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Influencing Economic Rate of Return

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ABSTRACT

Starting from the idea that in economics, as well as in other sciences, anything has the tendency to depend on anything else, in this paper it was intended to develop an economical model capable of expressing the relation between the economic rate of return – as fundamental indicator of expressing the firm's financial - economic performance- and its determinant factors. The multiple linear regression model has been developed through the analysis from 30 Mauritian Companies.

Economic rate of return (ERR) is the rate of return used in capital budgeting to measure and compare the profitability of investment. It is also called the discounted cash flow rate of return (DCFROR) or the rate of return (RoR).

It has been tried to develop a model that shows how the ERR depends on the six different variables such as good money, gross operating capital, operating gross margin return , cash flow, EBIT margin (Earnings before interest and taxes) , and the total debt turnover.

The above mentioned independent variables are important to study to analyze how they affect the return and hence the profitability. Businesses use the calculation of gross operating capital to measure the cash flow which in turn affects the economics rate of return. EBIT margin is useful when comparing multiple companies , especially within a given industry , and also called the debtors receivable ratio indicate s how effective a company is at selling on credit and collecting debt. It can be an early indicator of impeding cash crisis and is an important tool in financial analysis. Thus all these variables might directly or indirectly affect rate of return and that is the area this paper wish to study through this project.

Given our multivariate linear regression model, we can express it with the following equation

$$\hat{y}_i = \hat{\beta}_1 + \hat{\beta}_2 . x_{2i} + \hat{\beta}_3 . x_{3i} + \hat{\beta}_4 . x_{4i} + \hat{\beta}_5 . x_{5i} + \hat{\beta}_6 . x_{6i} + \hat{\beta}_7 . x_{7i}$$

where,

$\hat{y}_i$ = Economic Rate of Return

x_{2i} = Good money

x_{3i} = Gross Operating Capital
x_{4i} = Operating Gross Margin Return
x_{5i} = Cash Flow
x_{6i} = EBIT Margin
x_{7i} = Total Debt Turnover
And, $\hat{\beta}_1$ = estimator of the intercept
While $\hat{\beta}_2$, $\hat{\beta}_3$, $\hat{\beta}_4$, $\hat{\beta}_5$, $\hat{\beta}_6$, $\hat{\beta}_7$ are the slope coefficients

Now that we have established the model to show the relationship between economic rate of return and the six independent variables mentioned above, it can be inferred from the data that economic rate of return is positively related to EBIT margin and total debt turnover while negatively related to good money, gross operating capital, operating gross margin return and cash flow.

For explanation, consider EBIT margin and gross operating capital

If there is one unit increase in EBIT margin, then the economic rate of return is going to increase by 1.58 units. While if there is an increase of one unit in gross operating capital, EROR will decrease by 1.22 units and likewise for other variables.

HYPOTHESIS TESTING

A Statistical hypothesis test is a method of making decisions using the data. In statistics, a result is called statistically significant if it has been predicted as unlikely to have occurred by chance above. According to our model we test that the sample slope coefficient are significant.

ANALYSIS

1. H_0 : $\beta_2 = 0$ (n = 30)
   H_a : $\beta_2 \neq 0$

$$t_{(0.05,\,23)} = \frac{\hat{\beta}2 - \beta 2}{s.e.\ (\beta 2)} \approx 23 \text{ d.f. (5\% level of significance)}$$

t_{stat} = -1.10276
$t_{critical}$ = ± 2.069

Hence we do not reject the null hypothesis and claim that i.e , good money's coefficient is statistically not significant. Or in other words, good money does not have an impact on the economic rate of return.

2. H_0 : $\beta_3 = 0$
   H_a : $\beta_3 \neq 0$

t_{stat} = -0.27986
$t_{critical}$ = ± 2.069

We do not reject the null hypothesis and claim that gross operating capital might not have an impact on the economic rate of return.

3. $H_0 : \beta_4 = 0$
   $H_a : \beta_4 \neq 0$
   $t_{stat} = -0.47094$
   $t_{critical} = \pm 2.069$

We do not reject the null hypothesis.

4. $H_0 : \beta_5 = 0$
   $H_a : \beta_5 \neq 0$
   $t_{stat} = -0.90911$
   $t_{critical} = \pm 2.069$

We do not reject the null hypothesis.

5. $H_0 : \beta_6 = 0$
   $H_a : \beta_6 \neq 0$
   $t_{stat} = 2.5637$
   $t_{critical} = \pm 2.069$

Since $t_{critical} < t_{stat}$,

We reject the null hypothesis and claim that $\beta_6 \neq 0$ i.e., the coefficient for EBIT return is statistically significant. Any change in the EBIT return will have a positive impact on the economic rate of return.

6. $H_0 : \beta_7 = 0$
   $H_a : \beta_7 \neq 0$
   $t_{stat} = 2.97266$
   $t_{critical} = \pm 2.069$

Since $t_{stat} > t_{critical}$, we reject the null hypothesis and claim that total debt turnover is statistically significant in our model and affects the economic rate of return.

NOTE: The null hypothesis which haven't been rejected might give some other result when we take other sample hence we cannot comment with full precision that good money, gross operating capital, operating gross margin and cash flow will not affect the economic rate of return.

INTERPRETATION OF REGRESSION STATISTIC

Given the value of $R^2 = 0.683331734$, it explains that 68% of variation in the sample data can be explained through the regression line developed in the model while the rest accounts for the unexplained.

To check for the same we will set up the hypothesis as below:

$H_0 : R^2 = 0$
$H_a : R^2 \neq 0$

$$F_{(0.05,\,6,\,23)} = \frac{R^2/k-1}{1-R^2/n-k}$$

$$= 8.27186867$$

$$F_{critical} = 7.66515$$

Hence $F_{stat} > F_{critical}$ and we reject the null hypothesis that all partial slopes are simultaneously equal to zero. And thus we claim that collectively all the six variables have an impact on the economic rate of return (ERR) although individually some of them may not affect the ERR.

CONCLUSION

Thus, the model developed in this paper has shown the interesting result that although we analyzed that operating capital, good money, operating gross margin and cash flow might not affect the ERR but still these are important for the analysis and computation of the same collectively.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.82663882
R Square	0.68333173
Adjusted R Square	0.60072262
Standard Error	0.05529584
Observations	30

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	0.151753879	0.0252923	8.271869	7.66515E-05
Residual	23	0.070325488	0.0030576		
Total	29	0.222079367			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
	-0.01710591	0.036661237	-0.4665938	0.64518	-0.092945453	0.058733642	-0.092945453	0.058733642
good money	-0.04958866	0.044967363	-1.10277	0.281533	-0.142610736	0.04343342	-0.142610736	0.04343342
Gross operating capital	-1.2216E-09	4.36507E-09	-0.2798645	0.782083	-1.02515E-08	7.80821E-09	-1.02515E-08	7.80821E-09
operating gross margin return	-0.20705904	0.439666744	-0.4709454	0.642116	-1.116579	0.70246091	-1.116579	0.70246091
cash flow	-0.48383139	0.532201659	-0.9091129	0.372719	-1.584774402	0.617111624	-1.584774402	0.617111624
EBIT margin	1.58307827	0.617481343	2.563767	0.017359	0.305720789	2.860435746	0.305720789	2.860435746
total debt turnover	0.03651366	0.012283147	2.9726633	0.006813	0.011104035	0.061923287	0.011104035	0.061923287

No	Economic rate of return	good money	Gross operating capital	operating gross margin return	cash flow	EBIT margin	total debt turnover
1	0.056	0.442	10,383,120	0.087	0.057	0.036	3.513
2	0.076	0.022	9869544	0.07	0.027	0.042	2.565
3	0.227	1	26685671	0.249	0.136	0.152	5.201
4	0.041	0.003	12138277	0.11	0.024	0.076	1.4
5	0.063	0.06	12032959	0.096	0.056	0.037	1.704
6	0.077	0.004	10798008	0.083	0.012	0.08	0.905
7	0.032	0.007	10696810	0.112	0.052	0.047	1.601
8	0.281	2.452	23165418	0.212	0.194	0.165	9.502
9	0.047	0.006	5421437	0.058	0.027	0.025	1.807
10	0.174	0.043	13324530	0.132	0.063	0.117	1.937
11	0.127	0.062	14044440	0.154	0.039	0.105	1.355
12	0.11	0.006	13390931	0.149	0.058	0.096	1.344
13	0.06	0.04	1492526	0.024	0.007	0.012	3.051
14	0.245	0.025	20313159	0.227	0.046	0.179	1.358
15	0.066	0.03	29643236	0.542	0.246	0.278	1.357
16	0.047	0.044	3735283	0.053	0.023	0.017	3.479
17	0.122	0.087	13251207	0.153	0.083	0.094	3.6
18	0.004	0.095	3989975	0.046	0.057	0.004	3
19	0.135	0.177	14794181	0.222	0.034	0.136	0.703
20	0.163	0.165	11972850	0.144	0.087	0.115	2.385
21	0.06	0.044	3873616	0.082	0.023	0.03	1.4
22	0.066	0.009	9019110	0.108	0.059	0.062	1.338
23	0.116	0.164	3811847	0.056	0.003	0.043	1.878
24	0.416	0.347	14421802	0.191	0.086	0.143	6.435
25	0.09	0.004	14018015	0.207	0.11	0.073	1.116
26	0.15	0.074	11856849	0.159	0.061	0.099	1.243
27	0.136	0.261	8376274	0.194	0.064	0.078	1.706
28	0.137	0.025	15355836	0.279	0.092	0.132	0.795
29	0.229	0.058	19331352	0.287	0.18	0.139	2.343
30	0.12	0.346	4741264	0.073	0.039	0.046	3.295

RESIDUAL OUTPUT

Observation	*Predicted Economic rate of return*	*Residuals*
1	0.087962373	-0.031962373
2	0.102335473	-0.026335473
3	0.20837779	0.01862221
4	0.104961486	-0.063961486
5	0.039039915	0.023960085
6	0.106203831	-0.029203831
7	0.053992648	-0.021992648
8	0.303404079	-0.022404079
9	0.056457849	-0.009457849
10	0.162618101	0.011381899
11	0.127605218	-0.000605218
12	0.108373673	0.001626327
13	0.101131118	-0.041131118
14	0.220537154	0.024462846
15	0.203589679	-0.137589679
16	0.10799017	-0.06099017
17	0.170812324	-0.048812324
18	0.041964811	-0.037964811
19	0.134594279	0.000405721
20	0.157314838	0.005685162
21	0.046484583	0.013515417
22	0.067527495	-0.001527495
23	0.093703113	0.022296887
24	0.328256566	0.087743434
25	0.025802215	0.064197785
26	0.104414993	0.045585007
27	0.074356505	0.061643495
28	0.098607979	0.038392021
29	0.115486009	0.113513991
30	0.119093733	0.000906267

THE END