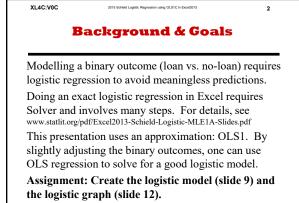
XL4C:VOC 215 STATUL LaplaC Regression Logistic Regression using OLS1C in Excel 2013

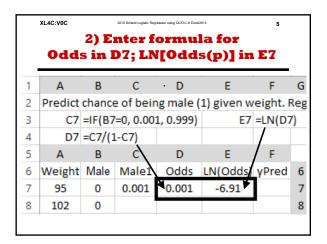
by Milo Schield Member: International Statistical Institute US Rep: International Statistical Literacy Project Director, W. M. Keck Statistical Literacy Project

Slides, output and data at: www.StatLit.org/ pdf/2015-Schield-Logistic-OLS1C-Excel2013-Slides.pdf pdf/2015-Schield-Logistic-OLS1C-Excel2013-Demo.pdf Excel/2015-Schield-Logistic-OLS1C-Excel2013-Data.xlsx



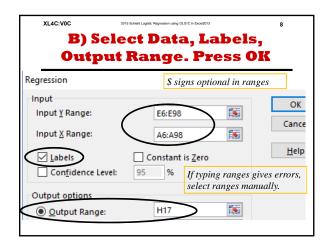
XL4C:V	OC		2015 Schield Logistic Regression using OLS1C in Excel2013		3
Th			no uses Weig dict Gender (
0	Colu	mn B	: 0=Female, 1 = Ma	ale (ci	rcled)
Α	В	С		121	0
Weight	Male	Male1	Data	122	0
95	0		in	122	(1)
102	0		1 n		9
108	0		rows	125	0
108	0		7 to 98	125	0
110	0		/ 10 98	125	0
110	0			125	0
112	0			125	0
115	0			130	0
115	0			130	(1)
116	0			130	0
116	0			130	0

x	L4C:V0C		ield Logistic Regression using OL e Bina l		4	
_	-	_	te Zero	-		
1	А	В	С	D	E	
2	Predict	chance	e of bein	g male g	given weig	ht.
3	C7	=IF(B7	=0, 0.001	L, 0.999)		
4						
5	Α	В	С	D	E	
6	Weight	Male	Male1	Odds	LN(Odds)	уP
7	95	0	0.001			
8	102	0				



XL4C:V0C		2015 Schield Logistic	Regression using OLS1C in Ex	xel2013	6	
		3) Sel	ect C7	:E7		
Dra	g to I	botto	n of d	ata: Ro	w 98	
· A	В	С	D	E	F	G
Predict	chance	e of beir	ng male g	iven weig	ht. Reg	res
C7	=IF(B7	=0, 0.00	1, 0.999)	E7	=LN(D7	7)
D7	=C7/(1	L-C7)				
А	В	С	D	E	F	
Weight	Male	Male1	Odds	LN(Odds)	yPred	6
95	0	0.001	0.001	-6.91		7
102	0					8
108	0				,	9

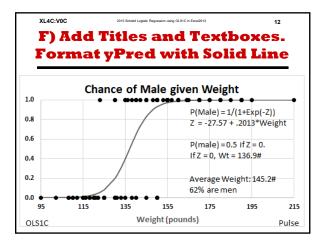
red Columns ≅ Data Validation ▼ ♥ Ungroup ▼ 1 ?• S Data Validation ▼ ♥ Ungroup ▼ 1 ?• S Data Validation ▼ ♥ E Subtotal Outline Data Analysis Tools Covariance	7		DLS1C in Excet2013	stic Regression usi	2015 Schield Logist	(L4C:V0C	x
ed Flash Fill Text to Columns S Data Validation ~ 4 Matysis Tools Covariance			-	sis;	Analy	Data	DAT
Analysis Tools	Data Analys Solver Analysis	-∃ ? _⇒ Sol	Ungroup 🔹	s 🖽 -	emove Duplicates lata Validation 👻	Text to Columns 😽 D	٤d
Covariance	OK	?	a Analysis	D	<u>A</u> nalysis Tools		
Exponential Smoothing F-Test Two-Sample for Variances Fourier Analysis Histogram Moving Average Random Number Generation Date and Barcentite	Cancel Help	Canc	Covariance Descriptive statistics Descriptive al Smoothing First two Sample for Variances Fourier Anabysis Histogram Moving Average Random Number Generation				



	XL4C:V0C	d Logistic Regression u	using OLS1C in Excel20	113		9	
	C) Lo Re	ogist esult		-			
19	Regression Sto	atistics					
20	Multiple R	0.708667					
21	R Square	0.5022089					
22	Adjusted R Square	0.4966779	1	Check to	o see tha	it you ge	t the
23	Standard Error	4.7839195		same re	sults.		
24	Observations	92					
25							
26	ANOVA						
27		df	SS	MS	F	ignificance	F
28	Regression	1	2078.01	2078.01	90.79874	2.73E-15	
29	Residual	90	2059.73	22.88589			
30	Total	91	4137.739				
31			_				
32		Coefficients	ndard Erro	t Stat	P-value	Lower 95%	Jpper 95
33	Intercept	-27.56682	3.106615	-8.87359	6.31E-14	-33.7387	-21.39
34	Weight	0.2012952	0.021125	9.528837	2.73E-15	0.159327	0.2432

XL4C:V0C	XL4C:V0C 2015 Bohield Logistic Regression using OLS1C in Excel2013								
	D) (enerat	e F7;						
Pull F7 down to F98									
С	D	E	F	G					
of bein	g male g	given weig	ht. Reg	ress	using				
=0, 0.001	, 0.999)	E7	=LN(D)	7)					
-C7) <	F7	=1/(1+EXF	P(-I\$33-	1\$34	*A7))				
С	D	E	F	7					
Male1	Odds	LN(Odds)	yPred	6					
0.001	0.001	-6.91	0.000	7					
			,						

XL4C:V0C 2015 Statist Laplet Regression state (LSIC In Execution) 11 E) Insert XY-Plot. Add Two Series: Male vs Weight; yPred vs Weight						
Edit Series	Edit Series					
Series <u>n</u> ame:	Series <u>n</u> ame:					
='Male Wt'!\$B\$6	='Male Wt'!\$F\$6					
Series <u>X</u> values:	Series <u>X</u> values:					
='Male Wt'!\$A\$7:\$A\$98	='Male Wt'!\$A\$7:\$A\$98					
Series <u>Y</u> values:	Series <u>Y</u> values:					
='Male Wt'!\$B\$7:\$B\$98	='Male Wt'!\$F\$7:\$F\$98					



Logistic Regression using OLS1C in Excel 2013

by Milo Schield

Member: International Statistical Institute US Rep: International Statistical Literacy Project Director, W. M. Keck Statistical Literacy Project

Slides, output and data at: www.StatLit.org/ pdf/2015-Schield-Logistic-OLS1C-Excel2013-Slides.pdf pdf/2015-Schield-Logistic-OLS1C-Excel2013-Demo.pdf Excel/2015-Schield-Logistic-OLS1C-Excel2013-Data.xlsx

Background & Goals

Modelling a binary outcome (loan vs. no-loan) requires logistic regression to avoid meaningless predictions. Doing an exact logistic regression in Excel requires Solver and involves many steps. For details, see www.statlit.org/pdf/Excel2013-Schield-Logistic-MLE1A-Slides.pdf This presentation uses an approximation: OLS1. By slightly adjusting the binary outcomes, one can use OLS regression to solve for a good logistic model. **Assignment: Create the logistic model (slide 9) and** the logistic graph (slide 12).

This demo uses Weight (col A) to predict Gender (col B)

Column B: 0=Female, 1 = Male (circled)

A	В	C
Weight	Male	Male1
95	0	
102	0	
108	0	
108	0	
110	0	
110	0	
112	0	
115	0	
115	0	
116	0	
116	0	

]	Da	ta				
in						
rows						
7	to	98				

× ×	· · · ·
121	0
122	0
123	(1)
125	0
125	0
125	0
125	0
125	0
130	0
130	(1)
130	0
130	0

1) Nudge Binary Male to Eliminate Zero and One

1	Α	В	С	D	E					
2	Predict chance of being male given weight.									
3	C7 =IF(B7=0, 0.001, 0.999)									
4										
5	Α	В	С	D	Е					
6	Weight	Male	Male1	Odds	LN(Odds)	уP				
7	95	0	0.001							
8	102	0								

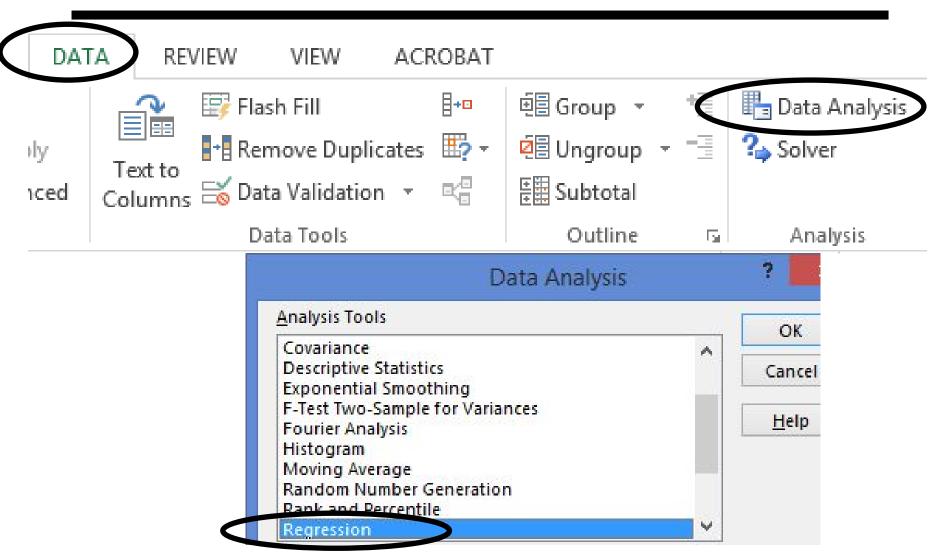
2) Enter formula for Odds in D7; LN[Odds(p)] in E7

1	Α	В	С	· D	E	F	G
2	Predict	chance	e of beir	ng male (1) given w	eight. F	Reg
3	C7	=IF(B7	= 0, 0.00	1, 0.999)	E7	=LN(D7	7)
4	D7	=C7/(1	l-C7)				
5	Α	В	c\	D	E	F	
6	Weight	Male	Male1	Odds	LN(Odds)	yPred	6
7	95	0	0.001	0.001	-6.91		7
8	102	0					8

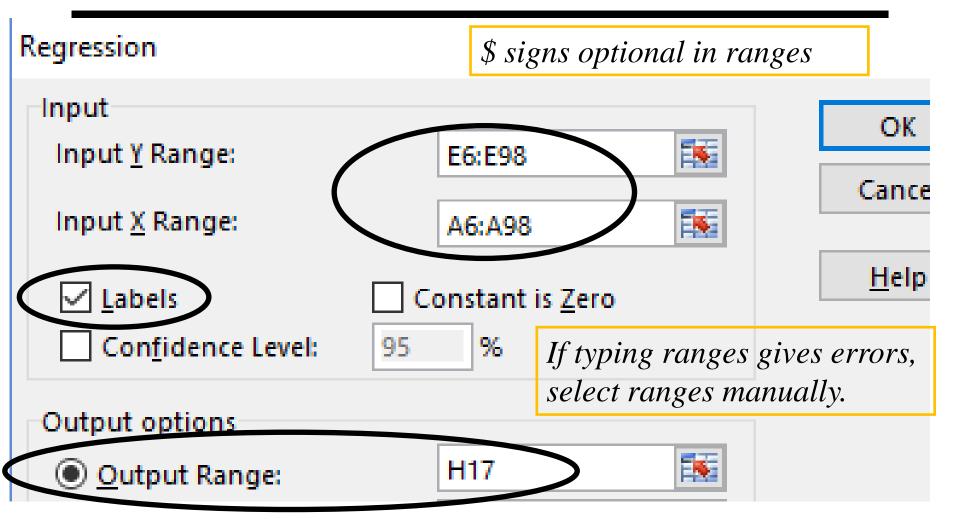
3) Select C7:E7 Drag to bottom of data: Row 98

· A	В	С	D	E	F	G						
Predict chance of being male given weight. Regres												
C7	=IF(B7	=0, 0.001	E7 =LN(D7)									
D7	=C7/(1	L-C7)										
Α	В	С	D	E	F							
Weight	Male	Male1	Odds	LN(Odds)	yPred	6						
95	0	0.001	0.001	-6.91		7						
102	0					8						
108	0					9						

A) From Data Bar, Select Data Analysis; Regression



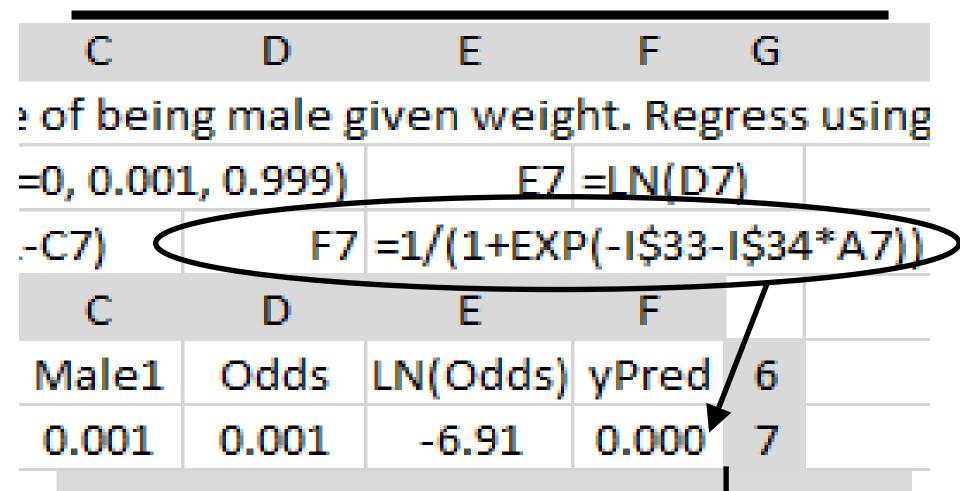
B) Select Data, Labels, Output Range. Press OK



C) Logistic Regression: Results Using OLS1

19	Regression Statistics						
20	Multiple R	0.708667					
21	R Square	0.5022089					
22	Adjusted R Square	0.4966779		Check to	o see tha	it you gei	t the
23	Standard Error 4.7839195			same results.			
24	Observations	92					
25							
26	ANOVA						
27		df	SS	MS	F	ignificance	F
28	Regression	1	2078.01	2078.01	90.79874	2.73E-15	
29	Residual	90	2059.73	22.88589			
30	Total	91	4137.739				
31							
32		Coefficients	undard Erro	t Stat	P-value	Lower 95%	Jpper 95%
33	Intercept	-27.56682	3.106615	- <mark>8.</mark> 87359	6.31E-14	-33.7387	-21.395
34	Weight	0.2012952	0.021125	9.528837	2.73E-15	0.159327	0.24326

D) Generate F7; Pull F7 down to F98



E) Insert XY-Plot. Add Two Series: Male vs Weight; yPred vs Weight

Edit Series

Series name:

='Male|Wt'!\$B\$6

Series X values:

='Male|Wt'!\$A\$7:\$A\$98

Series <u>Y</u> values:

='Male|Wt'!\$B\$7:\$B\$98

Edit Series

Series name:

='Male|Wt'!\$F\$6

Series X values:

='Male|Wt'!\$A\$7:\$A\$98

Series Y values:

='Male|Wt'!\$F\$7:\$F\$98

F) Add Titles and Textboxes. Format yPred with Solid Line

