## Interence for randomized experiments.

The Average Treatment Effect CATE). [also Army Cansal Effect CACE)]

This is a fixed quantity. ble the potential outcomes an fixed.

This is unidentifiable, can only estimate it.

Estimator for T! The Negman estimator / difference -in-many.

$$\frac{2}{\pi} : Z \xrightarrow{1} \sum_{i,j \in S} \sum_{i,j \in S}$$

Properties.

① 
$$\mathbb{E}[\hat{\tau}] = \tau$$
.
②  $Var(\hat{\tau}) \leq \frac{S^2}{n_1} + \frac{S^2}{n_2}$  where.

 $for k = 0, 1, S^2 = \frac{1}{n_2 - 1} \cdot \sum_{i=1}^{n_2} (Y_i(k) - 7(k))^2$ .

Pf Lg(0):

$$\hat{z} = \int_{\Omega_1} \frac{Z}{Z_{i,2}} Y_{i,1}(u) - \int_{\Omega_2} \frac{Z}{Z_{i,2}} Y_{i,2}(u).$$

$$= \int_{\Omega_1} \hat{Z}_{i,2} \frac{Z}{Z_{i,2}} Y_{i,1}(u) - \int_{\Omega_2} \hat{Z}_{i,2} \frac{Z}{Z_{i,2}} Y_{i,2}(u).$$

$$F(z) = \sum_{i=1}^{n} F(z_{i} \cdot Y_{i}(u)) - \sum_{i=1}^{n} F(z_{i} \cdot Y_{i}(u)).$$

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Contidence intervals

Volume =  $\frac{S^2}{n_1} + \frac{S^2}{n_0}$ Wark a sample estimate of Neyman.

Define the estimator Neyman =  $\frac{3^2}{n_1} + \frac{8^2}{n_0}$ when  $8^2_1 = \frac{1}{n_1-1} \sum_{i=1}^{n_1-1} \sum_{i=1}^{n$ 

Fact. El Vieyman] z Vieyman.

Thun Under regularity conditions, (F-T. =) N(0, 62), where & \lambda \

Hence, an asymptotically valid 95% CI for the ATE T

is given by CZ-1.96-JV Neyman, Z+1.96 J Vieyman).

Hypothesis testing

Degran's week will How: ATE = 0.

Fisher's strong rull HOF! ITE; = 1;(1)-1;(6)=0 4;

To test How, consider the test startistic

Get appropriately valid, conservative fralue by companies & opinst NCO, 1).

To fest Hop, doserve that if Hop is trone, we know all the entries in the Science Talde. Hence, we can use permentation test.

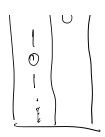
Fisher's exact test.

Assume broany ortrone variable Y. E.g. Z = tola aspirts.

f = fever goes away,

Sineme Table:

(0);}	(till)	
1		
'		1
	( 0	
	\ A	1



Can summerize by cross tabulation, to get a  $2x^2$  contingency table.

F Moo Not No S Moo Not No

(1/10) (1/10)

 $N_S = No. of vous with 0.$   $N_F = No. of vous with 0.$ 

Also, Noo, no, no, no all tollow hypergeonotic distributions.

Un this to comprer productor observed Noo, No, No, No, Na.