Intention to Use Internet Banking in Penang

Regression Model Analysis

Building multiple regression based on this research model in figure (1):

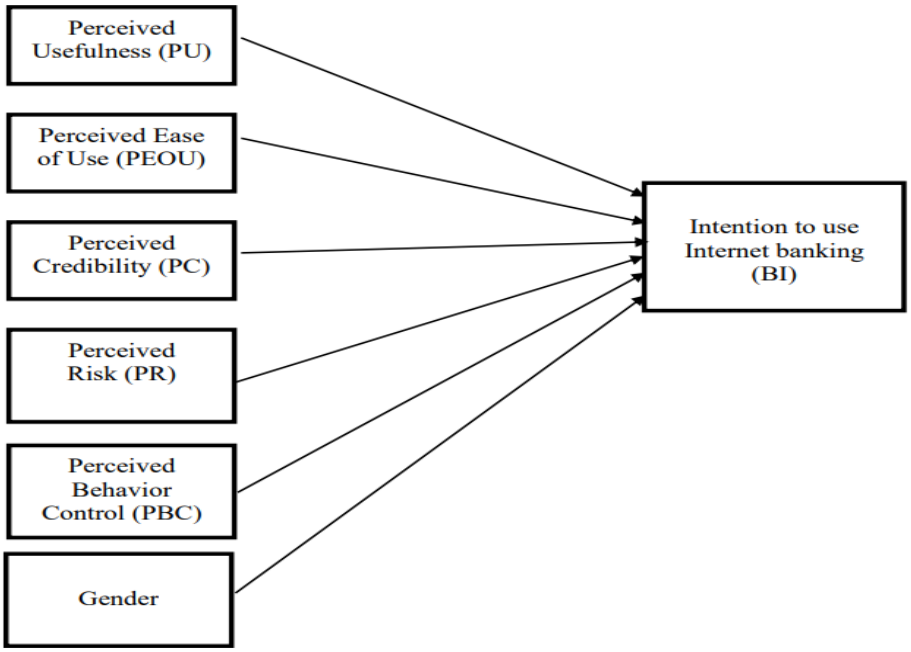


Figure 1 *Research Model*

Our predictors are the ones mentioned in the left sided rectangles. According to the research problem, we are going to enter the variables with the order of the hypothesis mentioned depending on the forced entry method as some researchers believe that this method is the only appropriate method for theory testing (Studenmund & Cassidy, 1987) because stepwise techniques are influenced by random variation in the data and so seldom give replicable results if the model is retested.

Hypotheses:

H1: Perceived usefulness will be positively related to intention to use Internet banking

H2: Perceived ease of use will be positively related to intention to use Internet banking

H3: Perceived credibility will be positively related to intention to use Internet banking

H4: Perceived risk will be negatively related to intention to use Internet banking

H5: Perceived behavioural control will be positively related to intention to use Internet banking

H6: Male respondents have higher Intention to use compared to female respondents

Question (1): Build a multiple regression model to test the six hypothesized effects on the outcome (assume that all the statistical requirements of the analysis have already been met). Interpret the results in terms of the F statistic and R2 value.

Building Multi-regression Model

Step 1: Recoding variables:

Most of the variables has been recoded in the assignment section, but one variable needs to be dummy recoded here for the sixth hypothesis to be tested, which is gender.

Dummy Recoding Gender into:

Male: 1

Else: 0

Step 2: Testing Assumptions:

1. Normality
2. Normality of error term
3. Linearity
4. Multicollinearity
5. Constant Variance
6. Outliers
7. Autocorrelation

Discussed in details below.

Step 3: Implementing the multivariant regression model on SPSS:

In this section we present the most important and needed output (i.e. tables) and interpreted the F statistics and R^2

1. Normality

Since Univariate analysis can be done on SPSS, we do it there, while the multivariate we used website to help.

Table (1): Descriptive Statistics

Construct	Mean	Std. Deviation	Skewness	Kurtosis
perceived usefulness	2.891	.612	1.809	3.005
perceived ease of use	3.664	.596	-.441	-.295
Intention	3.471	.380	-.092	.367
Control	3.648	.494	-.318	.562
Risk	2.343	.542	.357	-.224
Creditability	3.369	.800	.247	-.300
Male	.250	.434	1.164	-.652

Table (2): Mardia's multivariate skewness and kurtosis

	b	z	p-value
Skewness	11.148	356.750	0.000
Kurtosis	64.057	0.652	0.514

According to skewness, all the variables are normal except perceived usefulness and gender (male). While on kurtosis the variables are between the cut off values. However, we implemented multivariate normality, the overall model is not normal because of skewness and kurtosis. Multivariant skewness ais 11.148 which is greater than +/- 3 (the cut off value), and multivariant kurtosis is 64.058 which is greater than +/- 20 (the cut off value). Additionally, skewness z equals 356.750 which is greater than 1.96 (cut off value) and p value equals zero which is less than 0.05.

2. Normality of error term

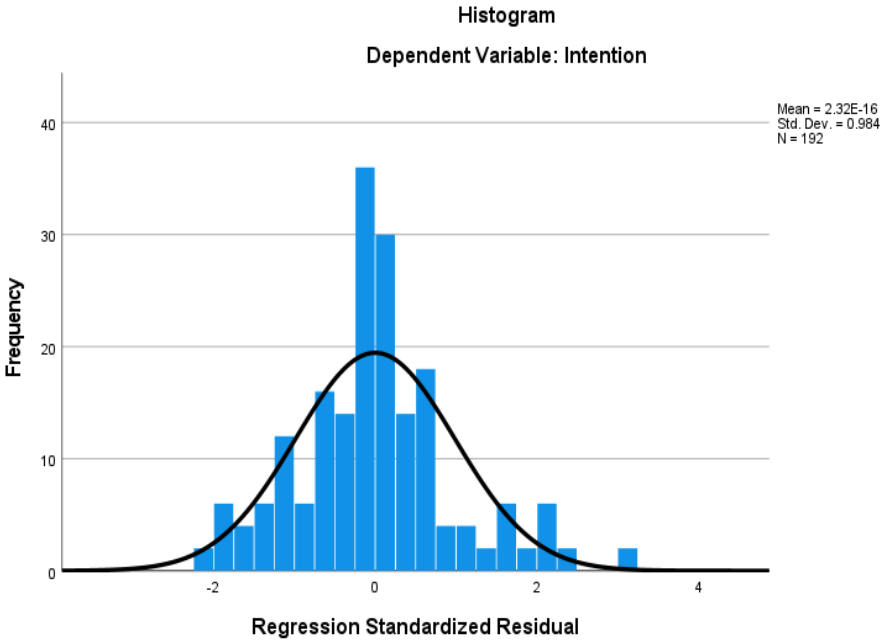


Figure (2): Regression Standardized Residual

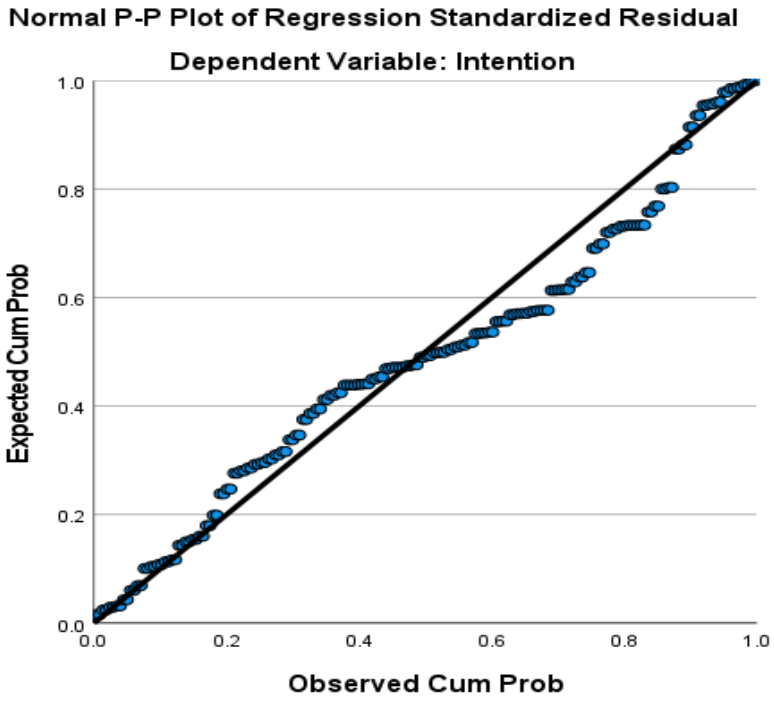
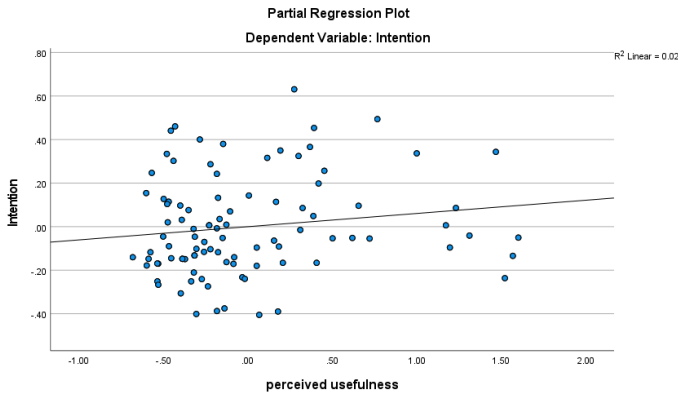


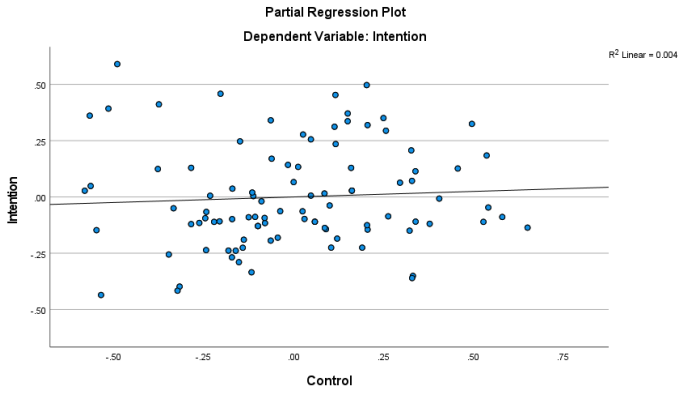
Figure (3): Observed Cum Prob

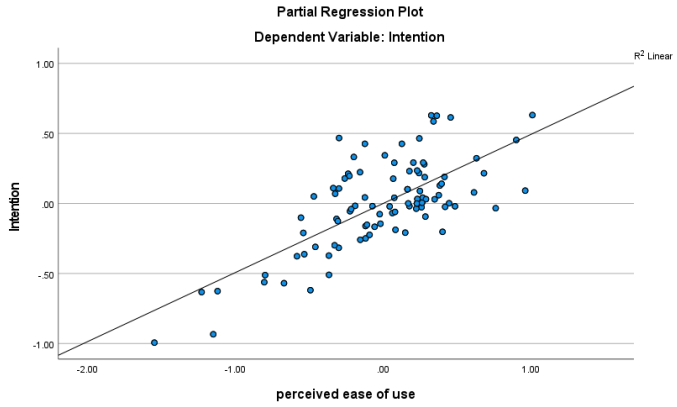
Those two graphs in figures are a proof of the normality assumption

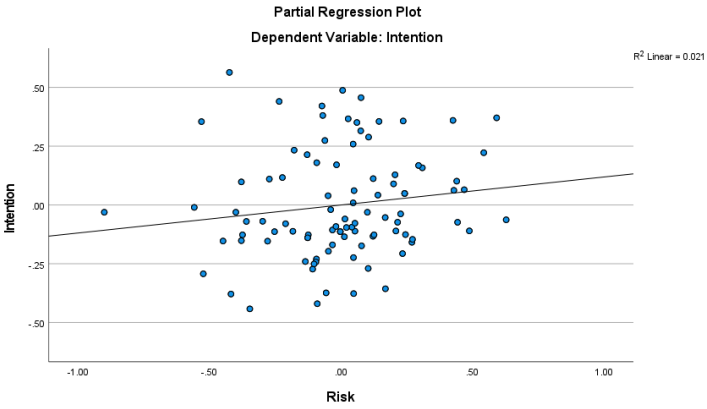
The residuals (errors) are approximately normally distributed as the mean is close to zero and standard deviation is very small.

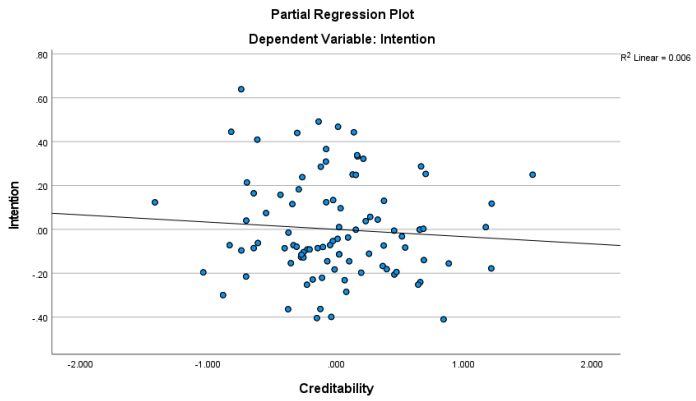
3. Linearity











The independent variables have linear relationship with the dependent variable.

4. Multicollinearity

Table (3): Collinearity Diagnostics[a]

Dimension	Condition Index	(Constant)	Usefulness	Ease of use	Control	Risk	Creditability	Male
6	27.433	.01	.01	.79	.36	.01	.06	.02
7	69.554	.99	.00	.02	.61	.87	.62	.00

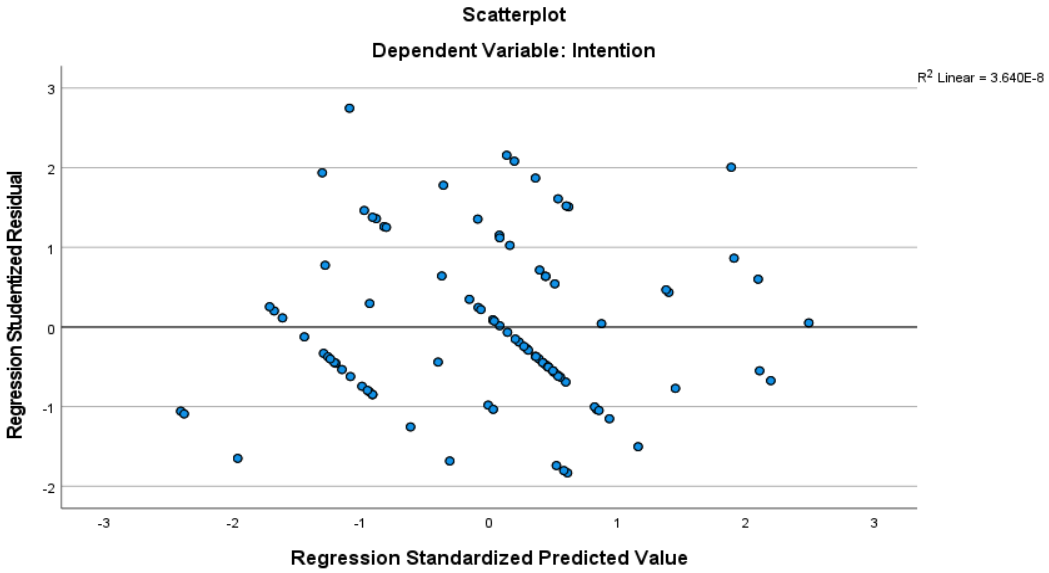
a. Dependent Variable: Intention

VIF values for all the variables are less than 5. While conditional index till sixth dimension it is less than thirty. Which indicates there is no multicollinearity.

However, the last dimension shows multi collinearity as it is nearly double the cut off value. Although its VIF is lower than 5, it is 1.077.

From coefficient table (7)	
Construct	VIF
Usefulness	1.250
Ease of use	1.731
Credibility	3.055
Risk	3.989
Control	2.374
Male	1.077

5. Constant Variance



The data is showing homoscedasticity as variance along the line shows similarity.

6. Outliers

While running the model we have identified the case wise diagnostic to be 3 and there is no table of case wise diagnostic is shown in the output.

7. Autocorrelation

Durbin Watson equals 1.433 which is close to 2 which means residuals are uncorrelated and autocorrelation here is considered positive as it is between 0 to less than 2.

Step 3: Implementing the multivariant regression model on SPSS:

a) Detecting relationships between the dependent and each independent variable

Table (4) Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of Estimate	R^2 Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.809[a]	.655	.644	.227	.655	58.48	6	185	$<_1$ 001	1.433

a. Predictors: (Constant), Gender, Creditability, perceived ease of use, perceived usefulness, Control, Risk
b. Dependent Variable: Intention

Since, the R square is the measure of variability in the outcome accounted by predictors, which is evaluated by F statistics, we focused on interpreting it. Here, the model changed R square from 0 to .655, and the amount changed in variance showed an increase in F-ratio of 58.48, which is significant with a probability less than .001. However, R square and adjusted R square are both the same this mean our model is generalised in a very good way. Finally, the assumption of independence of errors has been met as the Durbin Watson is close to 2 which means residuals are uncorrelated and autocorrelation here is considered positive as it is between 0 to less than 2.

Table (5) ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.148	6	3.025	58.48	$<_1 001^b$
	Residual	9.569	185	.052		
	Total	27.717	191			

a. Dependent Variable: Intention

b. Predictors: (Constant), Gender of users of internet banking, Creditability, perceived ease of use, perceived usefulness, Control, Risk

ANOVA is a test to know if the model is better at predicting the outcome than using the mean significantly! As we have manipulated the output of the regression model to color the background with significance a light green color, from the first glance, it is well-known that the model has affected the prediction of outcome significantly in a positive way if compared with not fitting the variables into regression model. T Usually, R squared is used to compare two models together. However, the F statistic shows the overall significance of the model as it shows there is a linear relationship between all of independents or at least one and the intention. here is a significant effect independents on intention at $p > 0.05$ level for condition [$F(6, 185) = 58.48$, $p = .001$].

b) Pearson Correlation Matrix

Table (6): Correlations

	Intention	Usefulness	Ease of Use	Control	Risk	Creditability	Gender
Intention	1.000						
Usefulness	.339	1.000					
Ease of use	.784	.356	1.000				
Control	.464	.411	.616	1.000			
Risk	-.167	-.311	-.397	**-.655**	1.000		
Creditability	-.210	.091	-.067	**.056**	-.595	1.000	
Gender (Male)	**-.051**	-.134	-.058	-.186	.111	**.094**	1.000

The negative correlation indicates when one increases the other decrease. For example, the highest negative is -.655 indicates that people who choose high score for control usually choose low score for risk. While positive means the opposite. The strength relationship identified by how near the correlation is to 1 or -1, the nearer the stronger.

There is no multicollinearity as the correlation matrix variables as all the variables correlation ranges between -0.655 and 0.784, there is no correlation above 0.8.

The strongest correlated variable with the dependent variable (Intention) is Ease of use. Ease of use has strong positive relationship with intention. While Control and usefulness have positive relationship. On the other hand, Credibility, risk, and Gender has negative relationship with intention, while the weakest relationship is gender with intention.

c) Detecting unusual cases exerting undue influence over the parameters of the model

While building the model, we have chosen Cook´s distance, Leverage values (hat values), Mahalanobis distances, Standardized DFBeta, Standardized DFFit, Covariance ratio. All of this to make sure the outcome tables in the output of the regression model covering all the unusual cases for a thorough model analysis.

Table (7): Coefficients[a]

Construct	Unstd. B	Std. Error	Std. β	t-value	Sig	Correlations (Zero, Partial, Part)			Tolerance	VIF
Usefulness	.061	.030	.098	2.024	.044	.339	.147	.087	.800	1.250
Ease of Use	.494	.036	.773	13.605	<1 001	.784	.707	.588	.578	1.731
Control	.049	.058	.064	.844	.400	.464	.062	.036	.327	3.055
Risk	.119	.061	.170	1.969	.050	-.167	.143	.085	.251	3.989
Creditability	-.033	.032	-.070	-1.045	.297	-.210	-.077	-.045	.421	2.374
Male	.005	.039	.006	.136	.892	-.051	.010	.006	.928	1.077

a. Dependent Variable. Intention

This table is vital with a lot to focus on. Starting with b-value, it helps us know which predictors affects outcome when all other predictors are constant whether it is positive or negative. Positive values indicate positive relationships between predictors and outcome just like most of the predictors here spotting perceived ease of use as the highest one with 0.922, while the only negative one is credibility. Nevertheless, each beta value has a standard error that shows how far the value could vary in different samples. We see that the standard error of predictors is insignificant.

Moving to the next, standardized beta are measured in standard deviation units that´s why we could know the importance of a predictor in the model, so the higher the variance the higher the importance. In this case, it is also the perceived ease of use with higher value.

T test columns measures the predictor contribution and if it is significant or not. Accordingly, it is clear that only two variables make a significance contribution to the model which are in green, the highest is perceived ease of use then perceived usefulness. The next confidence interval columns show CI for b-values in the population. Then correlation types to finally had collinearity statistics where variance inflation factor (VIF) is better when it is close to 1 as half of them is to avoid any bias.

Table (8)

Hypothesis Testing

Hypotheses	Construct	Unstd. B	Std.Error	Std. B	t-value	Sig	LL	UL	VIF
H1	Usefulness	.061	.030	.098	2.024	.044	.002	.120	1.250
H2	Ease of use	.494	.036	.773	13.605	$<_1$ 001	.422	.565	1.731
H3	Credibility	-.033	.032	-.070	-1.045	.297	-.096	.029	3.055
H4	Risk	.119	.061	.174	1.969	.050	.000	.239	3.989
H5	Control	.049	.058	.064	.844	.400	-.066	.164	2.374
H6	Male	.005	.039	.006	.139	.892	-.072	.083	1.077

Question 2: Explain which predictors are significant and why.

Question 3: Explain which predictors are not significant and why.

Table (6)

Hypotheses	Construct	Result
H1	Usefulness	Supported
H2	Ease of use	Supported
H3	Credibility	Non supported
H4	Risk	Supported
H5	Control	Supported
H6	Gender (Male)	Non supported

The significant variables are:

The multiple regression model outcome indicates that the perceived usefulness and perceived ease of use are able to significantly predicting the intention as, F (6, 185) = 58.475, p $<_1$ 001, and those variables has p value lower than 0.05 (p < 0.05).

Perceived usefulness (β = 0.061, t=2.024, p < 0.044), Perceived Ease of use (β = 0.494, t=13.605, p = $<_1$ 001), Perceived behavioural control (β = 0.045, t=0.844, p < 0.400) were positively related to intention, while Perceived Risk (β = 0.119, t=1.969, p < 0.050) was negatively related. Thus, H_1 , H_2 , H_4 , and H_5 are supported.

The insignificant variables are:

The multiple regression model outcome indicates that the perceived control, perceived risk, perceived behavioural credibility, and gender are not able to predict the intention and has insignificant role in predicting as their alpha p > 0.05.

Perceived behavioural credibility (β = -0.33, t=-1.045, p < 0.297), and the Male (β = 0.005, t=0.139, p < 0.892). They were negatively related to intention. Thus, from H_3 to H_6 are not supported.

The standard error of predictors is insignificant as it will show us to what extent these values would and how variety would be only. but we will need more information so we will look at the p-value column that all independent variables (Perceived ease of use, credibility coefficients, Perceived usefulness, control, risk, age of users of internet banking) are statistically significantly different from 0 (zero). Although the intercept, B_0, is tested for statistical significance and it is rarely on its importance.

4. Explain which predictor is the strongest and which predictor is the weakest in the model and why

The strongest predictor is Perceived Ease of Use because this predictor has the highest Standardized Coefficients Beta, which is (.773).

The weakest predictor is Perceived behavioural credibility because this predictor has the lowest Standardized Coefficients Beta, which is (-.070).

Appendix:

Correlation by chart builder