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The Efficient Market Hypothesis in Developing Countries: Indonesia

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Abstract:

By considering all the historical and developmental background of the efficiency market hypothesis, in this paper it will be a quick review on the evidence of the rejection of the hypothesis based on previously done studies and based on own investigations. The main object of the paper is about the determinations done on stock prices. It is thought that a high quality predictability of the stock prices has a huge role in the security market and in the whole macroeconomic policies of a country. The efficiency and predictability adjusted by the efficiency market hypotheses are violated in stock market, by emphasizing the fact that the future stock prices and returns are not estimated completely by the previous years' data. In this paper, it is tried to find out other models done for returns and prices securities in Indonesia to prove the rejection of the hypothesis, that in fact it is implicated also in some other developing countries. The model of the stock prices and the other estimators by using the root test examine the weak form of the efficiency market hypothesis and confirm the rejection of the hypothesis. By the help of the Augmented Dickey-Fuller test and the Granger test of causality, it can be understood that market efficiency cannot be fully predictable and understandable, because it is a matter of the economic behavior.

Key Words: *Augmented Dickey Fuller Test, Efficient Market Hypothesis, Indonesia, Stock Markets*

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Introduction

The developing economies recently are surpassing huge economical, institutional, social and political changes. Economic growth is related especially with capital flows, trade and financial market expansions. All the market participants are working out together to try to construct an international capital market economy where their emerging market can integrate in the world economical activities. Behavior of the stock prices and also the fluctuations on exchange rate give the trace to the investors to have some information about the market. This is the point where Fama (1970) developed the idea of the Capital Market Efficiency which relies on the utilization of the information available for the rational expectations. The efficiency of the market is supposed to be completed whenever the whole market shares all the information which is needed to predict the future background for the newly investments. He derived this idea in an empirical evidence of the relationship between the forward rate and the spot rate into an operational form where the forward rate is thought to be equal to the expected spot rate and the risk premium of the issued security. Due to this idea other empirical researches are done especially on stock markets to show the effect of prices behavior on publicly available information. The hypothesis is assumed to be a joint one since it is believed that the agents that are expecting the evaluation of the prices in the next period are rational in the meaning that they do make no systematic forecasting errors and they have sufficient information to know the expected market price equilibrium and equilibrium returns. The prices of the assets are said to be a random walk variable. The availability of the information and the rationality of the agents divide the hypothesis into three forms: weak, semi-strong and strong efficient forms (Lo and MacKinlay, 1988). This classification is done to emphasize the point where the hypothesis is break down, which is the point that the market has potential information to be reflected into the securities' prices. Most of the studies done previously have been tested due to the first two forms of the hypotheses because the distribution of the private information is so difficult and privately saved and there it is thought that the share of information is costless and the market ought to be perfectly competitive so that the prices gain all the possibility to capture freely all the market information. An interested characteristic that caught my attention (being one of the reasons why it is choose Indonesia as an example in this paper) is that there exist three stock markets: Jakarta, Surabaya and Indonesia Stock market. Each of them seeks to pursue efficient strategies for investors and other financial agents in order to offer to the market a profitable and secure environment. Due to the economic factors it is difficult to have a fully behavioral and efficient stock market. Government is trying to find efficient policies to be implemented into the economy in order that the participants can access to the target aims. The Jakarta Stock Market is becoming one of the most performed markets in the asian continent. Although the markets are emerging towards financial globalization, there are still some mismatches between the structural changes of the market and the behavior of the people despite that they have three different markets for carrying their preferences from one market to another. But again there are a lot of structural risks, that associate the companies that invest in the market such as credit risk, liquidity risk, market risk, exchange rate risks etc.. There are real improvements in the stock market that outperform the investors' environment, as improvements in the confidence of the business cycle and in the investors. The Jakarta Market tries to supply to the public the needed amount of the stocks in order that they can try to achieve the required profits. It performs micro and macro economic conditions so that the seller and the buyers of the securities can interact easily with each other. The domestic environment of the capital market, especially the political conditions, it has negatively effects in the global liberalization of the stock market. In mostly developing countries the efficiency market hypothesis is rejected.

Metodothogy

The EHM states the fact that the stock prices reflect all the information done publicly, so the Indonesian market by being so well performed may accept this statement. The data used on this investigation includes all the data of the stock markets for the trade companies. Most of the data used are monthly collected from Datastream. Based on the other researches, there are evaluated the results according to the traditional EHM methodology. The basic econometric regression is tested over the logarithms of stock prices of a certain period and one previous period. $P_t = \mu + P_{t-1} + \varepsilon_t$, *for* $t=1\ldots\ldots T$ where P_t and P_{t-1} are the logarithm of the prices of the stocks of tomorrow and today respectively. And the null hypothesis is: $H_0: \mu=0$ *where the* ΔP*=composition of returns* $= \mu + \varepsilon$. It is used the Augmented Dickey Fuller tests to examine the stationarity of the prices. The investigation that is done here generates the informations that the prices are in the market as a whole and also shows the market turnover rate volatility over time. If it is looks behind in time a vary range of the data analyses will be seen in order to determine the path of the asset prices. Eugene Fama (1970) was the first economist who beside the

development of the idea of the market efficiency hypothesis and he also investigated the basic econometric regressive model. He has emphasized strongly the randomness in the price movements and the data collected in an arbitrage form, where he evaluated the idea of the joint hypothesis, under which the coming analyses were derived. First the methodology will examine if the exchange rates are a random walk and secondly if the future data are an unbiased predictor of the future prices taking also into consideration the returns. There are a lot of econometric techniques that try to test the hypothesis and for sure that they all have the same variables adopted in different manner (Guidi, Gupta and Maheshwari, 2011). In the previously studies are treated two kinds of financial markets: the stock market and the exchange rate market. The basic regression used in the exchange rate market is: $\Delta s_{t+k} = \alpha + \beta fp_t + u_{t+k}$.

According to this regression developed by Fama (1970), Dickey-Fuller (1981), Engle and Grager (1987), Phillips and Perron (1988), Johansen (1991) there are used to estimate the analysis by testing the order and degree of integration of the variables and also by testing the moving-average errors. For instance, the basic idea of these tests is hidden behind the orthogonality concept where the relation of the information available and the forecast is proved. Based on this scheme, directly the prices of the assets are analyzed. Hansen and Hodrick (1983), Giovannini and Jorion (1987), Chan, Gup and Pan (1992) have exploited the capital asset pricing model into the econometric equation in order to evaluate the riskiness of security shares. They all expected that the profit in the long run will be at its normal level despite the short term fluctuations, since they are caused due to slow adaptation of the new market information. After them many other regression models are been used to test the hypothesis of the efficiency. Dickinson and Muragu (1994) adopted the most recently used methods of autoregressive conditional heteroscedasticity structure to show the level of the return of the stocks. $E_t[P_{t+1}|S_t] = P_t + \mu$ is the representation of the fundamental definition of the EHM where the expectation of the tomorrow prices giving all the relevant information S_t will be equal to the today's price and a deterministic regular variable change μ. In base of this concept, the linear models of regression dominates the financial market by inquiring the price changes. The ARCH linear model have some autoregressive structure of their distribution. Moreover people started to pay more attention on General ARCH since their models include more than one lag: $h_{t+1}=\alpha_0+\alpha_1 u_t^2+\beta_1 h_t=\alpha_0+(\alpha_1+\beta_1)h_t+\alpha_1(u_t^2-h_t)$. In which, it is thought that the shock volatility is being reflected also in the next period. Nevertheless, several studies emphasize that stock market volatility is higher during recessions than during expansions, while mean that returns are lower during recessions (Kim and Shamsuddin, 2008). For instance, if there appears to be GARCH (1,1) with $\alpha_1+\beta_1=1$, which has a unit autoregressive root it signifies that today's volatility is going to affect forecasts of volatility into the indefinite future. Moreover the term "volatility clustering" appeared in the ARCH processes emphasize the fact that the returns are very bounded with the time changes so also the price volatility are reflected directly in the next period. The more the economy is integrated to the world system, the higher are the effects of the macroeconomic variables into the market of that country. Above and beyond this it can be say that the return of the stocks beside its prices depends also from the exchange rate fluctuations, inflation rates, interest rates, prices of the bonds and many other macroeconomic variables. Another model is the linear Granger causality test, where there is a nonlinear parametric causality test based on the nonexistent predictive power for yt of lagged values of another variable xt that is characterized by an additive smooth transition component as in the additive smooth transition regression model: $\hat{\eta}_t = \beta_0' g_t + \sum_{j=1}^{q} \delta_j x_{t-j} + \sum_{i=1}^{q}\sum_{j=1}^{q} \varphi_{ij} x_{t-1} x_{t-j} + \sum_{j=1}^{q} \psi_j x^3_{t-j}$. The hypothesis "$x_t$ does not Granger cause y_t" can be written as $H_0: \delta 1 = 0, \varphi ii = 0$ and $\Psi j = 0$. There are many other regression equations and models used to treat this topic, but in this study it is tried to give the most important one. As a summary, all the methods estimate the random walk model for the return distribution.

Results

From the results of the test, it can be seen that the null hypothesis of nonlinearity is rejected completely. The today prices are not able to reflect to the public the information needed to predict the tomorrow ones, meaning that the market is inefficient. This kind of investigation shows only the inner effect that the stock market obtains, but are not taking into consideration the other economic variables.

Table 1. Regression results.

	Coefficient	Std. Error	z-Statistic	Prob.
C	0.0435764935848	0.0167721497886	2.59814598211	0.00937286374323

LOGX	0.992780522113	0.00274149597436	362.130942886	0
	Variance Equation			
C	8.95600570563e-06	1.69972917402e-06	5.26907806404	1.37110649501e-07
ARCH(1)	0.149807018985	0.0580656301223	2.57996027374	0.0098811681507
GARCH(1)	0.600545016307	0.0738663242009	8.13015975553	4.4408920985e-16
R-squared	0.995673121977	Mean dependent var		6.1214737516
Adjusted R-squared	0.995639449775	S.D. dependent var		0.0826286734711
S.E. of regression	0.00545634003197	Akaike info criterion		-7.61638691007
Sum squared resid	0.0153026263239	Schwarz criterion		-7.57542444491
Log likelihood	1981.45240316	F-statistic		29569.5870099
Durbin-Watson stat	1.78604647358	Prob(F-statistic)		0

Source: Author calculations.

As mentioned previously, the stock market must be thought as a separate institution where the participants act without looking outside the market. The prices of securities do not behave apart from the other macro and micro variables. The fluctuations of the macro indicators affect the development of the economy of Indonesia but also in the stock prices. The investors when predict the future environment takes into consideration the today prices but also try to capture all the informations that other variables offers to them. Most of the investors are quite sensitive to the market rumors, especially from the ones raised from political disturbances. Since the prices of securities and their turnover rate are not alone in the market, it is decided to test some variables to show their fluctuations and volatility. The unit root test shows in an appropriate way the deviations of the variables of the economy. The Augmented Dickey Fuller test that it is used is obtained by: $\Delta X_t=\lambda_0+\lambda_1 X_{t-1}+\lambda_2 T+\sum_{i=1}^{u} \psi 1 \Delta X_{t-1}+\varepsilon$, where λ_0, λ_1, λ_2 are the coefficients that are estimated and ε is the white noise error term. According to the formula, it is emphasized the fact that ADF method is used to test the variables in the presence of a constant term and a deterministic drift.

Table 2. The results of the Augmented Dickey Fuller Test.

Variables	With intercept/ no trend	No intercept/ with trend
turnover	-2.851876**	-2.706144*
RER	1.137613	-1.641691*
interest rate spread	-2.407386*	-2.388681*
real interest rate	-2.138996*	-2.437125*
inflation	-2.315566*	-2.233385*
Δturnover	-3.473887***	-3.312033**
ΔRER	-2.309938*	-3.386031**

Δinterest rate spread	-4.58942	-4.585493***
Δreal interest rate	-4.425071	-4.233533***
Δinflation	-4.058288	-3.928913***

Source: Author calculations.

The critical values for 1%, 5% and 10 % level of significance for no trend variation are -3.9228, -3.0659, -2.6745 respectively and critical values for 1%, 5% and 10 % levels of significance with trend variation are -4.6712, -3.7347 and -3.3086 respectively. Most of the values are significant but it still should prefer the variables with no intercept and trend. As it is seen from the table, it is not only the variable (turnover rate) that reject the unit root test but also almost all the other variables reject the hypotheses. This means that not only the variable (turnover) is fluctuating across the time but also the economy as a whole it is not follow a regular path because the nonlinearity is a feature that associates the market in general. The unequal dissemination of the economic standards in Indonesia distorts the predictable stock movements. The indonesian market could not reflect all the information among the prices or returns of the stocks since the ineffectiveness of the markets comes from the instability of the economy in general. The macroeconomic agents fluctuates over time which also changes the prices of the securities since the stock market is a dependent institution with the economy as a whole. The parameters of the economy highlight the ways of dealing with investments among which the investors can evaluate the indexes of the markets. Despite the fact that the Jakarta Stock Market has make huge progress in the last years it doesn't give the strength to attribute all the relevant information to investors to examine the tomorrow prices by just looking at today ones. Traders do not only diversify their portfolio among this three stock Indonesian markets but also they used other fields of the economy, even abroad. Thus the market can experience with some stimulus coming from outside that distort the feature of a "closed and isolated" stock market. Indonesia has an inflation targeted policy. Although the inflation should move on the same track, it does not have a unique linear behavior by indicating that the economy has in general abundance resources. Since the major part of the shares is owned by the foreign investors, the exchange rate and the inflation rate patterns should also be considered. The market in Indonesia is still in a transition period because it is trying to cope with the global standards. The new standardization period is comprised of some new behavior investor perspectives where to reach the needed information it has become more difficult because the market policies have been not successfully. The companies not only have to collect info about the stock market but also about for the functioning of the economy.

Conclusions

The Efficient Market Hypothesis has been studies for more that two decades and on its theoretical bases is supported by many economists but in practice it is a false verdict. Especially the stock market has no incentive to accept this hypothesis because the prices fluctuated overtime without considering the information that is supposed to be attracted by the participants. This paper tried to conclude the evidence that the EHM has in the stock market especially in the developing countries. In the first part of this study it is explained the efficient market hypothesis and its methodology. Then based on the previously empirical researches, it is tried to make some reviews to show the role that with hypothesis has on the stock market. Lastly, it is developed an empirical study over indonesian market. According to all the investigations done, the weak form of the hypothesis (that the market reflects a set of the information available to the investors to predict future prices), is strongly rejected. The rejection states that the stock markets of the developing countries are inefficient by meaning that the prices fluctuate overtime without having a unique trend. The mostly used methods were the unit root test (especially that of the Augmented Dickey Fuller test) which try to investigate the significance of the level of the variables for the stock markets (where the most important test was to prove the volatility of the prices and its returns). The returns of securities and its prices did not follow a non-stationary trend. They deviate from the normality, so their distribution is violated and they are correlated serially with each other. The environment of stock market that the developing countries offers to the investors in not so reliable because of the instability of the economic situation that these countries have. The mal-functioning of the regulatory of the institutions for the stock markets make the information spread gradually deviating from its point. The economic and also political policy

developments in the developing countries open or close new gates for investment opportunities. But by looking back into retrospective the figures of the stock markets are highly distorted due to the lack of organizational institutions and also due to the lack of technology (due to which the information it is not transmitted completely). On the other hands, in the last years the technological advancements have been occurred but still the prices of securities indexes have not pursue a normality path. The volatility of the prices happened due to the emerging of the markets in the global financial system has make the investors to deal more with the foreign exchange regimes which make the entrepreneurs suspecting and being afraid to react quickly to the market. The relevant informations in the market are not so reliable. Moreover the crucial aim of the investors is to maximize their profits so they do not care too much to transmit their acknowledgement to the public; moreover they try to find other illegal ways to increase their earnings. Thus the market by itself cannot adjust the set of the information available to the public because, by opposing the EHM, the stock market is not isolated from the economy as a whole. The inconsistency and inefficiency of the stock market due to macro and micro economic effects and due to the non-asymmetric behavior of the people make the Efficient Market Hypothesis be strongly rejected. To conclude in this paper it is emphasized the fact that the prices of today are not able to reflect all the information that is available to the public for evaluating or predicting the prices for tomorrow. Thus the efficient market hypothesis is strongly rejected especially for the stock market in the developing countries...

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