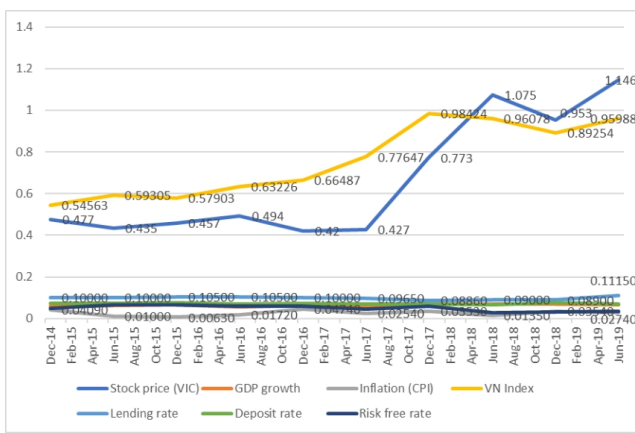


period from 2014-2015 have impacts on Viet Nam economy. Therefore, we could assume Vingroup stock price in Viet Nam as a function depending on these macro-economic factors in the US and in VN.

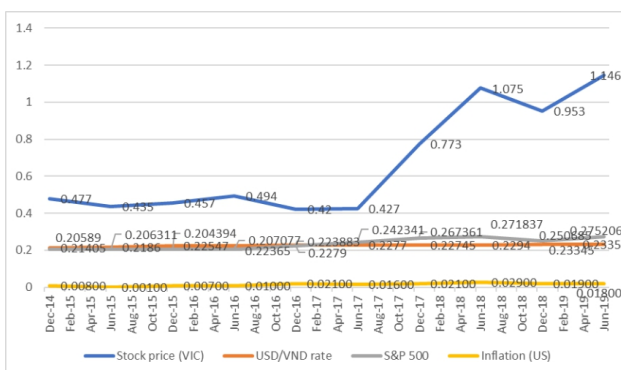
Now, we see in the below chart 9 showing all above internal macro factors and VIC stock price, in Dec 2016, although VN Index increased slightly, VIC stock price decreased a little.

Chart 9 – Inflation in Myanmar, inflation in VN and in the US (VnIndex unit: 1,000,000 VND, VIC stock price unit: 100,000 VND)



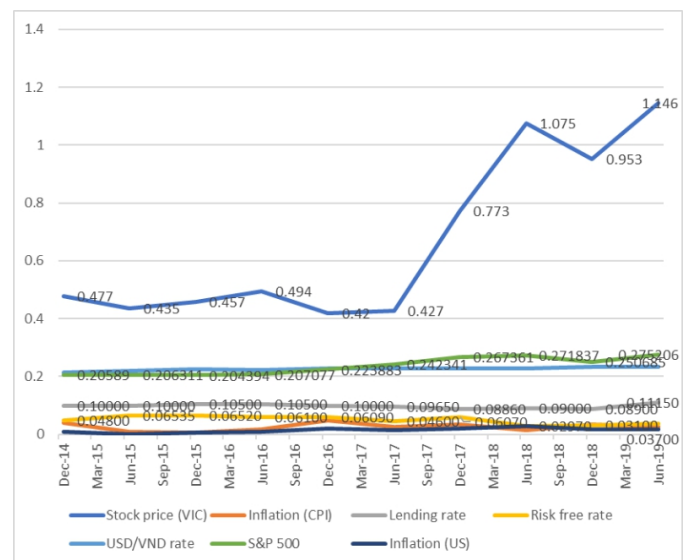
Next we see the visual relationship between external factors (macro factors in the US) and VIC stock price in the below chart 10. It shows us that, in around June 2015, VIC stock price has a little decrease.

Chart 10 – Exchange rate, S&P 500, Inflation in the US vs. VIC stock price (macro factors calculated at the equivalent ratio for easy comparison)



Last but not least, we see a mix of internal and external factors and their relationship to VIC stock price in the below chart 11. It shows us that, VIC stock price followed the same trend as other macro factors in VN and in USA and esp. In June 2016, and June 2018, VIC stock price has increases little much.

Chart 11 – in the US vs. VIC stock price (macro factors calculated at the equivalent ratio for easy comparison)



On the other hand, we could see statistical results with Eview in the below table with 3 variables:

Table 1 – Statistical results for internal and external macro-economic variables

	Stock price (VIC)	Inflation (CPI)	Lending rate	Risk free rate	USD/VND rate	S&P 500	Inflation (US)
Mean	0.6657	0.02588	0.09856	0.05044	0.226117	0.235499	0.015
Median	0.4855	0.0264	0.1	0.05433	0.227575	0.233112	0.017
Maximum	1.146	0.0474	0.1115	0.06533	0.2335	0.275206	0.029
Minimum	0.42	0.0063	0.0886	0.0297	0.21405	0.204394	0.001
Stand.dev	0.29278	0.013884	0.007636	0.0140	0.006102	0.029493	0.008353

The above table shows us standard deviation of VIC stock price in Vietnam is the highest (0.29), standard deviation of S&P 500 in the US is the second highest (0.03) and standard deviation of USD/VND exchange rate is the lowest (0.006).

If we want to see correlation matrix of six(6) internal macro variables, Eview generate the below result in table 2:

Table 2 – Covariance matrix for six (6) internal macro-economic variables (GDP growth, inflation in VN, VN index, Risk free rate, lending and deposit rates)

	GDPGRO...	INFLATIO...	VNINDEX	RF_RATE	LENDINGR...	DEPOSIT ...	C
GDPGRO...	1605766	102734.8	-47.02845	42884.23	36204.41	-1641944	41710.68
INFLATIO...	102734.8	80715.57	-2.797794	10557.79	29443.82	-89321.24	-3603.500
VNINDEX	-47.02845	-2.797794	0.002459	4.781649	6.108154	70.05956	-4.630697
RF_RATE	42884.23	10557.79	4.781649	116345.2	517.3589	-11672.99	-11743.13
LENDINGR...	36204.41	29443.82	6.108154	517.3589	311173.8	128855.3	-47631.98
DEPOSIT ...	-1641944	-89321.24	70.05956	-11672.99	128855.3	3490767	-207295.5
C	41710.68	-3603.500	-4.630697	-11743.13	-47631.98	-207295.5	21057.59

The above table 2 shows us that correlation among six macro variables (total internal macro economic factors). An increase in GDP growth and increase in inflation might lead to a decrease in VN Index. Whereas an increase in deposit interest rates might lead to decrease in investment and reduce GDP growth rate. Furthermore, when deposit rate increases, risk free rate tends to decline.

The below table 3 shows us that correlation among six (6) macro economic variables (both internal and external macro factors). Inflation in VN has a negative correlation with inflation in the US, lending rate in VN and risk free rate (government bond) and has a positive correlation with exchange rate and S&P 500 index. Whereas lending rate in Viet Nam has a negative correlation with inflation in VN, risk free rate and exchange rate and it has a positive correlation with inflation in the US and S&P 500. Last but not least, risk free rate has a negative correlation with inflation in VN and exchange rate and it has a positive correlation with inflation in the US and S&P 500.

Hence, a reduction in risk free rate may lead to an increase in lending rate. A reduction in risk free rate might stimulate VN inflation. And an increase in inflation may lead to a reduction in lending rate to stimulate demand and investment.

Table 3 – Correlation matrix for 6 macro economic variables (inflation in VN and the US, lending rate, risk free rate, exchange rate, S&P500)

	INFLATIO...	LENDINGR...	RF_RATE	USD_VND...	SP500	INFLATIO...	C
INFLATIO...	278031.8	-13975.43	-2088.807	1.815179	2.407377	-336933.4	-47372.21
LENDINGR...	-13975.43	1109150	-13332.25	-6.211770	3.099744	731668.9	13900.69
RF_RATE	-2088.807	-13332.25	411359.6	-0.079808	10.47141	121678.5	-44080.01
USD_VND...	1.815179	-6.211770	-0.079808	0.000331	-0.000321	-11.79963	-5.981657
SP500	2.407377	3.099744	10.47141	-0.000321	0.002181	-35.90159	1.757697
INFLATIO...	-336933.4	731668.9	121678.5	-11.79963	-35.90159	2930692	237860.5
C	-47372.21	13900.69	-44080.01	-5.981657	1.757697	237860.5	129668.3

3.3 Regression analysis and main results

In this section, we will find out the relationship between macro economic factors such as inflation in Viet Nam or Myanmar, inflation in USA and unemployment rates in Viet Nam or Myanmar.

A. Scenario 1: regression model with 2 variables : Inflation (CPI) in Viet Nam and VIC stock price.

Note: inflation in Viet Nam (INFLATION_CPI), C: constant

Using Eview give us the below results:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLATION_CPI	36.99844	745.4686	0.049631	0.9616
C	65.61248	21.64752	3.030947	0.0163

R-squared	0.000308	Mean dependent var	66.57000
Adjusted R-squared	-0.124654	S.D. dependent var	29.27802
S.E. of regression	31.04925	Akaike info criterion	9.885883
Sum squared resid	7712.446	Schwarz criterion	9.946400
Log likelihood	-47.42941	F-statistic	0.002463
Durbin-Watson stat	0.361381	Prob(F-statistic)	0.961633

Therefore, Stock price_VIC = 36.99 * Inflation_CPI + 65.6 (8.1), R² = 0.0003, SER = 31.04

$$(21.6) \quad (745.4)$$

(within the range of 10 observations of inflation as described in the above charts)

B. Scenario 2 - internal factors model: regression model with 3 variables : unemployment rate in Viet Nam, inflation in Viet Nam and inflation in the US:

Using Eview gives us the result:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDPGROWTH	1763.682	1272.256	1.386263	0.2150
INFLATION_CPI	-126.7315	389.2463	-0.325582	0.7558
VNINDEX	0.107378	0.040383	2.658998	0.0376
C	-124.7945	67.51514	-1.848393	0.1140

R-squared	0.807532	Mean dependent var	66.57000
Adjusted R-squared	0.711298	S.D. dependent var	29.27802
S.E. of regression	15.73137	Akaike info criterion	8.638365
Sum squared resid	1484.857	Schwarz criterion	8.759399
Log likelihood	-39.19183	F-statistic	8.391335
Durbin-Watson stat	1.402457	Prob(F-statistic)	0.014423

Therefore, Stockprice_VIC = 1763.6 * GPDgrowth – 126.7*Inflation_CPI + 0.1*VNindex -124.7 (8.2), R² = 0.8, SER = 15.7

$$(389.2) \quad (0.04) \quad (1272.2)$$

Hence, Vingroup stock price has a negative correlation with inflation in Vietnam, but has a positive correlation with GDP growth rate and VN Index in Viet Nam. Esp., it is highly positively affected by GDP growth rate and slightly positively affected by VNindex.

C. Scenario 3 - internal factors model: regression model with 3 variables: risk free rate in Vietnam (government bonds maturity 5 years), lending rate and deposit rate of Vietnam commercial banks:

Using Eview gives us the result:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RF_RATE	-1540.751	562.5359	-2.738938	0.0338
LENDINGRATE	131.4701	996.5784	0.131921	0.8994
DEPOSIT_RATE	-1517.343	2309.580	-0.656978	0.5356
C	239.9250	185.5767	1.292862	0.2436

R-squared	0.632092	Mean dependent var	66.57000
Adjusted R-squared	0.448138	S.D. dependent var	29.27802
S.E. of regression	21.74988	Akaike info criterion	9.286268
Sum squared resid	2838.345	Schwarz criterion	9.407302
Log likelihood	-42.43134	F-statistic	3.436141
Durbin-Watson stat	1.904653	Prob(F-statistic)	0.092587

Hence, Stock price_VIC = -1540.7 * Rf rate+ 131.4 * Lendingrate - 1517.3*Deposit_rate + 239.9 (8.3), R² = 0.63, SER = 21.7

$$(996.5) \quad (2309.5) \quad (562.5)$$

We find out Vingroup stock price has a negative correlation with risk free rate in VN and deposit rate of VN commercial banks, but has a positive correlation with lending rate in Vietnam (within a range of 10 observations from 2014-2019). When Rf and borrowing rate increase, VIC stock price tend to decrease due to investment capital decline into stock market. High lending rate, on the contrary, will not encourage firms to borrow money from banks, so they might invest in stock market.

D. Scenario 4 - total combination of 6 internal factors model: regression model with 6 internal variables: GDP growth, VN Inflation, VN Index, risk free rate in Vietnam (government bonds maturity 5 years), lending rate and deposit rate of Vietnam commercial banks:

Using Eview gives us the result:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDPGROWTH	2559.259	1267.188	2.019636	0.1367
INFLATION_CPI	-45.72084	284.1049	-0.160929	0.8824
VNINDEX	0.055131	0.049588	1.111795	0.3473
RF_RATE	-767.2811	341.0941	-2.249471	0.1100
LENDINGRATE	969.7973	557.8295	1.738519	0.1805
DEPOSIT_RATE	-1527.967	1868.359	-0.817812	0.4734
C	-85.84569	145.1123	-0.591581	0.5957

R-squared	0.952970	Mean dependent var	66.57000
Adjusted R-squared	0.858911	S.D. dependent var	29.27802
S.E. of regression	10.99736	Akaike info criterion	7.829215
Sum squared resid	362.8257	Schwarz criterion	8.041024
Log likelihood	-32.14607	F-statistic	10.13158
Durbin-Watson stat	2.581567	Prob(F-statistic)	0.042145

Variable	Coefficient	Std. Error	t-Statistic	Prob.
USD_VND_RATE	0.005252	0.015390	0.341237	0.7446
SP500	0.093021	0.039524	2.353498	0.0568
INFLATION_US	-691.2743	1295.680	-0.533522	0.6128
C	-260.8727	311.2972	-0.838018	0.4341

R-squared	0.749252	Mean dependent var	66.57000
Adjusted R-squared	0.623878	S.D. dependent var	29.27802
S.E. of regression	17.95585	Akaike info criterion	8.902883
Sum squared resid	1934.475	Schwarz criterion	9.023917
Log likelihood	-40.51442	F-statistic	5.976138
Durbin-Watson stat	1.064096	Prob(F-statistic)	0.031062

Hence, Stock price_VIC = 0.005 * USD_VND_rate + 0.09 * SP500 - 691.3*Inflation_US - 260.8 (8.5), R² = 0.75, SER = 17.9

Hence, Stock price_VIC = 2559.3*GDPgrowth - 45.7*Inflation_CPI +0.05*VNindex-767.3* Rf_rate+ 969.8 * Lendingrate - 1527.9*Deposit_rate -85.8 (8.4), (0.039) (1295.7) (0.015)

(284.1) (0.05) (1267.2)

(341.1) (557.8) (1868.3)

Therefore we see that Vingroup stock price has a negative correlation with risk free rate, inflation in VN and deposit rate of VN commercial banks, but has a positive correlation with GDP growth rate, VN Index and lending rate in Vietnam (within a range of 10 observations from 2014-2019). GDP growth, lending rate, deposit rate and Rf have highly impact on VIC stock price.

E. Scenario 5 - external factors model: regression model variables: risk free rate in Vietnam (government bonds maturity 5 years), lending rate and deposit rate of Vietnam commercial banks:

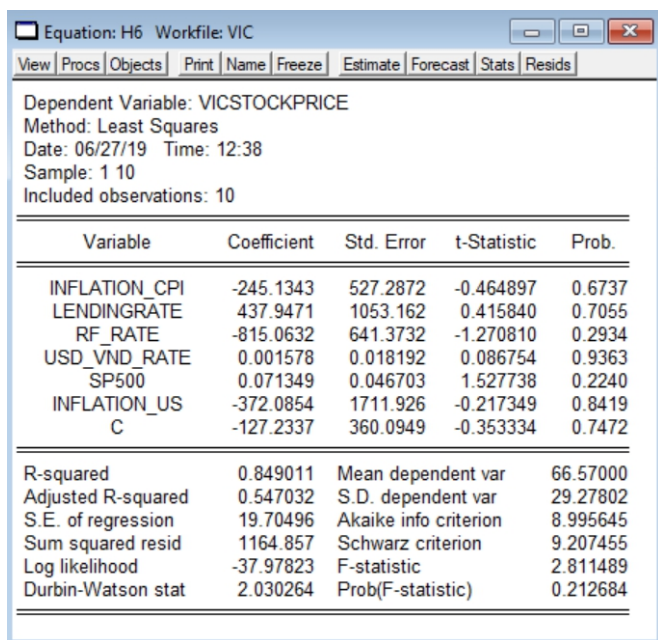
Using Eview gives us the result:

Here, the above equation shows us that Vingroup stock price has a negative correlation with inflation in the US, while it has a positive correlation with SP500 in the US and exchange rate (USD/VND) (within a range of 10 observations from 2014-2019). The US stock market and foreign exchange rate have slightly positively affect on VIC stock price. When USD/VD rate increases, foreign currency gains more value compared to VND and foreign investment into stock /financial market tends to increase, Vingroup stock price might increase slightly. On the contrary, decrease in inflation in the US will direct international capital flows into emerging markets including Vietnam, so VIC stock price might increase.

F. Scenario 6 - a mix of six (6) internal and external factors model: regression model with 3 internal variables: risk free rate in Vietnam (government bonds maturity 5 years), lending rate and inflation of

Vietnam, together with 3 external macro variables: SP 500, inflation in the US and USD/VND rate:

Using Eview gives us the result:



Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLATION_CPI	-245.1343	527.2872	-0.464897	0.6737
LENDINGRATE	437.9471	1053.162	0.415840	0.7055
RF_RATE	-815.0632	641.3732	-1.270810	0.2934
USD_VND_RATE	0.001578	0.018192	0.086754	0.9363
SP500	0.071349	0.046703	1.527738	0.2240
INFLATION_US	-372.0854	1711.926	-0.217349	0.8419
C	-127.2337	360.0949	-0.353334	0.7472

R-squared	0.849011	Mean dependent var	66.57000
Adjusted R-squared	0.547032	S.D. dependent var	29.27802
S.E. of regression	19.70496	Akaike info criterion	8.995645
Sum squared resid	1164.857	Schwarz criterion	9.207455
Log likelihood	-37.97823	F-statistic	2.811489
Durbin-Watson stat	2.030264	Prob(F-statistic)	0.212684

Hence, Stock price_VIC = -245.13 * Inflation_CPI + Lendingrate - 815.06*Rf rate USD_VND_rate+0.07*SP500 - 372.08*Inflation_US (7.6), R² = 0.84, SER = 19.7

$$\begin{aligned}
 & (1053.1) \qquad (641.4) \qquad (527.3) \\
 & (0.018) \qquad (0.05) \qquad (1711.9)
 \end{aligned}$$

Finally, the above equation enables us to figure out that Vingroup stock price has a negative correlation with inflation, risk free rate in Vietnam, and inflation in the US, while it has a positive correlation with Lending rate in Vietnam, SP500 in the US and exchange rate (USD/VND) (within a range of 10 observations from 2014-2019). In an interactive global financial markets, both inflation in VN and US has negatively affect on Vic stock price. It means that high inflation might harm the investment values and may not encourage the increase in stock price of Vingroup, and therefore

the whole stock market. Rf, Inflation in these 2 countries, and Lending rate are among factors that affect much more on Vingroup stock price.

4. Limitation of the model

Eview has advantages such as: analyzing data quickly, mange it efficiently, and good for econometric and statistical analysis. On the other hand, Eview can not give the absolutely correct correlation between variables in the model. Therefore, in this model, Eview can only provide us with results for reference.

5. Discussion for further research

We can add one more factor into our regression model, for example, unemployment rate. Or we can add foreign investment growth rate over years into our regression model in order to see the effects of these macro factors.

6 Conclusion and Policy suggestion

The government and authorities of Vietnam might consider controlling inflation and issuing proper policies in which risk free rate is controlled and not increasing too much in order to support stock price, in specific, and stock market in general. To do this, they need to pay attention to not only treasury bonds but also corporate bonds to created proper mechanisms and policies to attract more capital.

Macro economic and financial policies need to consider impacts of macro factors such as inflation in their countries and outside factors such as inflation in the US. Further more, lending interest rates and exchange rate need to be increased at a rational level, because stock price, and therefore stock market, has a positive correlation with lending rate and exchange rate. Hence, in credit /loan policy, bank system and relevant government companies need to control and balance the capital source to limit the using of short-term capital to finance long-term projects.

Because inflation in the US has a negative correlation with stock price and therefore stock market in Viet Nam, the government of Viet Nam need to implement suitable macro policies if inflation in the US increases or decreases. One lesson from Vingroup company development is balancing the importance of both internal and foreign investment capital. In order to

develop real estate market, it needs not only bank capital, investors pre-payment, but also stock market channel, corporate bond market, and foreign investment.

Viet Nam stock market has been becoming a competitive capital channel compared to commercial bank system and attracted more than 86,000 b VND for companies in 2018, together with 2,75 b USD from net foreign investment flow. Hence, the government and authorities in Viet Nam can issue proper policies which can protect their market economy, encourage and develop stock market to reduce pressure on bank system, increase its size to 100% GDP in period from 2020-2022 and reduce negative impacts from the global recession.

Last but not least, this study provides a regression model with its equation which helps investors to seek financial gains in the real estate industry and stock market based on observing fluctuations in macro policies and macro economic (internal and external) variables or data as we saw in the above equations.

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Research

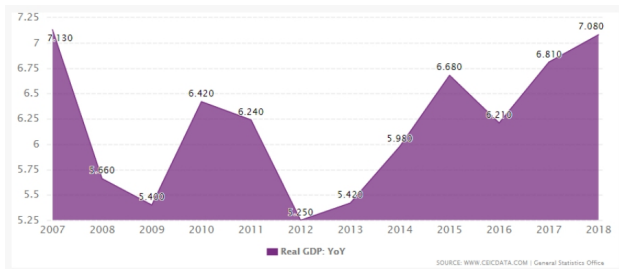
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Exhibit

Exhibit 1 – GDP growth rate past 10 years (2007-2018) in Vietnam



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