

APPENDIX 3. Details of Calculations of-

I Prediction of overall degree of success, i.e. PScE grant total percent (y_e) from SSCE English (x_1) and SSCE Mathematics (x_2)

	N	x_1	x_2	x_2^2	x_1^2	$x_1 x_2$	y_e
1	278	15899	18758	1320592	933211	1083758	11514
x_1		933211	1083758	77087772	56072195	64277000	671646
x_2			1320592	96530570	64277000	77087772	727514
x_2^2				7293833128	4615816878	5693346842	57554392
x_1^2					3441409147	3902881040	40160830
						4619816878	47012551
	278	15899	18758	1320592	933211	1083758	11514
1	57.1906474820	67.4748201439	4750.3309352518	3356.8741007194	3898.4100719424	41.4172661871	
	23936.89586	10975.83453	1562260.46045	2701253.67268	2296178.26620	13152.88489	
1		.4585320785	65.2657922454	112.8489553863	95.9263179694	.5494816481	
		49866.55152	6707515.78044	70141.15760	2908524.47748	14577.90122	
1			134.5093168865	1.4066374245	58.3261602983	.2923382663	
			16798565.25350	1021291.85777	4052153.97019	39784.62398	
1				.0622793422	.2471041770	.002426103953	
				3741382.61727	1376954.76779	2508.70253	
1					.3680336679	.0006705281942	
					3468713.98541	3522.376355	
1						.0010154704	

$$(1) \therefore b_{x_1 x_2} = .0010154704$$

$$b_{x_1^2} + b_{x_1 x_2} (.3680336679) = .0006705281942$$

$$\therefore b_{x_1^2} = .0002968009$$

$$b_{x_2^2} + b_{x_1^2} (.0.22793422) + b_{x_1 x_2} (.2471041770) = .002426103953$$

$$\therefore b_{x_2^2} = .0021566924$$

$$b_{x_2} + b_{x_2^2} (134.5093168865) + b_{x_1^2} (1.4066374245) + b_{x_1 x_2} (58.3261602983) = .2923382663$$

$$b_{x_2} = -.0574029345$$

$$b_{x_1} + b_{x_2} (.4585320785) + b_{x_2^2} (65.2657922454) + b_{x_1^2} (112.8489553863) + b_{x_1 x_2} (95.9263179694) = .5494816481$$

$$b_{x_1} = .3041404889$$

$$c + b_{x_1} (57.1906474820) + b_{x_2} (67.4748201439) + b_{x_2^2} (4750.3309352518) + b_{x_1^2} (3356.8741007194) + b_{x_1 x_2} (3898.4100719424) = 41.4172661871$$

$$c = 12.6964814682$$

$$y_e = .0002968009x_1^2 + .0010154704x_1x_2 + .0021566924x_2^2 + .3041404889x_1 - .0574029345x_2 + 12.6964814682$$

$$(ii) \therefore b_{x_1}^2 = .00067052819$$

$$b_{x_2}^2 + b_{x_1}^2 (.0622793422) = .002426103953$$

$$b_{x_2}^2 = .00238434390$$

$$b_{x_2} + b_{x_1}^2 (134.5093168865) + b_{x_2}^2 (1.4066374245) = .2923382663$$

$$b_{x_2} = -.02332139297$$

$$b_{x_1} + b_{x_2} (.4585320785) + b_{x_2}^2 (65.2657922454) + b_{x_1}^2 (112.8489553863) = .5494816481$$

$$b_{x_1} = .35167194794$$

$$c + b_{x_1} (57.1906474820) + b_{x_2} (67.4748201439) + b_{x_2}^2 (4750.3309352518) + b_{x_1}^2 (3356.8741007194) = 41.4172661871$$

$$c = 10.8516026512$$

$$(iii) \therefore b_{x_2}^2 = .00242610395$$

$$b_{x_2} + b_{x_2}^2 (134.5093168865) = .2923382663$$

$$\therefore b_{x_2} = -.03399531871$$

$$b_{x_1} + b_{x_2} (.4585320785) + b_{x_2}^2 (65.2657922454) = .5494816481$$

$$b_{x_1} = .40672739588$$

$$c + b_{x_1} (57.1906474820) + b_{x_2} (67.4748201439) + b_{x_2}^2 (4750.3309352518) = 41.4172661871$$

$$c = 8.92513012354$$

$$(iv) b_{x_2} = .2923382663$$

$$b_{x_1} = b_{x_2} (.4585320785) + .5494816481$$

$$b_{x_1} = .4154351752$$

$$c + b_{x_1} (57.1906474820) + b_{x_2} (67.4748201439) = 41.4172661871$$

$$c = -2.0672124626$$

$$(v) b_{x_1} = .5494816481$$

$$c + b_{x_1} (57.1906474820) = 41.4172661871$$

$$c = 9.9920549358$$

I Prediction of overall degree of success, i.e. PScE grand total percent (y_e) from SSCE English (X_1) and SSCE Mathematics (X_2)

(i) The fitted regression of y_e on X_1 , X_2 , X_2^2 , X_1^2 , X_1X_2 is

$$y_e = .3041404889X_1 - .0574029345X_2 + .0002968009X_1^2 + .0021566924X_2^2 + .0010154704X_1X_2 + 12.6964814682$$

$$\begin{aligned} \therefore \text{Reg. S.S.} &= (.3041404889)(671646) - (.0574029345)(797514) + (.0002968009)(40160830) \\ &\quad + (.0021566924)(57554392) + (.0010154704)(47012551) \\ &\quad + (12.6964814682)(11514) - \frac{(11514)^2}{278} \\ &= 488469.13 - 476878.40 \\ &= 11590.73 \end{aligned}$$

(ii) The fitted regression on X_1 , X_2 , X_2^2 , X_1^2 is

$$y_e = .3316419479X_1 - .0293213930X_2 + .0006705282X_1^2 + .0023843439X_2^2 + 10.8516028651$$

$$\begin{aligned} \therefore \text{Reg. SS.} &= (.3316419479)(671646) - (.0293213930)(797514) + \\ &\quad + (.0006705282)(40160830) + (.0023843439)(57554392) \\ &\quad + (10.8516028651)(11514) - \frac{(11514)^2}{278} \\ &= 488465.55 - 476878.40 \\ &= 11587.15 \end{aligned}$$

(iii) The fitted regression on X_1 , X_2 , X_2^2 is

$$y_e = .4067279959X_1 - .0339953187X_2 + .0024261040X_2^2 + 8.9252601235$$

$$\begin{aligned} \therefore \text{Reg. S.S.} &= (.4067279959)(671646) - (.0339953187)(797514) \\ &\quad + (.0024261040)(57554392) + (8.9252601235)(11514) - \frac{(11514)^2}{278} \\ &= 488463.87 - 476878.40 \\ &= 11585.47 \end{aligned}$$

(iv) The fitted regression on X_1 and X_2 is

$$y_e = .4154351752X_1 + .2923382663X_2 - 2.0672124163$$

$$\begin{aligned} \text{Reg. S.S.} &= (.4154351752)(671646) + (.2923382663)(797514) \\ &\quad - (2.0672124163)(11514) - \frac{(11514)^2}{278} \\ &= 488367.35 - 476878.40 \\ &= 11488.95 \end{aligned}$$

(v) The fitted regression of y_e on X_1 is

$$y_e = .5494816481X_1 + 9.9920549358$$

$$\begin{aligned} \text{Reg. S.S.} &= (.5494816481)(671646) + (9.9920549358)(11514) - \frac{(11514)^2}{278} \\ &= 484105.67 - 476878.40 \\ &= 7227.27 \end{aligned}$$