

Logistic Regression in Excel



This handout uses the **Bankruptcy data.xlsx** data set.

For help with Excel, go to: <http://office.microsoft.com/en-us/excel-help>

Suppose we want to predict (explain) the probability of corporate default, as a function of various financial ratios. In the data, Columns D-H are the explanatory variables, and *Default* (Column C) is the dependent variable that takes only two values 0 or 1 (a dummy variable). The Logistic regression equation takes the form:

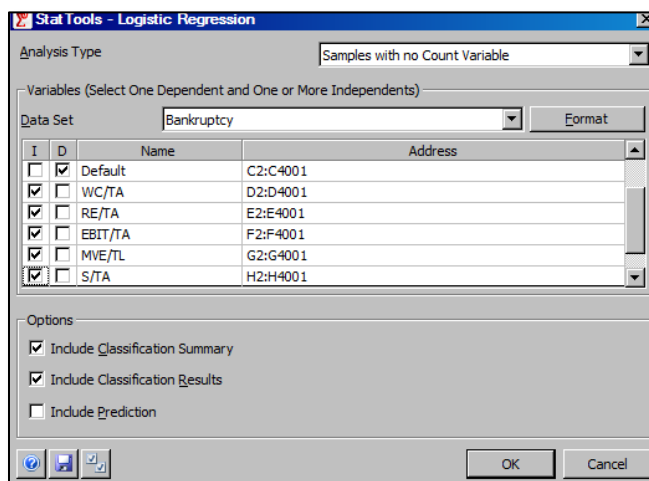
$$p = \frac{e^z}{1 + e^z}, \text{ where } z = a + b_1X_1 + b_2X_2 + \dots, \text{ and } p = E[Y] \text{ where } Y \text{ is the dependent variable} = 0 \text{ or } 1. \text{ The}$$

X variables are companies' financial ratios:

- WC/TA = working capital / total assets = a measure of liquidity
- RE/TA = retained earnings / total assets = a measure of historical profitability
- EBIT/TA = earnings before interest and taxes / total assets = a measure of current profitability
- MVE/TL = market value of equity / book value of liabilities = leverage
- S/TA = sales / total assets = a measure of competitiveness

Use StatTools:

- **StatTools → Regression and Classification → Logistic Regression.**
- Specify: "I" = WC/TA, RE/TA, EBIT/TA, MVE/TL, S/TA; "D" = Default. "I" stands for independent (or explanatory) variable, and "D" stands for dependent variable which is a dummy variable (0 or 1).
- In the Options, select the first two. Click OK.



Logistic Regression for Default							
Summary Measures							
Null Deviance	721.1993803						
Model Deviance	561.0514084						
Improvement	160.1479719						
p-Value	< 0.0001						
Regression Coefficients							
	Coefficient	Standard Error	Wald Value	p-Value	Lower Limit	Upper Limit	Exp(Coeff)
Constant	-2.543480125	0.266029429	-9.560897583	< 0.0001	-3.064897806	-2.022062444	0.078592412
WC/TA	0.414393111	0.572477939	0.723858655	0.4692	-0.70766365	1.536449872	1.513451965
RE/TA	-1.454020505	0.229486203	-6.335982243	< 0.0001	-1.903813462	-1.004227548	0.23362909
EBIT/TA	-7.999076924	2.702403707	-2.95998592	0.0031	-13.29578819	-2.702365658	0.000335772
MVE/TL	-1.59359233	0.323405321	-4.92753899	< 0.0001	-2.22746676	-0.9597179	0.203194358
S/TA	0.619730049	0.349198241	1.77472271	0.0759	-0.064698504	1.304158603	1.858426291

- These are the coefficients of Logit: $z = a + b_1X_1 + b_2X_2 + \dots$
- Convert into the probability of bankruptcy by plugging in actual values of the X variables and using the

Logistic function:
$$p = \frac{e^z}{1 + e^z}$$