

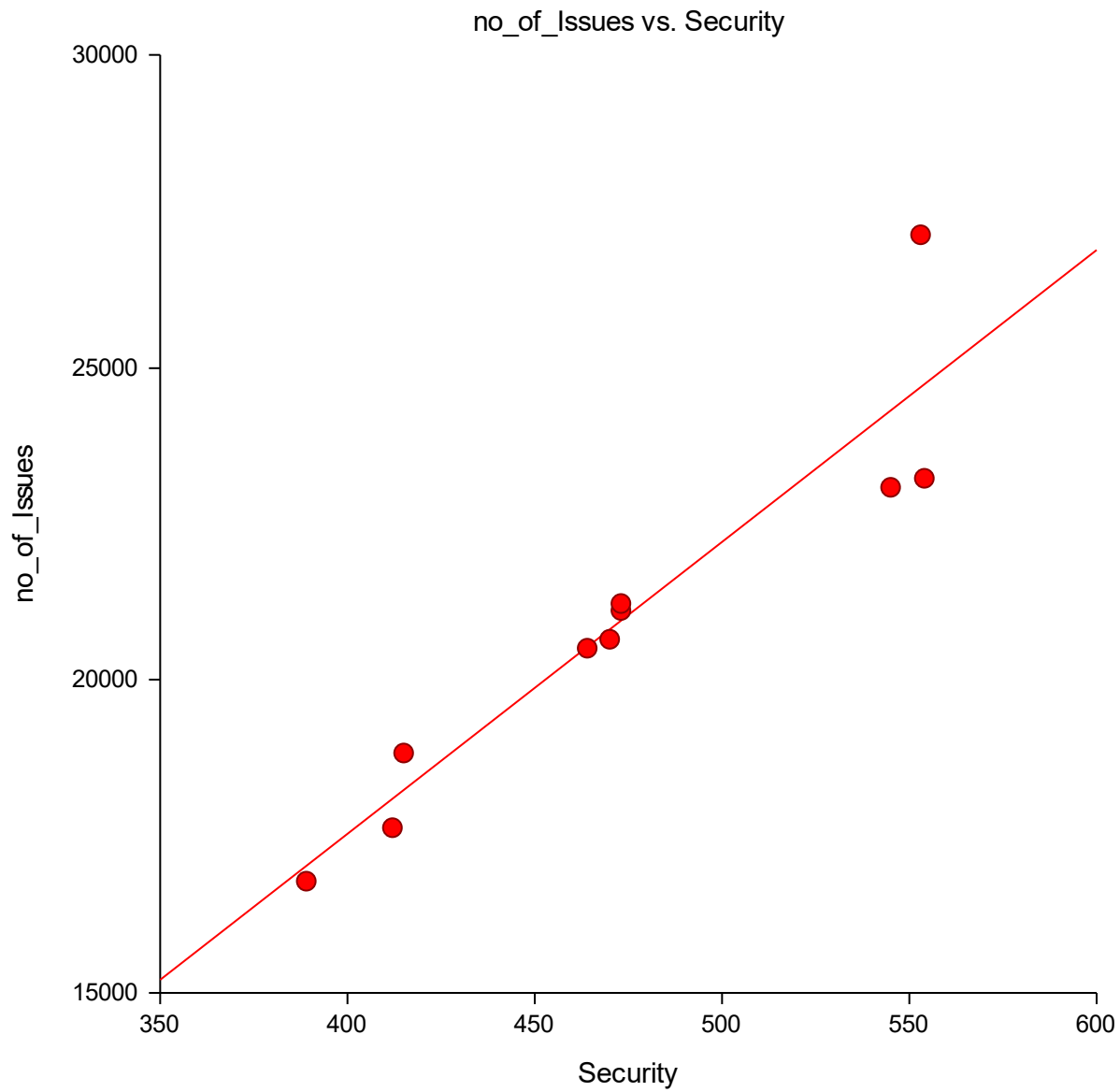
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There are 23 days remaining in your free trial (Expires on 4/20/2018).

### Linear Regression Report

Dataset           Untitled  
Y = no\_of\_Issues   X = Security

#### Linear Regression Plot Section

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### Linear Regression Report

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#### Run Summary Section

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Parameter	Value	Parameter	Value
Dependent Variable	no_of_Issues	Rows Processed	10
Independent Variable	Security	Rows Used in Estimation	10
Frequency Variable	None	Rows with X Missing	0
Weight Variable	None	Rows with Freq Missing	0
Intercept	-1143.2392	Rows Prediction Only	0
Slope	46.6842	Sum of Frequencies	10
R-Squared	0.8708	Sum of Weights	10.0000
Correlation	0.9332	Coefficient of Variation	0.0544
Mean Square Error	1307665	Square Root of MSE	1143.532

#### Summary Statement

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The equation of the straight line relating no\_of\_Issues and Security is estimated as:  
 $\text{no\_of\_Issues} = (-1143.2392) + (46.6842) \text{ Security}$  using the 10 observations in this dataset. The y-intercept, the estimated value of no\_of\_Issues when Security is zero, is -1143.2392 with a standard error of 3040.5915. The slope, the estimated change in no\_of\_Issues per unit change in Security, is 46.6842 with a standard error of 6.3585. The value of R-Squared, the proportion of the variation in no\_of\_Issues that can be accounted for by variation in Security, is 0.8708. The correlation between no\_of\_Issues and Security is 0.9332.

A significance test that the slope is zero resulted in a t-value of 7.3420. The significance level of this t-test is 0.0001. Since  $0.0001 < 0.0500$ , the hypothesis that the slope is zero is rejected.

The estimated slope is 46.6842. The lower limit of the 95% confidence interval for the slope is 32.0215 and the upper limit is 61.3469. The estimated intercept is -1143.2392. The lower limit of the 95% confidence interval for the intercept is -8154.8558 and the upper limit is 5868.3774.

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#### Regression Estimation Section

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Parameter	Intercept B(0)	Slope B(1)
Regression Coefficients	-1143.2392	46.6842
Lower 95% Confidence Limit	-8154.8558	32.0215
Upper 95% Confidence Limit	5868.3774	61.3469
Standard Error	3040.5915	6.3585
Standardized Coefficient	0.0000	0.9332
T Value	-0.3760	7.3420
Prob Level (T Test)	0.7167	0.0001
Reject H0 (Alpha = 0.0500)	No	Yes
Power (Alpha = 0.0500)	0.0628	1.0000
Regression of Y on X	-1143.2392	46.6842
Inverse Regression from X on Y	-4432.8101	53.6125
Orthogonal Regression of Y and X	-4431.4963	53.6097

#### Notes:

The above report shows the least-squares estimates of the intercept and slope followed by the corresponding standard errors, confidence intervals, and hypothesis tests. Note that these results are based on several assumptions that should be validated before they are used.

#### Estimated Model

$(-1143.23920652014) + (46.6841600811285) * (\text{Security})$

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#### Correlation and R-Squared Section

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Parameter	Pearson Correlation Coefficient	R-Squared	Spearman Rank Correlation Coefficient
Estimated Value	0.9332	0.8708	0.9848
Lower 95% Conf. Limit (r dist'n)	0.7160		
Upper 95% Conf. Limit (r dist'n)	0.9813		
Lower 95% Conf. Limit (Fisher's z)	0.7359		0.9348
Upper 95% Conf. Limit (Fisher's z)	0.9844		0.9965
Adjusted (Rbar)		0.8546	
T-Value for H0: Rho = 0	7.3420	7.3420	16.0404
Prob Level for H0: Rho = 0	0.0001	0.0001	0.0000

#### Notes:

The confidence interval for the Pearson correlation assumes that X and Y follow the bivariate normal distribution. This is a different assumption from linear regression which assumes that X is fixed and Y is normally distributed.

Two confidence intervals are given. The first is based on the exact distribution of Pearson's correlation. The second is based on Fisher's z transformation which approximates the exact distribution using the normal distribution. Why are both provided? Because most books only mention Fisher's approximate method, it will often be needed to do homework. However, the exact methods should be used whenever possible.

The confidence limits can be used to test hypotheses about the correlation. To test the hypothesis that rho is a specific value, say  $r_0$ , check to see if  $r_0$  is between the confidence limits. If it is, the null hypothesis that  $\rho = r_0$  is not rejected. If  $r_0$  is outside the limits, the null hypothesis is rejected.

Spearman's Rank correlation is calculated by replacing the original data with their ranks. This correlation is used when some of the assumptions may be invalid.

#### Summary Matrices

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Index	X'X 0	X'X 1	X'Y 2	X'X Inverse 0	X'X Inverse 1
0	10	4748	210224	7.070004	-0.01467988
1	4748	2286694	1.013243E+08	-0.01467988	3.091802E-05
2 (Y'Y)			4.500364E+09		
Determinant		323436			3.091802E-06

#### Variance - Covariance Matrix of Regression Coefficients

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Index	VC(b) 0	VC(b) 1
0	9245197	-19196.36
1	-19196.36	40.4304

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#### Tests of Assumptions Section

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Assumption/Test	Test Value	Prob Level	Is the Assumption Reasonable at the 0.2000 Level of Significance?
<b>Residuals follow Normal Distribution?</b>			
Shapiro Wilk	0.9032	0.237265	Yes
Anderson Darling	0.5051	0.202738	Yes
D'Agostino Skewness	1.5902	0.111797	No
D'Agostino Kurtosis	1.7251	0.084506	No
D'Agostino Omnibus	5.5047	0.063779	No
<b>Constant Residual Variance?</b>			
Modified Levene Test	3.2079	0.111059	No
<b>Relationship is a Straight Line?</b>			
Lack of Linear Fit F(7, 1) Test	246.8777	0.048967	No

#### No Serial Correlation?

Evaluate the Serial-Correlation report and the Durbin-Watson test if you have equal-spaced, time series data.

#### Notes:

A 'Yes' means there is not enough evidence to make this assumption seem unreasonable. This lack of evidence may be because the sample size is too small, the assumptions of the test itself are not met, or the assumption is valid.

A 'No' means the that the assumption is not reasonable. However, since these tests are related to sample size, you should assess the role of sample size in the tests by also evaluating the appropriate plots and graphs. A large dataset (say  $N > 500$ ) will often fail at least one of the normality tests because it is hard to find a large dataset that is perfectly normal.

#### Normality and Constant Residual Variance:

Possible remedies for the failure of these assumptions include using a transformation of Y such as the log or square root, correcting data-recording errors found by looking into outliers, adding additional independent variables, using robust regression, or using bootstrap methods.

#### Straight-Line:

Possible remedies for the failure of this assumption include using nonlinear regression or polynomial regression.

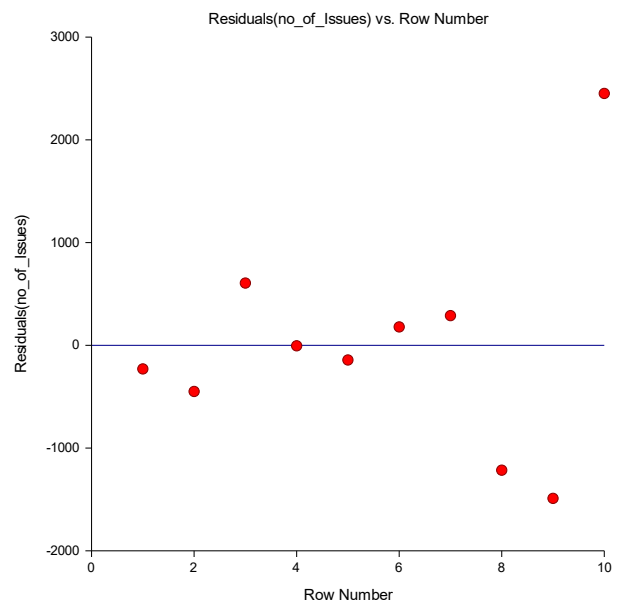
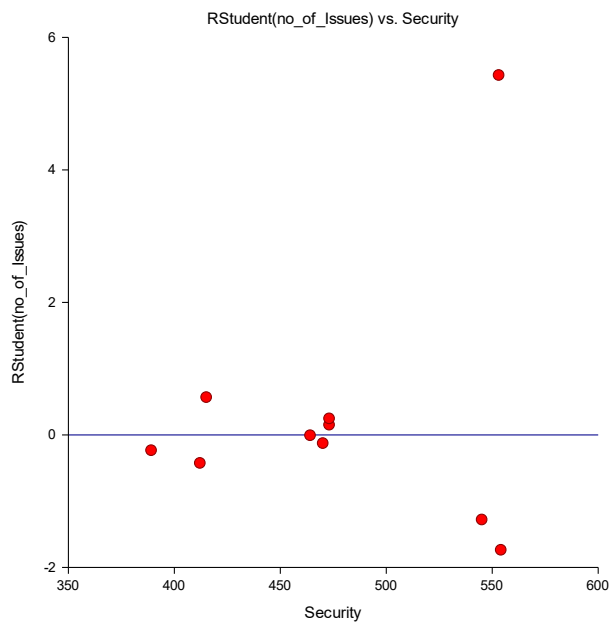
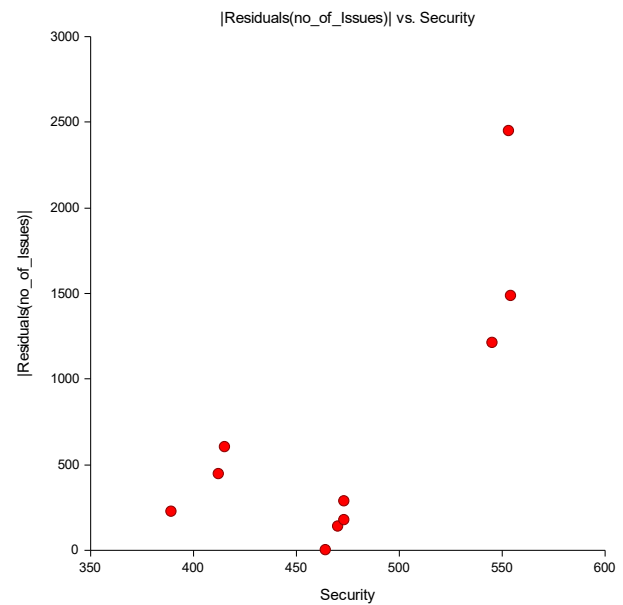
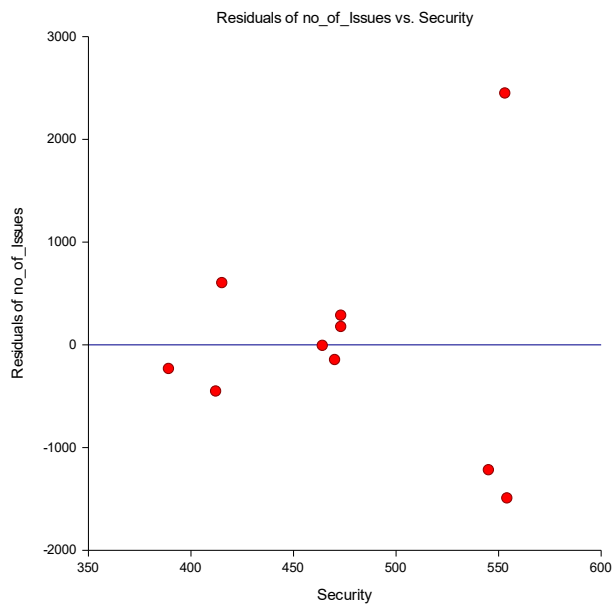
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### Residual Plots Section

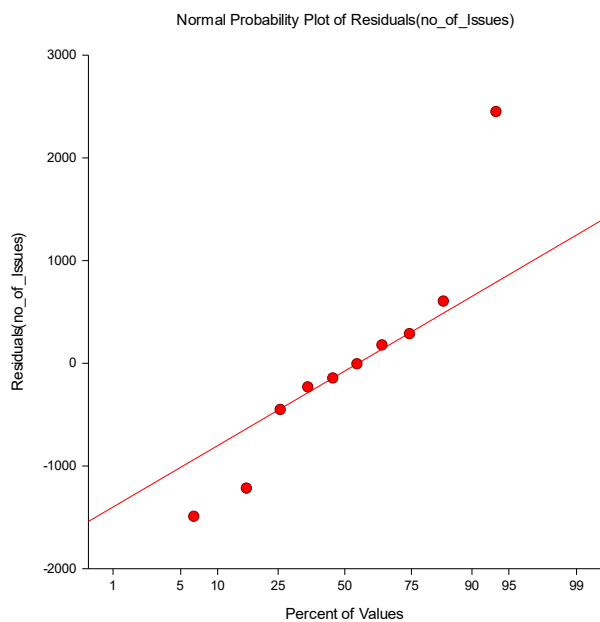
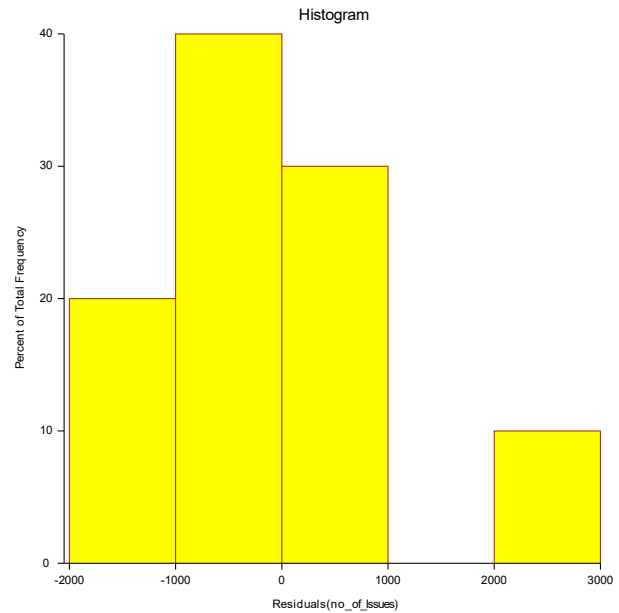
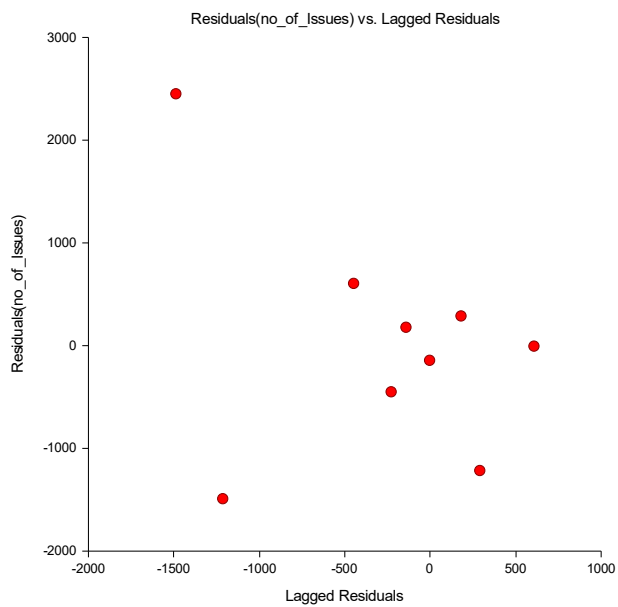
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## Linear Regression Report

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### Procedure Input Settings

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#### Autosaved Template File

C:\Users\KASATLA\Documents\NCSS 12\Procedure Templates\Autosave\Linear Regression and Correlation - Autosaved 2018\_3\_29-23\_41\_15.t153

#### Variables Tab

-- Variables -----

Y: Dependent Variable(s):                  no\_of\_Issues  
 X: Independent Variable:                    Security  
 Frequency Variable:                        <Empty>  
 Weight Variable:                            <Empty>

-- Model Specification -----

Remove Intercept                            Unchecked

-- Resampling (Increases computation time) -----

Calculate Bootstrap C.I.'s                  Unchecked  
 Run Randomization Tests                  Unchecked

-- Alpha Levels -----

Alpha for C.I.'s and Tests:                  0.050  
 Alpha for Assumptions:                    0.20

#### Reports Tab

-- Select Report / Plot Group -----

Select a Group of Reports and Plots:      Display only those items that are CHECKED BELOW  
 Show Notes                                    Checked  
 Show All Rows                                Checked

-- Select Reports -----

.. Summaries .....

Run Summary                                  Checked  
 Summary Statement                          Checked  
 Descriptive Statistics                      Unchecked  
 Correlation and R-Squared                  Checked  
 Summary Matrices                            Checked

.. Estimation .....

Regression Estimation                      Checked

.. ANOVA .....

ANOVA    Unchecked

.. Assumptions .....

Assumptions                                  Checked  
 Levene Groups:                                2  
 Durbin-Watson                                Unchecked  
 PRESS    Unchecked



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### Procedure Input Settings (Continued)

#### Reports Tab (Continued)

.. Prediction .....	
Predict Y at these X values:	<Empty>
Predicted Y - C.L.	Unchecked
Predicted Y - P.L.	Unchecked
.. Row-by-Row Lists .....	
Original Data	Unchecked
Predicted Y Means	Unchecked
Predicted Y Individuals	Unchecked
Simultaneous Bands	Unchecked
Predicted X Means	Unchecked
Predicted X Individuals	Unchecked
.. Regression Diagnostics .....	
Residuals	Unchecked
Residual Diagnostics	Unchecked
Leave One Row Out	Unchecked
Outlier Detection Chart	Unchecked
Influence Detection Chart	Unchecked
Outlier-Influence Chart	Unchecked

#### Report Options Tab

-- Report Options -----	
Precision:	Single
Variable Names:	Names
.. Decimal Places .....	
Probability:	4
Beta (Coefficients):	4
SE:	4
T:	4
R2:	4
X:	4
Y:	4
Residuals:	4
Std Residuals:	4
Sum Squares:	All
Matrix:	All

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#### Procedure Input Settings (Continued)

##### Plots Tab

-- Select Plots -----	
Y vs X	Checked
RStudent vs X	Checked
Histogram	Checked
Residuals vs X	Checked
Residuals vs Row	Checked
Probability Plot	Checked
Residuals  vs X	Checked
Serial Correlation	Checked
-- Plot Options -----	
Y vs X Plot Size:	Medium
All Other Plot Sizes:	Small

##### Resampling Tab

-- Bootstrap Calculation Options -----	
.. Sampling .....	
Samples (N):	3000
Sampling Method:	Observations
Retries:	50
.. Estimation .....	
Percentile Type:	Ave X(p[n+1])
C.I. Method:	Reflection
Bootstrap Confidence Coefficients:	0.90 0.95 0.99
-- Randomization Test Options -----	
Monte Carlo Samples:	1000

##### Storage Tab

-- Data Storage Options -----	
Storage Option:	Do not store data