Shariah Compliant Investments Linear Regression Model

Formulation of the Model: Total Shariah i=α_0+α_1 Age i+α_2 Parent Income i+$\alpha_3$school1 dummy i+α_4 school 2 dummy i+α_5 Finance Courses Taken i+α_6 Ethics Score i + ε_i

Estimation of the Model: Total Shariah i^=1147.149^+82.584^ Age i+135.149^ Parent Income i-146.590^school1 dummy i-48.069^ school 2 dummyi+203.645^ Finance Courses Taken i+241.151^ Ethics Score i + ε_i

Checking the multicollinearity of variables: According to the table, all the VIFs are less than 5, we can conclude that we do not have any multicollinearity problems.

the LINE assumptions: I. Linearity between Y and all the Xs

1) Linearity of the relationship between Total Shariah and Age. P value=0.000 < alpha=0.05, reject H0, the relationship is not linear. The graph is not concave.

2) Linearity of the relationship between Total Shariah and Parent Income. P value=0.002 < alpha=0.05, reject H0, the relationship is not linear. The graph is not concave.

3) Linearity of the relationship between Total Shariah and Finance Courses Taken. P value=0.000 < alpha=0.05, reject H0, the relationship is not linear. The graph is not concave.

4) Linearity of the relationship between Total Shariah and Ethics Score. P value=0.000 < alpha=0.05, reject H0, the relationship is not linear. The graph is not concave.

The graphs of all the variables are not concave, and the data is not too large, so we will use the square root to transform the variables that are not linear.

Re-estimating the model: Total Shariah i^=-3135.140^+799.809^ Age i+371.507^ Parent Income i-161.384^school1 dummy i-55.214^ school 2 dummyi+412.448^ Finance Courses Taken i+1399.605^ Ethics Score i + ε_i

II. Independence of errors: Based on the graph, all the dots are not located in a rectangular shape, but they are between -3 and 3. We can conclude that the errors are not independent over time.

III. Normality of errors. P value = 0.683> alpha=5% so we will accept H0, we can conclude that errors are normally distributed

IV. Equality of variances. White test=0.152*120= 18.24<31.410, accept H0, we can conclude that the errors are Homoscedastic

First-order autocorrelation. We have n=120 and k=6 so Dl=1.421, DU=1.670. DW test=2.021>DU=1.670, accept H0, we can conclude that the first-order autocorrelation is absent

Blue estimates: The parameters are blue:

Measure of goodness of fit

R2:93.2% of the variation of total sharia investments is explained by Age, Parent Income, school dummies, Finance Courses Taken, and Ethics Score

R2adj:92.8% of the variation of total sharia investments is explained by Age, Parent Income, school dummies, Finance Courses Taken, Ethics Score, taking into account the degrees of freedom.

T(tests):

The Relationship **between** Total Shariah and Age. P value=0.000 < alpha=0.05, reject H0, there is a significant relationship between Total Shariah and Age

The **relationship between** Total Shariah and Parent Income. P value=0.000 < alpha=0.05, reject H0, there is a significant relationship between Total Shariah and Age

The **relationship between** Total Shariah and school 1 dummy. P value=0.000 < alpha=0.05, reject H0, there is a significant relationship between Total Shariah and school dummy2

The **relationship between** Total Shariah and school 2 dummy. P value=0.151 > alpha=0.05, accept H0, there is a no significant relationship between Total Shariah and school dummy2

The **relationship between** Total Shariah and Finance Courses Taken. P value=0.000 < alpha=0.05, reject H0, there is a significant relationship between Total Shariah and Finance Courses Taken

The **relationship between** Total Shariah and Ethics Score. P value=0.000 < alpha=0.05, reject H0, there is a significant relationship between Total Shariah and Ethics Score

F test: P value=0.000 < alpha=0.05, reject H0, the model fits well the data

Interpretation: Total Shariah i^=-3135.140^+799.809^ Age i+371.507^ Parent Income i-161.384^school1 dummy i-55.214^ school 2 dummyi+412.448^ Finance Courses Taken i+1399.605^ Ethics Score i + ε_i

- When the student belongs to school 1, the total Shariah-compliant investments of the student start at an average base value of - 3019.354 MAD
- When the student belongs to school 2, the total Shariah-compliant investments of the student start at an average base value of -3190.354 MAD
- When the student belongs to school 3, the total Shariah-compliant investments of the student start at an average base value of -3135.140 MAD
- The average value of the total sharia investments increases by 799.809 MAD, **on average**, for each additional one unit of age
- The average value of the total sharia investments increases by 371.507 MAD, **on average**, for each additional one unit of Parent Income
- The average value of the total Sharia investments increases by 412.448 MAD, **on average**, for each additional one unit of Finance Courses Taken
- The average value of the total sharia investments increases by 1399.605 MAD, **on average**, for each additional one unit of Ethics Score

Regression Model B: Predicting investment in non–Shariah-compliant assets

1) **OLS Sample Model Parameters Estimation:** $\hat{Y}\_Total\_conventional_i$ = 602.796 + 84.457*(Age_i) + 158.827*(Parents_Income_i) - 114.919*(School1_Dummy_i) - 45.725*(School2_Dummy_i) + 133.574*(Finance_Courses_Taken_i) + 162.344*(Ethics_Score_i)

2) **Multicollinearity check:** For a most efficient VIF of 5, regressors exhibit no multicollinearity. R^2 accurately summarizes the full explanatory power of regressors.

3) **LINE assumptions:** Linearity tests: Age_i => p-value< α, DR=> reject H0. The relationship is not linear. Relation graph showcases no concavity. **Perform square root transformation for Age_i**

Linearity tests: Parents_Income_i => p-value< α, DR=> reject H0. The relationship is not linear. Relation graph showcases no concavity. **Perform square root transformation for Parents_Income_i**

No linearity test for dummy variables.

Linearity tests: Finance_Courses_Taken_i => p-value< α, DR=> reject H0. The relationship is not linear. Relation graph showcases no concavity. **Perform square root transformation for Finance_Courses_Taken _i**

Linearity tests: Ethics_Score_i => p-value< α, DR=> reject H0. The relationship is not linear. Relation graph showcases no concavity. **Perform square root transformation for Ethics_Score_i**

Modified model becomes: $\hat{Y}\_Total\_conventional_i$ = -3067.027 + 816.818*sqrt(Age_i) + 433.444*sqrt(Parents_Income_i) - 124.269*(School1_Dummy_i) - 50.570*(School2_Dummy_i) + 273.136*sqrt(Finance_Courses_Taken_i) + 941.755*sqrt(Ethics_Score_i)

4) **Independence of error terms over time:** Total conventional investments expected are between -3 and 3, and residuals form a rectangular shape in the scatter plot => *errors are independent over time*

5) **Normality of errors test:** K-S p-value=0.0.94>α => accept H0 => *errors are normal*

6) **Equality of error terms' variances:** Regressing error² on model regressors, their squares, and their cross terms.

R^2 = 0.263 => white test statistic=n*R^2=120*0.263=31.56, Chi square, 0.05, (K'=27) = 40.113. White test falls in Rej Area => Errors are Homoscedastic

7) **1ˢᵗ order autocorrelation test:** Durbin-Watson test statistic = 2.265. n=120 ≈ 100, K'=6: D-lower= 1.421 and D-upper = 1.670

DW test statistic > Dupper => DR: accept H0 => error terms have no first-order autocorrelation

8) **BLUE Check:** parameters are consistent, unbiased, and efficient => they are BLUE

9) **Measures of Goodness of Fit:** R^2= 0.901. 90.1% of the variations in total non-shariah compliant investments are explained by the model regressors

R^2 adjusted= 0.895, so 89.5% of the variations in total non-shariah compliant investments are explained by the model regressors **taking into account degrees of freedom.**

T-tests of relationship significance: °p-values for relationship significance T-tests between total conventional investments and: age, parents' income, school1 dummy, number of finance courses taken, and ethics: <0.01 < α =>DR: Reject H0

°p-value for school2 dummy variable =.166 > α => DR: Accept H0

- The relationship between conventional investments and age *is significant*
- The relationship between conventional investments and parents' income *is significant*
- The relationship between conventional investments and school1 dummy variable *is significant*
- The relationship between conventional investments and finance courses taken *is significant*
- The relationship between conventional investments and ethics-score *is significant*
- The relationship between conventional investments and school2 dummy variable *is not significant*

ANOVA F-test: p-value < 0.001 < α. DR: Reject H0. **The model fits the data well**

10) **Parameters interpretation: Total_conventional_i = -3067.027 + 816.818*sqrt(Age_i) + 433.444*sqrt(Parents_Income_i) - 124.269*(School1_Dummy_i) - 50.570*(School2_Dummy_i) + 273.136*sqrt(Finance_Courses_Taken_i) + 941.755*sqrt(Ethics_Score_i)+E_i**

- *When the student belongs to school 1, the total non shariah compliant investments of the student start at an average base value of -3,191.296 MAD*
- *When the student belongs to school 2, the total non shariah compliant investments of the student start at an average base value of -3117.597 MAD*
- *When the student belongs to school 3, the total non shariah compliant investments of the student start at an average base value of -3,067.027 MAD*
- *Holding other variables constant, whenever the square root of student age grows by 1, the total non shariah compliant investments of the student grow by 816.181 MAD on average*
- *Holding other variables constant, whenever the square root of parents' income bracket grows by 1, the total non shariah compliant investments of the student grow by 433.444 MAD on average*
- *Holding other variables constant, whenever the square root of the number of finance-related courses the student has taken grows by 1, the total non shariah compliant investments of the student grow by 273.136 MAD on average*
- *Holding other variables constant, whenever the square root of the student's score on the ethics orientation scale grows by 1, the total non shariah compliant investments of the student grow by 941.755 MAD on average*

Recommendations for Financial Institutions in UAE: Shariah vs Conventional Investment preferences of university students

Product Development

Results of the regression models indicate that age, parents' income bracket, number of finance-related courses taken at university, and ethics orientation all positively predict the amount of student investment; but depending on school/major as well. Students from school 1 and school 2 will have generally less investment preferences for both types of investment products compared to students of School 3. In both investment types, ethics score is the strongest positive predictor amount invested (weight of 1399 in Shariah investment products and 942 in conventional investment products). Number of finance courses have a greater positive influence on Shariah investing compared to conventional investing, suggesting that more advanced students in finance courses will demonstrate more preference for Shariah investment products.

-Banks ought to increase Shariah compliant products among students with higher demonstrated ethics and number of finance classes taken. These groups are highly responsive to Shariah-compliant and ethical investment products.

-Marketing and product design should be based on major, the negative school dummy coefficients (-161.384 and -55.214 in the case of Shariah and -124.269 and -50.570 in the case of conventional) show that students in school 1 invest the least and those in school 3 invest the most, regardless of investment type. Banks need to customize their offerings: such as technology specific funds with engineering students and ESG funds with humanities students, while students from School 3 remain the most active target.

-The high ethics coefficient shows that there is high demand of ethical investment portfolios, regardless of shariah-compliance. Both Shariah and ESG friendly conventional products ought to highlight on social justice, sustainability and religious values as a way of capturing the attention of ethically oriented investors as that positively influences investment amount.

Marketing & Targeting

Segmentation is critical. The most effective drivers are ethics score, then age, and then finance courses.

-Target religious/ethical investors with Sukuk, Islamic equity and Halal tech funds: focus on the adherence to the Shariah law and social impact.

 -Focus on high income and older students with diversified portfolios; portfolios with both Shariah and conventional ESG offerings; income coefficients (371.507 Shariah vs 433.444 conventional) prove these students invest more and prove the effectiveness of ESG offering specifically.

-Provide crypto education courses and other finance education to those with limited number of courses in finance; finance education is closely linked with Shariah investment and can alleviate speculation errors.

Risk Management Implications

-Students with high ethics, higher income and finance courses tend to invest more so they could engage in riskier assets. UAE Banks ought to adopt risk profiling tools and also offer customized risk advice to frame risk seeking behavior of students towards optimal returns.

-Negative coefficients of the dummies indicate that the students of school 1 do not use traditional debt instrumentation and could be inclined to Shariah products. Institutions are supposed to make such clients access the conformable alternatives and should not induce traditional debt products to them.

Conclusion

This regression analysis shows that ethics orientation, age, finance education, and income of parents are the drivers of student investment and that school/major is a base determinant of initial investment intent regardless of shariah-compliance. Finance education and ethical consideration highly increase the predicted shariah-compliant investment amount. Parents' income and student age have positive predictive behavior of investment amount regardless of shariah-compliance.

Segmenting marketing push and pull strategies to university students based on their school, finance education, ethics orientation, age, and parents' income would lead to maximized leads for investment products. Selecting leads based on Ethics and Finance education for marketing campaigns about shariah-compliant investment products can maximize total leads for this particular investment products and enhance consumer-relationship for this emerging group of religiously concerned investors.