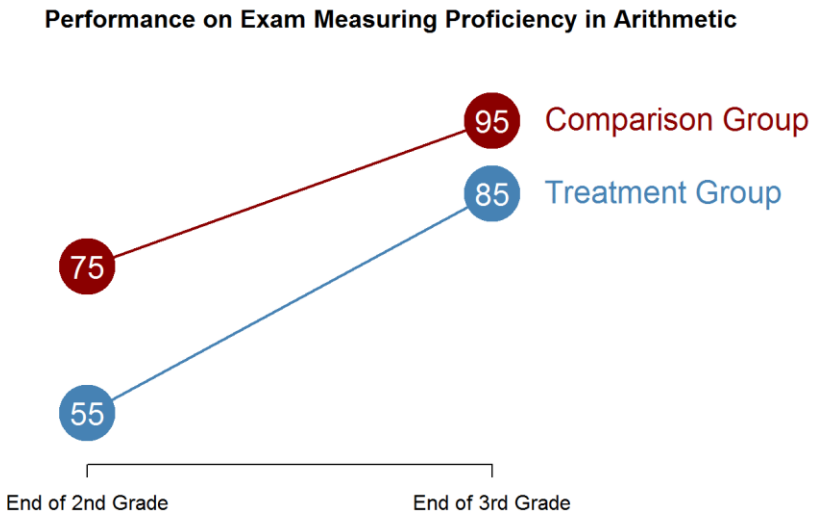
Difference-in-Difference Models



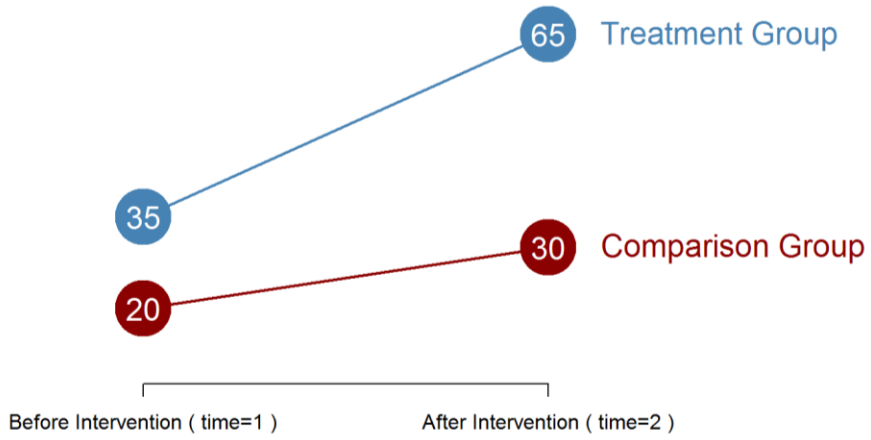
Using the diagram above calculate the following:

(1) Trend (C2 – C1):

(2) The Counterfactual: T1 + Trend

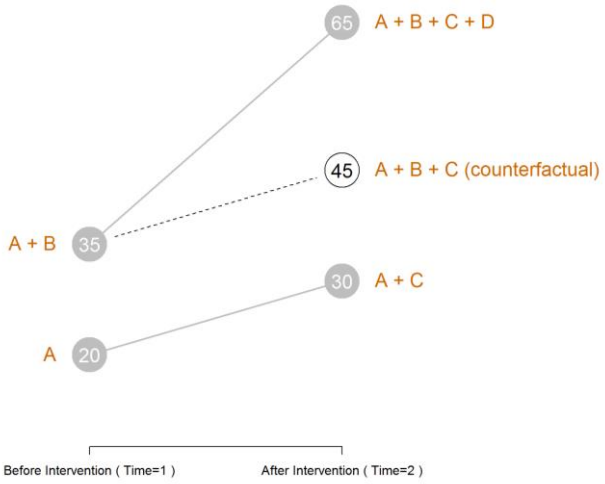
(3) Total Treatment Gains (T2 – T1):

(4) Program Effects: Total Gains – Trend



$$Y = b_0 + b_1 \cdot Treat + b_2 \cdot Post + b_3 \cdot Treat \cdot Post + e$$

	Dependent variable:
	moxy
b0: Intercept (A)	20***
	(0)
b1: Treatment Group (B)	15***
	(0)
b2: Post-Period (C)	10***
	(0)
b3: Treat x Post (D)	20***
	(0)
Observations	400
Note:	*p<0.1;* ***p<0.05;*** p<0.01



Use the results from the difference-in-difference regression table above to answer the following:

(1) What is the group mean for C1?

(2) What is the group mean for T1?

(3) What is the group mean for C2?

(4) What is the counterfactual?

(5) Does this program have an impact, and if so how much (effect size)?

Regressions with Interaction Effects

Model 1: Do men and women earn different wages, on average?

Model: $Wages = b_0 + b_1 * Female$

Test: If b0 is significant, Men's wages are different than zero. If b1 is significant, Women's wages are different than Men's.

Note: This is an unconditional average, so it might be explained by other factors like differences in experience between men and women.

Model 2: What is the wage gain related to an extra year of experience?

Model: $Wages = b_0 + b_1 * Years$

Test: If b1 is significant then it is different than zero, experience does impact wages.

Model 3: Do men and women have different initial wages at the start of their careers?

Model: $Wages = b_0 + b_1 * Years + b_2 * Female$

Test: If b2 is significant then the Female intercept (b0+b2) is different than the Male intercept (b0).

Model 4: Are the gains in wages related to experience the same for men and women?

Model: $Wages = b_0 + b_1 * Years + b_2 * Female + b_3 * Years * Female$

Test: If b3 is significant then the slope for Women (b1+b3) is different than the slope for Men (b1).

Note: If b3 is not significant it is better to use the model with one slope for both groups.

	Dependent variable:			
	wages			
	(1)	(2)	(3)	(4)
Constant	22,969***	9,584***	6,323***	7,847***
	(493)	(365)	(339)	(421)
female	6,711***		6,598***	3,565***
	(698)		(309)	(595)
years:female				200***
				(34)
years		1,104***	1,102***	1,001***
		(21)	(17)	(24)
Observations	1,000	1,000	1,000	1,000
Note:				*p<0.1;* ***p<0.05;*** p<0.01

Use Model 4 to answer the following questions:

(1) How much do men earn in their first job (zero years of experience)?

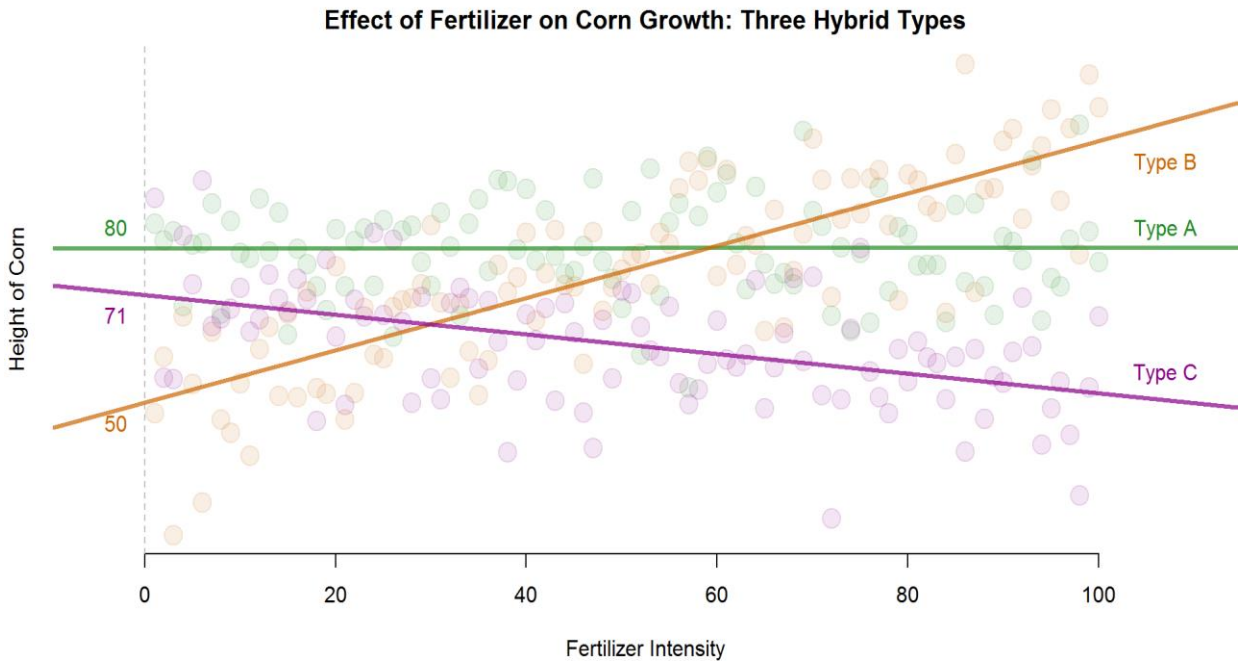
(2) How much do women earn in their first job?

(3) What is the average raise men receive each year?

(4) Do men and women receive different raises? How do we know?

(5) What is the average raise women receive each year?

Varying Effects by Groups: Corn Hybrids



Use the table below to answer the following questions:

(1) What is the average height of Hybrid A corn?

(2) What is the average height of Hybrid A without fertilizer?

(3) For each unit of fertilizer added, how much will Hybrid A grow?

(4) Which hybrid grows best at low levels of fertilizer? High levels?

	Dependent variable:			
	height			
	(1)	(2)	(3)	(4)
Constant		70.80***	79.78***	49.74***
		(2.05)	(2.05)	(2.05)
fertilizer	0.11***	-0.19***	0.003	0.51***
	(0.03)	(0.04)	(0.04)	(0.04)
dumA	74.51***	8.98***		30.03***
	(1.89)	(2.90)		(2.90)
dumB	70.09***	-21.05***	-30.03***	
	(1.89)	(2.90)	(2.90)	
dumC	55.72***		-8.98***	21.05***
	(1.89)		(2.90)	(2.90)
fertilizer:dumA		0.19***		-0.51***
		(0.05)		(0.05)
fertilizer:dumB		0.70***	0.51***	
		(0.05)	(0.05)	
fertilizer:dumC			-0.19***	-0.70***
			(0.05)	(0.05)
Observations	300	300	300	300
R^2	0.97	0.59	0.59	0.59
Note:			*p<0.1;* ***p<0.05;*** p<0.01	