

Regression Kink Design

http://www.jasondebacker.com/classes/Lecture8_Notes_Kinks.pdf

The regression analysis is run first by retrieving β_1 in this equation:

$$E[Y|V = v] = \alpha_0 + \sum_{p=1}^P [\alpha_p(v - k)^p + \beta_p(v - k)^p * D], \quad (1)$$

- Where Y is the outcome variable of interest; k is the kink point; v is the running variable, and D allows the slopes to change at the kink.
- The β_1 retrieves the change in slope in outcomes at the kink point in the treatment variable.

Data

x	y
0.0923	$3.39 \cdot 10^6$
0.196	$3.05 \cdot 10^6$
0.350	$2.48 \cdot 10^6$
0.478	$1.97 \cdot 10^6$
0.584	$1.48 \cdot 10^6$
0.680	$1.09 \cdot 10^6$
0.770	$7.20 \cdot 10^5$
0.852	$3.60 \cdot 10^5$
0.890	$1.46 \cdot 10^5$
0.930	$1.5 \cdot 10^3$
0.952	$6.6 \cdot 10^0$
0.972	$3.5 \cdot 10^{-2}$
0.980	$3.5 \cdot 10^{-4}$
0.986	10^{-7}

Equations

$k := 0.92$ Kink point

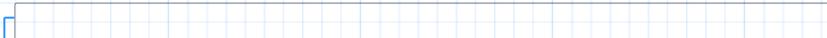
Guesses

$d \quad a_0 \quad a_1 \quad a_2 \quad a_3 \quad a_4 \quad a_5 \quad a_6 \quad b_1 \quad b_2 \quad b_3 \quad b_4 \quad b_5 \quad b_6$

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Generate Fit

$$\begin{aligned} f(x, d, a_0, a_1, a_2, a_3, a_4, a_5, a_6, b_1, b_2, b_3, b_4, b_5, b_6) := & a_0 + (a_1 \cdot (x - k) + b_1 \cdot d \cdot (x - k)) \\ & + (a_2 \cdot (x - k)^2 + b_2 \cdot d \cdot (x - k)^2) \\ & + (a_3 \cdot (x - k)^3 + b_3 \cdot d \cdot (x - k)^3) \\ & + (a_4 \cdot (x - k)^4 + b_4 \cdot d \cdot (x - k)^4) \\ & + (a_5 \cdot (x - k)^5 + b_5 \cdot d \cdot (x - k)^5) \\ & + (a_6 \cdot (x - k)^6 + b_6 \cdot d \cdot (x - k)^6) \end{aligned}$$



Gesuchte Werte

Solver

$$f(x, d, a_0, a_1, b_1, a_2, b_2, a_3, b_3, a_4, b_4, a_5, b_5, a_6, b_6) - y = 0$$

$$\begin{bmatrix} d \\ a_0 \\ a_1 \\ b_1 \\ a_2 \\ b_2 \\ a_3 \\ b_3 \\ a_4 \\ b_4 \\ a_5 \\ b_5 \\ a_6 \\ b_6 \end{bmatrix}$$

$\text{:=Minerr}(d, a_0, a_1, b_1, a_2, b_2, a_3, b_3, a_4, b_4, a_5, b_5, a_6, b_6)$

$$\begin{bmatrix} d \\ a_0 \\ a_1 \\ b_1 \\ a_2 \\ b_2 \\ a_3 \\ b_3 \\ a_4 \\ b_4 \\ a_5 \\ b_5 \\ a_6 \\ b_6 \end{bmatrix} = \begin{bmatrix} -250.4441 \\ 5.7546 \cdot 10^4 \\ 3.861 \cdot 10^6 \\ 2.6998 \cdot 10^4 \\ -1.0253 \cdot 10^7 \\ -1.3132 \cdot 10^5 \\ -3.3954 \cdot 10^6 \\ -5.0396 \cdot 10^5 \\ 5.2891 \cdot 10^7 \\ -9.6861 \cdot 10^5 \\ 9.3742 \cdot 10^7 \\ -9.2406 \cdot 10^5 \\ 4.8593 \cdot 10^7 \\ -3.3637 \cdot 10^5 \end{bmatrix}$$

