60080079 Introduction to Statistical Methods
Semester 2 2023-2024
Handout 9

A Brief Introduction to Regression Inferences in SPSS

I. Simple Linear Regression

As before:

1. Set up the **hsb.sav** data (i.e., open, cut-and-paste, type).
2. From the menu, choose **Analyze → Regression → Linear.**
3. Click in the appropriate **Dependent** and **Independent** variables. In the example below, we want to investigate whether Science score can be predicted from Math score.
4. Click **OK** to run the regression model.

Additional Possibilities: Before Step 4 above.

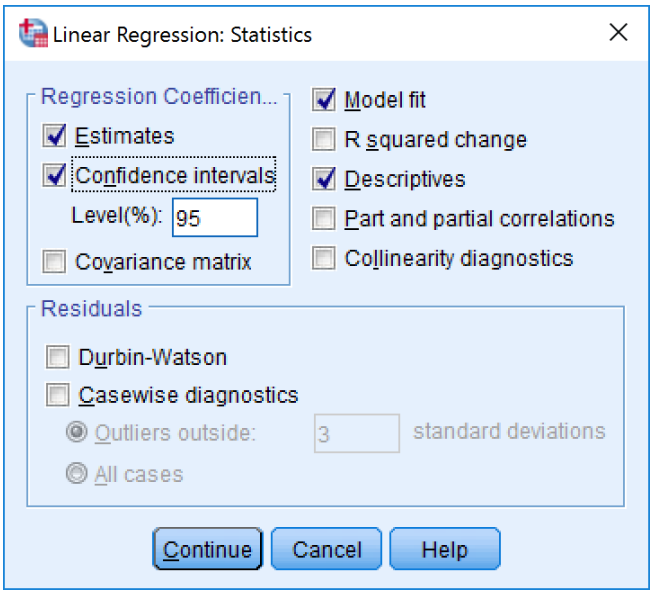
a) Confidence intervals for the regression parameter estimates and descriptive statistics for the predictor and response variables.

   i) Click the **Statistics** button.

   ii) Check the **Confidence Interval** option under **Regression Coefficients**.

   iii) Check the option **Descriptives**.

   iv) Click **Continue**



Below are some of the results of the requested analysis:

Correlations

		Science score	Math score
Pearson Correlation	Science score	1.000	.650
	Math score	.650	1.000
Sig. (1-tailed)	Science score	.	.000
	Math score	.000	.
N	Science score	600	600
	Math score	600	600

The **Correlations** table shows that Science and Math scores have a correlation of .650 and the corresponding p-value for testing H_0: $\rho = 0$ is close to 0 so reject the null hypothesis and conclude that the two scores are correlated.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.650[a]	.422	.421	7.38616

a. Predictors: (Constant), Math score

The **Model Summary** table shows same correlation, as well as the R^2 – Math score accounts for 42.2% of the variance in the Science score.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	23807.656	1	23807.656	436.395	.000[b]
	Residual	32624.077	598	54.555		
	Total	56431.733	599			

a. Dependent Variable: Science score

b. Predictors: (Constant), Math score

The **ANOVA** table shows that the regression model, which predicts Science score using Math score, is significant – the computed F is 436.395 and has a p-value of close to zero.

Note: In simple linear regression, the p-values in the **Correlations** and **ANOVA** tables are identical.

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	17.044	1.689		10.090	.000	13.726	20.361
	Math score	.670	.032	.650	20.890	.000	.607	.733

a. Dependent Variable: Science score

In addition to the estimates of the regression coefficients, computed *t*-statistics, and p-values, the **Coefficients** table also gives us a 95% confidence interval for the regression coefficients.

Note: The p-value of Math score in the **Coefficients** table is the same p-value above because we are working with a simple linear regression model.

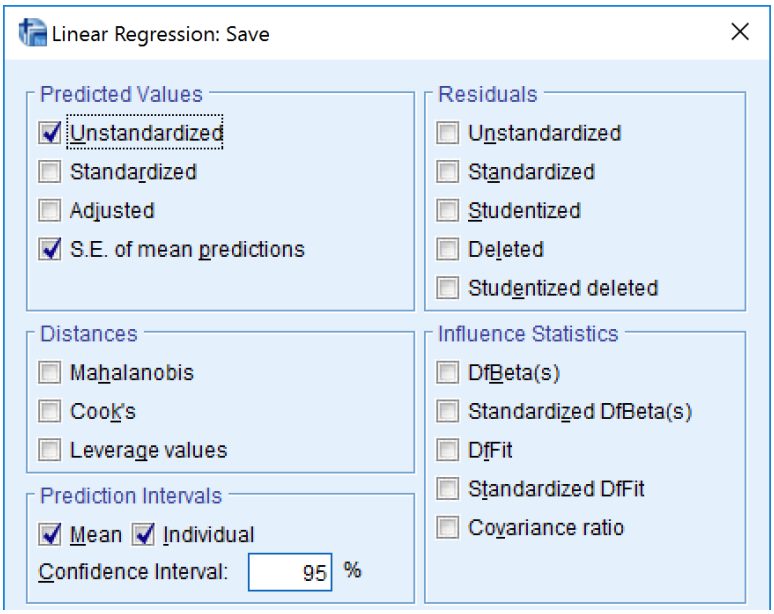
b) Obtaining predicted values and confidence intervals for the dependent variable

i) Click the **Save** button.

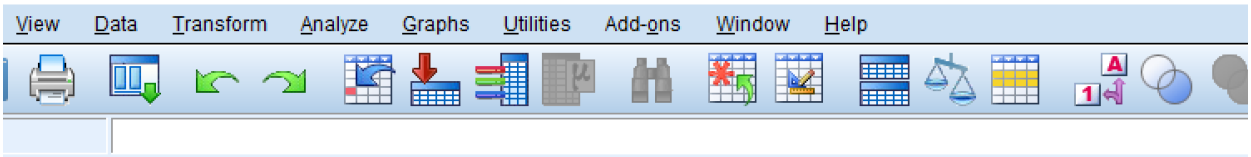
ii) For predicted values, check **Unstandardized** and **S.E. of mean predictions** under **Predicted Values**.

iii) For confidence intervals of predicted scores, check the **Mean** and **Individual** option.

iv) Click **Continue**.



Using the **Save** option will create new variables. In this example, it creates the variables containing the predicted values, standard error of the mean predictions, lower and upper limits of mean predictions, and lower and upper limits of individual predictions.



ID	MATH	SCIENCE	PRE_1	SEP_1	LMCI_1	UMCI_1	LICI_1	UICI_1
1.00	40.20	39.00	43.96278	.47996	43.02017	44.90539	29.42623	58.49933
2.00	41.90	36.30	45.10116	.43890	44.23918	45.96313	30.56961	59.63270
3.00	41.90	44.40	45.10116	.43890	44.23918	45.96313	30.56961	59.63270

Students 2 and 3 have the same Math score. Hence, all they have identical values in the new variables.