

Why different functional forms?

Model	Partial effect of X_1 on Y	How to Code in R
$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + u$	$\frac{\partial Y}{\partial X_1} = \beta_1$	<code>lm(Y ~ X1 + X2, df)</code>
$\log Y = \beta_0 + \beta_1 \log X_1 + \beta_2 X_2 + u$	$\frac{\partial \log Y}{\partial \log X_1} \approx \frac{\% \Delta Y}{\% \Delta X} = \beta_1$	<code>lm(log(Y) ~ log(X1) + X2, df)</code>
$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_1^2 + \beta_3 X_2 + u$	$\frac{\partial Y}{\partial X_1} = \beta_1 + 2\beta_2 X_1$	<code>lm(Y ~ X1 + I(X1^2) + X3, df)</code>
$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_1 X_2 + u$	$\frac{\partial Y}{\partial X_1} = \beta_1 + \beta_3 X_2$	<code>lm(Y ~ X1 + X2 + X1:X2)</code>