + \log b^x$

$\log Y = \log a + x \log b$ (2)

Straight line trend

$Y = A + BX$ (3)

$Y = \log Y$ $\quad XY = AX + BX^2$

$A = \log a \Rightarrow a = \text{antilog } A$

$X = x$

$B = \log b \Rightarrow b = \text{antilog } B$

$$\left.\begin{aligned} \Sigma Y &= nA + B\Sigma X \\ \Sigma XY &= A\Sigma X + B\Sigma X^2 \end{aligned}\right\}$$

$Y_t = ab^x$

t	Year	(Y) sales	$x = X - 2008$	$Y = \log y$	xY	x^2
	2006	32	−2	1.5051	−3.0102	4
	2007	47	−1	1.6721	−1.6721	1
	2008	65	0	1.8129	0	0
	2009	92	1	1.9638	1.9638	1
	2010	190	2	2.2787	4.5574	4

$\Sigma x = 0 \quad \Sigma Y = 9.2326 \quad \Sigma xY = 1.8389 \quad \Sigma x^2 = 10$

$$A = \frac{\Sigma Y}{n} = \frac{9.2326}{5} = 1.84652$$

$$B = \frac{\Sigma xY}{\Sigma x^2} = \frac{1.8389}{10} = 0.18389$$

$\therefore A = \log a \Rightarrow a = (\text{antilog } A)$

$a = \text{antilog } (1.84652)$

$\boxed{a = 70.203}$

$B = \log b \Rightarrow b = \text{antilog } (0.18389)$

$\Rightarrow b = 1.5272$

$Y = ab^x$

$Y = (70.203)(1.5272)^x$