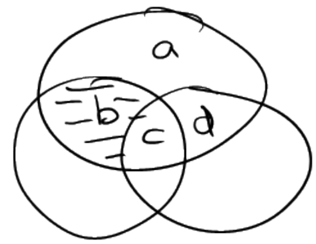
Ch5 LAB - STRENGTH & SIGNIFICANCE OF PREDICTORS

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 *1. Calculate SSchange for the unique contribution of quality.
REGRESS /DEP = buy /ENTER valu /ENTER qual.
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Model	R	R Square	
1	.820	.672	$R^2_{B.V}$
2	.882	.778	$R^2_{B.QV}$

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	c+d 24.200	1	24.200	12.305	.013
	Residual	11.800	6	1.967		
	Total	36.000	7			
2	Regression	b+c+d 28.000	2	14.000	8.750	.023
	Residual	8.000	5	1.600		
	Total	36.000	7			

$SS_{\hat{Y}.12}$ 28.0

$SS_{\hat{Y}.2}$ 24.2

b - $SS_{\hat{Y}1.2}$ 3.8

Model		Unstandardized Coefficients		t	Sig.
		B	Std. Error		
1	(Constant)	10.700	1.063	10.062	.000
	valu	1.100	.314	3.508	.013
2	(Constant)	5.000	3.821	1.309	.248
	valu	2.000	.649	3.082	.027
	qual	1.000	.649	1.541	.184

$r^2_{Y(1.2)} = \frac{3.8}{36} = .1056$

$\sqrt{} = .3249$

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 *2. Compute the part r for the unique contribution of quality.

*3. Find part r in a second way ... use R2s.
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$r^2_{Y(1.2)} = R^2_{Y.12} - R^2_{Y.2}$

$= .778 - .672$

$= .106$

#5

$F_{ch} = \frac{3.8/1}{1.60} = \underline{2.375}$

$F_{\alpha} = ?$ $df = 1, 5$

ns

```
*4. Add the zpp and change commands. find results.
REGRESS /STAT = DEFAULT ZPP CHANGE
 /DEP = buy /ENTER valu /ENTER qual.
```

			Change Statistics				
Model	R	R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.82	.672	.672	12.305	1	6	.013
2	.88	.778	$r^2_{Y(1.2)} = \boxed{.106}$	2.375	1	5	.184 $= p_t$

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	24.200	1	24.200	12.305	.013
	Residual	11.800	6	1.967		
	Total	36.000	7			
2	Regression	28.000	2	14.000	8.750	.023
	Residual	8.000	5	1.600		
	Total	36.000	7			

		Unstandardized Coefficients				Correlations		
Model		B	Std. Error	t	Sig.	Zero-order	Partial	Part
1	(Constant)	10.700	1.063	10.06	.000			
	valu	1.100	.314	3.508	.013	.820	.820	.820
2	(Constant)	5.000	3.821	1.309	.248			
	valu	2.000	.649	3.082	.027	.820	.809	.650
	qual	1.000	.649	1.541	.184	-.596	.567	$\boxed{.325}$

$\sqrt{\frac{1.60}{20(1-.9^2)}} = 1.649$

$= p_F$

$r_{Y(1.2)}$

$\sqrt{2.375} = 1.541$

$\frac{1.00}{.649}$

*5. Calculate Fchange. Compare to t for qual.

*6. Calculate SE and t for qual.

*7. Interpret results in terms of graphs from Lab 2:1.

CORR qual value/STAT

$SS_Q = (8-1)1.690^2 = 20$

$r_{QV} = -.90$

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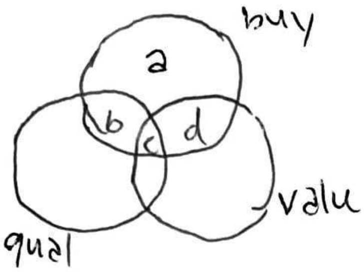
#1 SS_{change} - Line 19 Formula sheet

$SS_{\hat{Y}.12} - SS_{\hat{Y}.2}$, or $\underbrace{SS_{\hat{b}.vq} - SS_{\hat{b}.v}}$

So, SS for prediction/regression with qual and valu, subtract SS for prediction/regression with just valu leaves unique contribution of qual.

Venn diagram



a - variability in buy not predicted by either predictor (ie. SS_{res})

b+c+d - variability covered by both predictors (ie. SS_{reg})

c - overlap between two predictors (redundant)

We don't have a direct mathematical way to get area b, or unique contribution of qual. So, we need to get there by subtraction. Just using qual as a predictor would cover area b+c, which includes non-unique overlap. But, the same goes for valu, that covers c+d.

So: Take SS_{reg} (b+c+d) and subtract SS_{reg} for just valu (c+d), and you're just left with area b - unique to qual.

SS_{change} - how much does the equation change due to unique contribution of the new variable put into the equation?

Mathematically, $SS_{change} = SS_{\hat{b}.qv} - SS_{\hat{b}.v} = 28.0 - 24.2 = \boxed{3.8}$

#2 Part r - can get from R^2_{change} or $r^2_{y(1.2)}$

$r^2_{y(1.2)}$ is r^2 between y and x_1, removing the effects of x_2. In our case, it would be $r^2_{b(q.v)}$ to get unique contribution of qual.

Line 21, 1st formula: $r^2_{y(1.2)} = \dfrac{SS_{\hat{y}1.2}}{SS_y}$

$SS_{\hat{y}1.2}$ is SS_{change}, which we found out in Q1 → 3.8

SS_y is overall SS_{buy}, or SS_{Total} on SPSS printout → 36

So, $r^2_{y(1.2)} = \dfrac{3.8}{36} = \boxed{.1056}$ and $r_{y(1.2)} = \sqrt{.1056} = \boxed{.3249}$

#3 - Part r for qual (2nd way)... Second equation on Line 21

$r^2_{y(1.2)} = R^2_{y.12} - R^2_{y.2}$ just like for SS change

$r^2_{b(q.v)} = R^2_{b.qv} - R^2_{b.v} = .778 - .672 = \boxed{.106} \approx .1056$ From #2.

#5

Fchange → line 20

$F_{\hat{Y}1.2} = \dfrac{MS_{\hat{Y}1.2}}{MS_{res}}$ → $SS_{\hat{Y}1.2}/1$ → $3.8/1$

MS_{res} → from printout → 1.6

So, $F_{\hat{Y}1.2} = \dfrac{3.8}{1.6} = \boxed{2.375}$ → $\sqrt{2.375} = 1.541 = t$-value

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#6 SE and t for qual → Line 18

$t_{by1.2}$ is t-test based on the slope of variable 1, controlling for variable 2.

$$t_{by1.2} = \frac{b_{y1.2} - 0}{S_{by1.2}} = \frac{b_{y1.2} - 0}{\sqrt{\dfrac{MS_{res}}{SS_1(1 - r^2_{12})}}}$$

SEB = Standard error of B

Numerator - what is $b_{y1.2}$? If variable 1 is qual and variable 2 is valu, $b_{y1.2} = b_1$ and $b_{y2.1} = b_2$, ie. slope for q and v calculated in lab 2:1.

$b_1 (\text{qual}) = 1.0 = b_{y1.2}$

Denominator - need MS_{res}, SS_1, r_{12}

MS_{res} - From #5 - 1.6

$SS_1 = SS_q$, For any variable, line 1 Formula sheet $SS_y = (n-1)s^2$ → same for SS_x, SS_q, etc.

So for SS_q, $(8-1)(1.690)^2 = 20.0$

$r_{12} = r_{qv} = -.900$ $r^2_{12} = (-.900)^2 = .810$

$$t_{by1.2} = \frac{1.0 - 0}{\sqrt{\dfrac{1.6}{(20)(1 - .810)}}} = \frac{1}{\sqrt{.421}} = \frac{1}{.649} = \boxed{1.541}$$