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An Analysis on Risk Behavior on Selected Indicators on the Philippine Stock Exchange Index

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Abstract:

This study looks into the market risk behavior of the Philippine Stock Exchange with respect to how singular business sectors behave. It attempts to bring into common-term understanding the interplay of the market risk behavior as depicted in the workings of the Philippine Stock Exchange, in particular, and Philippine business and industry in general.

The study primarily relied on secondary data gathered from daily stock price indices available from the Philippine Stock Exchange. It determines the influence of financial, industrial, oil, mining and property sectors to the volatility of the Philippine stock market using time series data. A total of 2313 days were collected samples from the January 1999 to October 2015.

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It is found out that there is a strong multiple correlations between the factors of the Philippine Stock Market and it shows proof that the combined effects of the determinants can predict 98.6% of PSEi daily activities.

Key words: Multiple Linear Regression, Philippine Stock Exchange Index, Risk, Time Series Analysis

INTRODUCTION

Every rational investor would want to maximize returns in his investments. He can choose to invest in stocks, short-term riskless assets, long-term treasury bonds, corporate bonds, or even any other assets that returns the rate of inflation. These assets have varying levels of risks and returns. Of all these possible areas of investment, the stock market offers the greatest returns, but is also exposed to the greatest degree of risks. Risk is a much-dissected concept. According to Akrani (2012) in finance, risks are generally classified into two: systematic risk, or market risks, and unsystematic risks, or firm-specific risks.

The stock market is filled with the coexistence of high-risk and high-yield characteristics. As a barometer of the stock market, the stock index is an important reference for investors to make investment strategies. Stock prediction has still been a hot topic and there have been a lot of researches on the forecast of stock index. However forecasting is tricky and may lead you to uncertainty for it needs too much risk in deriving the desire outcome. Inconsistency of some factors such as interest rates and foreign exchange rates, is one of the reasons why forecasting is a sort of dilemma.

This study looks into the market risk behavior of the Philippine Stock Exchange with respect to how singular business sectors behave.

OBJECTIVES OF THE STUDY

The study aims to determine the critical industry sectors that influence the movement of the Philippine stock market, evaluate the behavior of these industry indices along with the movement or changes in the Philippines stock market indicator, and evaluate how industry influence on the growth of the Philippine stock market as they manage the market risk.

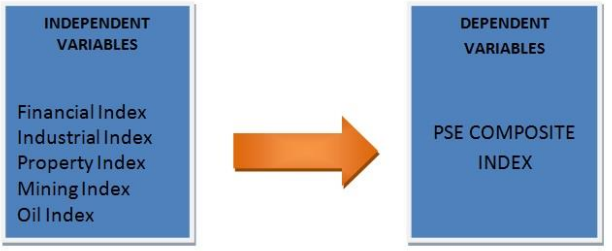

Figure 1: Research Paradigm

STATEMENT OF THE PROBLEM

This study is concerned about the influence of selected indicators on the risk behavior of the Philippine Stock Exchange. This study sought to answer the specific statements:

1. Determine the statistically significant selected industry or industries that influence the movement of the Philippine stock the companies making up these sectors and the effect of these industry indices on the Philippine stock market indicator.
2. Evaluate the predictability of the PSEi model.

SCOPE AND LIMITATIONS

The study is more of evaluative rather than exploratory, although it does attempt to test the validity of the PSEi as

representative of the stock market in general when only the 30 best-performing stocks are represented in that basket of stocks. What it attempted to look into is to consider the measure of the economic beta coefficient to capture the risk behavior of portfolio indices within the Capital Asset Pricing Model (CAPM) theory framework. This study only focused on assessing purely market risk influence contributed by specific industry sectors active in the Philippine Stock Exchange. The study considered purely aggregate data of industry sectors. No attempt was made to look into firm-specific data or relationships. Thus, the estimation model may not be the appropriate model with which to derive firm-specific conclusions.

Furthermore, the researchers did not compute for the pricing of the stocks since it was already provided by the Philippine Stock Exchange.

REVIEW OF RELATED LITERATURE AND STUDIES

The stock index reflects the fluctuation of the stock market. It is filled with the co-existence of high-risk and high-yield characteristics. As a barometer of the stock market, the stock index is an important reference for investors to make investment strategies. However, the stock price index is influenced by many factors such as the economic situation, policy changes, and emergency. Although faced with complicated challenges, the forecast of stock index has still attracted the attention of many industrial experts and scholars (Dai & Han 2014).

The globalization of economies has created an environment in which stock markets around the world can be affected by developments in various regions. In China, listed companies have played an important role in the economic and social development of a country. These companies are the main

force of national economy, the important sources of national wealth, and the engine of industrial transformation and upgrading. Meanwhile, they also play an increasingly vital role in expanding employment, meeting the diverse and individual needs of residents, achieving social specialization and collaboration, nurturing entrepreneurs, and technological innovation. As a result of better prospects for development, more and more investors choose to invest in listed companies. However, in the face of the increasingly competitive international economic environment, the risk faced by the listed companies becomes diversified, leading the shareholders to begin to pay attention to the efficiency in using funds of the invested companies. Therefore, under the condition of severe financial constraints, how to choose appropriate financing way and the proportion and form a reasonable financing structure and achieve higher efficiency in using funds and profit rate under the limited funds supply will become the main problem of the listed companies (Dong, Zhu et al 2016).

However, the Philippine stock market, in particular, has found itself moving in step with the US market for the better part of its existence, owing to the Philippine economy's dependence on the world's largest economy. It is one of the earliest exchanges established in Asia and has a rich history of events that have contributed to its development. It is also considered as a barometer of future economic performance, and for years has served its primary functions of facilitating the dual role of capital raising for companies and trading of shares by investors (Crisostomo, Padilla, & Visda 2013).

According to the HSBC (2015) study, Philippines will become the 16th largest economy by 2050. It was expected to post the biggest leap in terms of economic ranking over the next four decades. Nguyen (2015) stated that it is expected that the economy of the Philippines will expand by 6.0% on this year even as national output registered its weakest performance in

over three years at 5.2% last January-March on poor government expenditures and flagging exports.

Despite of this, the forecast of stock index has still attracted the attention of many industrial experts and scholars. The bulk of research in modern economics has been built on the notion that human beings are rational agents who attempt to maximize wealth while minimizing risk. These agents carefully assess the risk and return of all possible investment options to arrive at an investment portfolio that suits their level of risk aversion (Barber and Odean 2013).

In the June 2009 survey of the Social Weather Stations (cited in Crisostomo et al, 2013), it reported that only 1.0% of the Filipinos said that they own any stock. This is consistent with the number of investor accounts opened in stockbrokerage firms, as earlier cited that approximately, only 1/2 of 1.0% of the country's population are stock market investors, which is equivalent to 525,850 accounts. This number could be lower as there are some investors that have accounts in other brokers and thus counted several times.

There are many factors that possibly explain why Philippine's investing population is only minute relative to the total population. One is that the prevalence of poverty in the country could mean that those who do not have the funds to invest could not be expected to participate in the stock market as investors.

According to the first Consumer Finance Survey (CFS) conducted by the BSP in 2009, only 21.5% of the households have bank accounts, while only a very small percentage of these owned securities and investment accounts such as stocks, bonds, mutual funds, and unit investment trust funds (0.4%). In NCR, 0.8% had invested in any of these financial instruments while in AONCR, the percentage was negligible.

The PSE, through its Stock Market Investor Profile (SMIP) report, only began tracking the number of investor

accounts and the profile of these investors in 2008. The results every year have shown that, while investors have been growing, the overall investor base of 525,850 investor accounts has not reached a level that would indicate a widespread participation in the local market. This total barely accounts for half a percent of the estimated 100 million Filipino population, and may indicate that stock market investment continues to be limited to those which have a high level of disposable income and educational background to understand how the market works.

According to Balaba (2008) Philippine stock index can be determined the influence of the financial, industrial, oil, and property sectors to the volatility of the Philippine Stock Market. Embraced concepts on this theory rest on the Capital Asset Pricing Model (CAPM) developed by Jack Treynor in 1961, William Sharpe in 1964, John Lintner in 1965, and Jan Mossin in 1966, as offshoot to Harry Markowitz's work in 1952 on diversification and modern portfolio theory. The beta coefficient as a measure of market risk is widely associated with the development of the CAPM.

Bradfield (2003) when he proposed that some stocks are more sensitive to movements of the overall market index, and the beta coefficient represents this measure of riskiness of some stocks to changes in the overall market index is very close to the simple model presented.

De Ocampo (2004) establishes the role of the beta coefficient in explaining returns in the Philippine equity market arguing that a given stock portfolio may perform better when invested in high beta stocks when the market is up and in low beta stocks when the market is down.

Campbell et al. (2005) indicate that cash flow fundamentals of growth and value companies determine high betas of growth stocks and value stocks. They submit that accounting measures of firm-level risk have predictive power for firms' betas with market-wide cash flows and this predictive

power arises from the behavior of firms' cash flows. The systematic risks of stocks with similar accounting characteristics are primarily driven by the systematic risks of their fundamentals.

For the most part, it has been a long history in relating to risk and returns in stock market in the literature in the area of risk analysis of the financial markets. There has been much discussion on the merits and limitations of the Capital Asset Pricing Model, specifically the beta coefficient as a measure of risk, in explaining behavior of stock market returns and stock market volatilities.

METHODOLOGY

Research Design

The researcher used the descriptive research design. This method describes the nature of the situation as it exists at the time of the study and explores the causes of particular phenomena. The process involves describing, analyzing, and interpreting the data that now exists. Thus, it shows comparison and contrast, and attempts to discover relationship between existing non-manipulated variables.

Population and Sample

As of 17 November 2015, the Philippine Stock Exchange has a total of 241 listed companies. Stocks listed in the PSE are classified into six sectors; namely, Financials, Industrial, Holding Firms, Property, Services, and Mining & Oil.

The criteria for selecting the key industries are as follows: (1) the companies should belong to the top performers in the stock market; (2) they must have a complete set of daily data from January 1999 to October 2015; and (3) there must be no negative values in their daily stock index within the test period. It is argued that the relative strengths of these

industries contribute to the robustness or weakness, as the case may be, of the Philippine stock market. A total of 2313 days were collected as samples.

Holding Firms and Services are not included due to the above criteria.

Research Instrument

Observation of data on a daily basis within an eighteen-year period from 1999-2015 was done. Secondary data analysis of 2349 samples from sectors and PSEi were utilized for the multiple regression model.

Statistical Tool

Time series analyses were conducted to determine the daily performance of the Philippine stock market against the above mentioned 5 sectors.

Statistical Treatment

Multiple Linear Regression is a statistical technique that uses several explanatory (independent) variables to predict the outcome of a response (dependent) variable. The goal of multiple linear regression is to model the relationship between the explanatory and response variables. It takes a group of random variables and tries to find a mathematical relationship between them. The model creates a relationship in the form of a straight line (linear) that best approximates all the individual data points. The multiple linear regression equation is as follows:

$$\hat{Y} = \beta_0 + \beta_1 \mathrm{X}_1 + \beta_2 \mathrm{X}_2 + \beta_3 \mathrm{X}_3 + ... + \beta_p \mathrm{X}_p$$

Where $\hat{Y}$ is the predicted or expected value of the dependent variable, X_1 through X_p are p distinct independent or predictor variables, b_0 is the value of Y when all of the independent

variables (X_1through X_p) are equal to zero, and b_1 through b_p are the estimated regression coefficients.

Under the descriptive research design, correlation and time series analysis were used to explain the Philippine Stock Exchange phenomena in the multiple regression process:

$$PSEi = \alpha + \beta_1 industrial + \beta_2 Financial + \beta_3 Property + \beta_4 MiningOil$$

It looked into the influence of five selected industry sectors listed in the Philippine stock market. Data which capture the industry stock price index were collected from the Philippine Stock Exchange for the period of 2007-2015. Five sectors were considered in this study: *(1) financial sector, (2) industrial sector, (3) property sector, (4) mining and oil sector*.

Data Gathering Procedure

The researchers were able to gather the data or the price of the stocks by sending a request letter to the Philippine Stocks Exchange.

RESULTS AND DISCUSSION

1. Determine the statistically significant selected industry or industries that influence the movement of the Philippine stock the companies making up these sectors and the effect of these industry indices on the Philippine stock market indicator.

Figure 2: Regression Result

	Constant	Finance	Industry	Oil	Property
b	-88.925	0.412	0.487	-1.809	0.492
Se b	15.739	0.010	0.003	0.839	0.006
t	-5.650	41.896	163.304	-2.156	78.625
sig.	0.000	0.000	0.000	0.031	0.000
D -W =	1.981	R =	0.993	Std error=	3.317
		ADJ R^2 =	0.986	F =	31983.39

Statistical standard (low standard of error of the b-coefficients, high t-values, high significance level) for accepting the coefficients (b) for each determinant (finance, industrial, oil, and property) showed evidence of significance at 1% and 5%, respectively. The level of significance (0.000) shows that the study's chance of being wrong could be 1 out of a thousand and (.05) 5 out of a hundred.

The adjusted R-square (Adj R2 = 0.986) shows proof that the combined effects of the determinants can ably predict 98.6% of PSEi daily activities. The predicted Phisix model closely approximates the actual data of the PSEi as evidenced by low standard error of the estimates (std error = 3.317) for the whole regression and the high F – value (= 31983.39 > 10). The Prais-Winsten method for correcting autocorrelation of the variables shows absence of autocorrelation (DW = 1.981 > 1.831).

The regression results showed that finance, industrial, and property influenced positively the growth in PSEi. Mining is not statistically significant in the model and was dropped from the prediction model. For every unit increase in finance, industrial and property, the PSEi increased by 0.412, 0.487 and 0.492 index points, respectively. As previously discussed above, the finance sector provided the necessary capital stock to the different sectors that propel the daily growth of the money market and the economy, in the long run. The re-invested capital (in the form of productive and provident loans) helped the industry to produce the consumer goods of the economy. These consumer goods were allocated and distributed in the property sector (households and private sectors). The average combined unit increase of finance, industrial and property to PSEi growth is 1.795.44 index points. This means that the three sectors carry the weight of pushing the PSEi from 1999 – 2015.

This means that the combined activities of finance, industrial, and property sectors pushed up the daily trading

activities of PSEi within 1999 – 2015. There is strong multiple correlation (R = 0.993) to Philippine Stock Market.

1. Evaluate the predictability of the Phisix model.

Abbreviated actual and predicted values of PSEi (including the residual).

day	Phisix	predictd	resid	day	Phisix	predictd	resid	day	Phisix	predictd	resid
1	3170.56	3213.68	-43.12	46	3292.30	3293.30	-1.00	91	2694.40	2692.28	2.12
2	3154.48	3170.74	-16.26	47	3279.82	3284.63	-4.81	92	2682.10	2679.16	2.94
3	3169.26	3169.59	-0.33	48	3286.45	3286.27	0.18	93	2671.39	2669.98	1.41
4	3186.37	3190.39	-4.02	49	3289.34	3290.21	-0.87	94	2671.39	2671.57	-0.18
5	3195.47	3192.65	2.82	50	3280.99	3279.19	1.80	95	2677.11	2673.67	3.44
6	3206.99	3203.49	3.50	51	3270.64	3271.27	-0.63	96	2705.92	2707.74	-1.82
7	3223.36	3224.53	-1.17	52	3261.24	3263.27	-2.03	97	2631.09	2639.48	-8.39
8	3262.14	3259.73	2.41	53	3234.79	3232.35	2.44	98	2576.13	2572.05	4.08
9	3270.31	3271.68	-1.37	54	3231.86	3227.52	4.34	99	2509.36	2500.77	8.59
10	3261.72	3263.67	-1.95	55	3215.64	3215.89	-0.25	100	2499.38	2498.46	0.92
11	3258.52	3256.19	2.33	56	3200.61	3198.29	2.32	101	2538.97	2537.13	1.84
12	3290.19	3291.73	-1.54	57	3206.67	3205.77	0.90	102	2586.69	2588.72	-2.03
13	3294.31	3297.43	-3.12	58	3201.65	3202.24	-0.59	103	2598.20	2614.30	-16.10
14	3280.85	3279.78	1.07	59	3222.46	3220.88	1.58	104	2598.20	2598.41	-0.21
15	3279.23	3281.48	-2.25	60	3204.12	3207.80	-3.68	105	2710.91	2695.20	15.71
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2296	1954.29	1956.57	-2.28	2314	2072.05	2071.55	0.50	2332	2113.60	2112.23	1.37
2297	1944.62	1946.49	-1.87	2315	2063.74	2065.25	-1.51	2333	2100.25	2102.40	-2.15
2298	1922.50	1921.74	0.76	2316	2060.75	2062.45	-1.70	2334	2101.40	2101.03	0.37
2299	1917.47	1916.40	1.07	2317	2056.13	2058.00	-1.87	2335	2099.04	2101.52	-2.48
2300	1927.49	1927.80	-0.31	2318	2079.98	2079.86	0.12	2336	2097.25	2111.77	-14.52
2301	1934.55	1933.86	0.69	2319	2126.56	2130.51	-3.95	2337	2071.67	2069.42	2.25
2302	1941.46	1944.07	-2.61	2320	2130.93	2131.91	-0.98	2338	2047.56	2045.07	2.49
2303	1960.22	1961.03	-0.81	2321	2103.75	2102.51	1.24	2339	2024.70	2022.15	2.55
2304	1960.22	1960.46	-0.24	2322	2119.65	2119.72	-0.07	2340	2062.78	2067.75	-4.97
2305	1960.22	1960.46	-0.24	2323	2106.10	2104.50	1.60	2341	2075.05	2078.91	-3.86
2306	2007.12	2007.63	-0.51	2324	2106.10	2106.39	-0.29	2342	2078.58	2081.68	-3.10
2307	2031.70	2034.73	-3.03	2325	2107.36	2107.50	-0.14	2343	2111.46	2113.73	-2.27
2308	2031.70	2031.95	-0.25	2326	2099.74	2098.96	0.78	2344	2111.46	2111.82	-0.36
2309	2030.05	2027.75	2.30	2327	2086.18	2088.49	-2.31	2345	2088.60	2089.87	-1.27
2310	2046.93	2045.79	1.14	2328	2114.89	2112.74	2.15	2346	2067.32	2061.46	5.86
2311	2097.30	2101.52	-4.22	2329	2116.30	2114.22	2.08	2347	2096.04	2103.13	-7.09
2312	2099.14	2100.83	-1.69	2330	2099.15	2098.72	0.43	2348	2096.04	2096.40	-0.36
2313	2092.68	2095.71	-3.03	2331	2103.42	2104.28	-0.86	2349	2096.04	2096.40	-0.36

Table 1: Predictive Power of the Estimated PSEi Model.

The predicted values of the PSEi model are comparably close to the actual values of the 2349 daily PSE index. The closeness of the actual and predicted values indicates a small standard error of estimate (SEE) of about 3.317 index points (see Table 1, Figures 4 and 5) around the means of the PSE index. The small residual indicates that the difference between the actual and predicted values of PSEi is close to zero.

Figure 4. Predictive Power of the PSEi Model

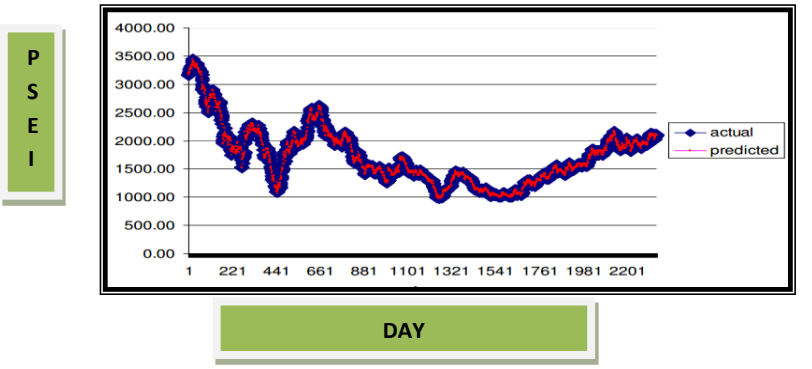
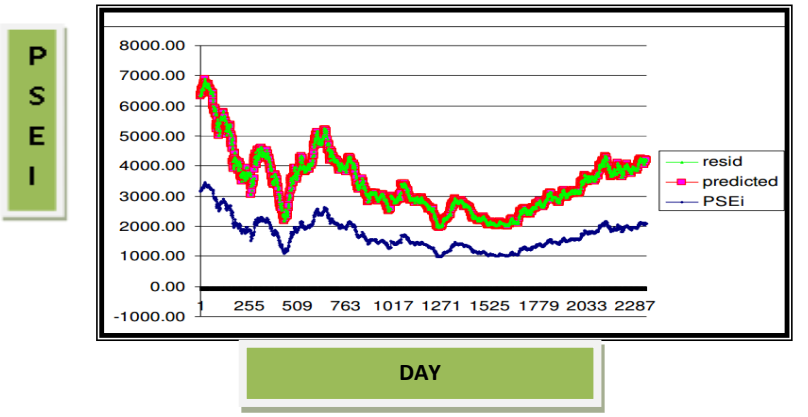


Figure 5. Actual, Predicted, and Residual of PSEi Mode



The study found that the derived PSEi prediction power approximates well the actual data. Table 1 shows the predictive power of the PSEi Model. It is presented in abbreviated form to minimize on space. The 2349 data set is presented in the appendix. Figure 3 shows the estimated PSEi model superimposed with the actual observations. Figure 4 exhibits individual daily pattern of actual and predicted PSEi together with the residual term.

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The results of the analyses done on the data gathered for the purpose of determining the risk relationship of the business and industry sectors to the behavior of the Philippine Stock Exchange Index yield a definitive argument for the problem stated at the beginning of this study.

This study showed that in the case of the Philippine model, the risk behavior of the Philippine stock market as measured by the PSEi, does not behave linearly. Because of the use of the SPSS software, however, the author was able to proceed to test the predictability of the CAPM-derived model to ascertain and derive sound conclusions. These are as follows:

1. Research and analyses revealed that there is clearly a determining relationship between the risk behaviors of four of the five stock market sectors with the Philippine Stock Exchange Composite Index. These are the property, industrial, financial, and oil sectors. These sectors contribute to the riskiness of the Philippine Stock Exchange in terms of the market risk common to the entire Philippine business and industry. The mining sector showed no significant effect. From the viewpoint of investing such risk behavior, these sectors points to higher returns potential as the PSEi strengthen. It must be recalled that the Asian Financial Crisis of 2007 was said to be spawned by risky investments in the property sector. But while there appears to be greater risk in the property sector, there is also higher return expected on such investments.
2. It was shown that the PSEi model and the conclusions derived from it reflect significant risk behavior between variables. There is strong evidence to support the

contention that indeed the PSei reflects the behavior of Philippine business and industry and not just the best-performing stocks. The PSEi is driven to perform or under-perform, as it is, by the performance of industry sectors in their management of the market risk.

3. Clearly, the effect of business activity in the property, industrial, financial, and oil sectors on capital formation as represented by the Philippine Stock Exchange has been shown to be significant. These sectors have determined for good or bad the rise and fall of the Philippine stock market for the time duration of this study. It is expected to continue doing so as well.

Therefore, the validity of the PSEi as the barometer of Philippine business and industry and not just the best-selected trading performers should not be doubted.

The implications for the findings and conclusions that have been derived from this research are focused on some practical recommendations that may be gleaned in an effort to strengthen Philippine business and industry, the role of the Philippine stock market as cheap source of funds and future research that may take off from this study. These are:

RECOMMENDATIONS

There is an imperative for Filipino business acumen to drive the growth of local companies in the property, industrial, and financial sectors, tame the riskiness of the Philippine stock market, and contribute to the effort of raising capital for business. These critical sectors have proved to be determinants of the behavior of the Philippine stock market. Noting the interrelationships of the industry sectors where industrial and property companies depend on financial companies for credit

and banking services, it is essential that Filipino companies are managed well and made competitive, efficient, and sustainable.

The financial health of these companies explains the robustness of the Philippine stock market. There are reasonably higher returns to be gained from investments in these publicly-listed companies and there is every reason to expect that these companies are well-managed in order to protect investment risk. Therefore, the key is the development of Filipino management skill and talent that will drive the development of the Philippine stock market and encourage more investors to invest and participate in capital formation for Philippine business and industry.

The oil industry must be able to demonstrate viable commercial activity in oil exploration in the Philippines. Oil exploration efforts must be directed towards discovery and generation of oil deposits. Without such a clear and direct outcome, investments in oil can only be risky speculative business that contributes to profit-taking trading activities perhaps but no real investment effort to strengthen local oil companies and fund their production activities. The can make investments in oil exploration attractive by granting incentives as well as improving access to credit.

Companies in the Philippine stock market must be able to demonstrate that investing in their company is worth the risk. Companies must be able to generate wealth for its investors if not in dividends then in shareholder value. Only with such companies in its fold will the Philippine stock market succeed in its mission.

It is recommended for the government to strengthen the support financial, industrial and property sectors for the increase of the economic productivity of the country.

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