

# Herd Behavior and Indonesian Financial Crisis

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**Abstract**—Indonesia is one of an emerging country in Asia. As an emerging country, Indonesian capital market attract the investor from around the world to make investment. Investment require good, clear information and trustworthy to make decision. The information that investor received may vary to other investor. These differences could lead to herd behavior. Good herd behavior will lead to economic growth otherwise will lead to crisis. These research examine the effect of herd behavior of investors to the financial crisis of 2008 and 2013 of the Indonesian capital market. Variables used in this research is financial crisis was measured using Exchange Market Pressure Index (EMPI) and herd behavior measured with LSV formula. The method used is a model of Vector Auto Regression (VAR) with a stationary test phase, co-integration test, VAR estimations, impulse response analysis, analysis of variance decomposition, and causality test. The findings is indicate that investors in Indonesia stock market has irrational behavior that leads to herd behavior, especially during financial crisis furthermore, herding behavior affecting the occurrence of financial crisis in Indonesia. These findings provide knowledge about the effect of herding behavior in financial crisis Indonesia and provide input for academics in the field of behavioral finance management, especially in the development of capital markets and for investors to give feedback on the importance of the behavior of investors in the Indonesian capital market.

**Index Terms**—financial crisis, herd behavior, vector auto regression

## I. INTRODUCTION

The data from World Bank shows that in 2010 to 2011 Indonesia's economic growth positive 0.3% from 6.2% to 6.5%, but decline 0.5% in 2012 which amounted to 6.3% to 5.8% in the year 2013. The growth is relatively higher than the growth of other developing countries in ASEAN based on data by International Monetary Fund (IMF) of 6.2% in 2012, 5.2% in 2013 and 4.5% in 2014, the IMF also projected ASEAN economic growth in 2015 and 2016 by 5.2% and 5.3%. This dynamics of Indonesia's economic growth makes Indonesia a global investor destination country other than in developed countries. This dynamics growth of economic could attract of investors to invest, one of which is the capital market. Indonesia capital market is relatively young capital market compared to other countries. Indonesia's capital market first operated in 1912 with a very simple system then managed by the government as a means of channeling funds and investment facilities parallel to the institutions of banks and financial institutions. In its

development, Indonesia capital market also experienced the same phase with other capital market in the world that is the information development. Information becomes necessary for investors in making investment decisions.

Information received by the investor will be decisive in investment decisions. Information has become its own power for investors in investing. Investors are trying to find as much information related to investment opportunities that led to the well informed investor and another investor is less informed, commonly known by the informed investors and uninformed investors. These conditions often make investors feel uninformed be hesitant in making investment decisions, thereby resulting in follow other investors are considered sufficient for information (informed). Such behavior is often referred to herd behavior.

Herd behavior can be a positive thing but it also have negative impacts on the development of capital markets. Be a positive thing if such behavior by investors who have the precise information of the investment will make the market growth positive, otherwise, will be negative or bad if wrong decisions by investors lead to the destruction or financial crisis as happened in the capital markets Argentina in 2000 to 2006 [1] and also the financial crisis Asia in 1997 to 1998 in the Indonesian capital market on reference [2], [3] and [4]. Investors basically have a rational behavior in determining investment decisions. Those behavior would be seen if the stock price fell, the stock will be purchased and vice versa. However, in the presence of certain conditions such as a crisis, investors tend to behave irrationally.

This research applies the concept of pre-existing herding by developing methods on the data on the Indonesia Stock Exchange and Bank of Indonesia period January 2005 to December 2014, using a method developed by reference [5] in the formulation of the financial crisis to determine the effect of herd behavior on the financial crisis that occurred in the Indonesian capital market in the period 2005 to 2014. The focus of this study was the effect of herd behavior to the financial crisis occurring in the subprime mortgage crisis in 2008 and the banking crisis of 2013 in the Indonesian capital market using VAR models (Vector autoregressive). Research on herding behavior during the subprime mortgage crisis have been done by reference [6] on six stock markets in Asia Pacific include Taiwan, China, South Korea, Singapore, Hong Kong, and Japan. On the stock markets in developing countries such as Taiwan and China, where the market is dominated by individual investors and the daily price limit known, herding

behavior tends to occur. While in Indonesia, there has been no research on the herd behavior of the financial crisis in Indonesia during the subprime mortgage crisis and the banking crisis. Therefore, this research is expected to complement the development of research on the financial crisis in Indonesia so can avoid the possibility of a financial crisis.

## II. THEORETICAL FRAMEWORK

### A. Behavior Finance

Behavioral finance is behavior based on psychology that affect the decision process that consists of two parts, cognitive and limits to arbitrage [7]. Behavior finance not only about human action, but also an understanding of the reasoning patterns of investors including emotional factors involved to the extent of its influence in the decision-making process [8].

### B. Herd Behavior

The word herding is basically from word herd described the animal spirit to explain the naive optimism and confidence in the capital market. Herd, defined as the behavior of investors who tend to imitate or follow the behavior of other investors. According to reference [9], herding behavior is associated with the people who (blindly) following the decisions of others. Reference [10] defines herding in the stock market as the tendency of a group of money managers to buy (sell) stock, especially at the same time, relative to what can be expected if the money managers itself doing trades and for herding, we use formula as on reference [10].

### C. Exchange Market Pressure Index

Financial crisis is defined as the decrease in the exchange rate of a country's currency against foreign currency (devaluation) caused by the pressure on the exchange rate market [6]. Exchange market pressure index using a formula developed on reference [6] as follows:

$$EMPI = \left(\frac{1}{\sigma_p}\right)(\Delta_p) + \left(\frac{1}{\sigma_q}\right)(\Delta_q) - \left(\frac{1}{\sigma_r}\right)(\Delta_r) \quad (1)$$

with,  $\sigma_p$ , standard deviation of changes in the value of the rupiah against the US dollar;  $\sigma_q$ , standard deviation of changes in interest rates;  $\sigma_r$ , standard deviation of changes in foreign exchange reserves;  $\Delta_p$ , changes in the value of the rupiah against the US dollar;  $\Delta_q$ , changes in interest rates;  $\Delta_r$ , changes in foreign exchange reserves.

The criteria that use as limitation to the Exchange Market Pressure Index can detect a financial crisis in a country, so to answer this question, it is necessary to set the upper threshold of the index. The economy is said to be crisis if the EMPI in that period exceeds the average plus the specified standard of deviation, namely  $m$ . Currency crisis occur if  $EMPI_t > \mu_{EMPI} + m\sigma_{EMPI}$ . Where  $\mu_{EMPI}$  is the average of the EMPI index and  $m\sigma_{EMPI}$  denotes the standard deviation of its EMPI index. The value of  $m$  is a threshold with a value of 1 - 3. In this study the threshold of  $m$  used is 1.5. This follows the

model used by the World Bank using 1.5 times of the standard deviation.

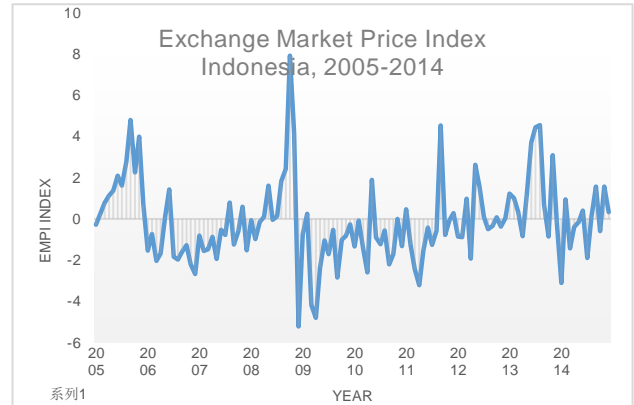


Figure 1. EMPI flows in Indonesia, 2005-2014

Fig. 1 shows EMPI flows in Indonesia during 2005-2014 base on equation (1) include the data of changes in rupiah against US Dollar, changes in interest rates, and changes in foreign exchange reserves. From this figure we can see that during 2008-2009 there is highest pressure to exchange market, on October 2008 the index reach 7,9 and 4,5 on August 2013 which is very high above the standard in detecting the crisis by world bank which has determine 1,5 to the value of standard deviation about 2,98. So, the crisis has occur in Indonesia on October 2008 and August 2013.

## III. RESEARCH METHODOLOGY

The research regarding financial crisis generally can be divided into four groups. The first group is only qualitative aspects with the causes and developments that lead to the financial crisis. This group is focuses on the shift from one to another indicators, but there is no usability testing of the various indicators in estimating the crisis. The second group, observes the general facts of the time preceding and followed by the financial crisis. Parametric and nonparametric methods are used to assess whether there is a systematic difference between before the crisis in the control group. The third group estimates the chances of the first devaluation or some future period that is usually based on a theoretical model. The fourth group presents a non-parametric approach to evaluating the usefulness of some variables in signaling future crisis. In relation to this research, so this research can be classified to groups four.

This research uses analysis Vector Auto-Regression (VAR). The VAR model is a regression model that can be used on time series data. The reason uses this model because the model is built with consideration of minimizing the theoretical approach with the aim to be able to capture the phenomenon of economic so the objectives in this research can be achieved. In general VAR model with  $n$  endogenous variables can be written as follows:

$$Y_{nt} = \beta_{01} + \sum_{i=1}^p \beta_{in} Y_{it-i} + \sum_{i=1}^p \alpha_{in} Y_{2t-1} + \dots + \sum_{i=1}^p \eta_{in} Y_{nt-i} + e_{nt} \quad (2)$$

Where:

$Y_{nt}$  = endogenous variables at time  $t$   
 $\beta, \alpha, \eta$  = the model parameter values,  
 $e_{nt}$  = residual at time  $t$  of the variables  $x$  and  $y$ , and  
 $t$  = time ( $t = 1, 2, \dots, n$  and  $n$  = the number of data)

The data in this research uses the data from Indonesian Stock Exchange (BEI) and central bank of Indonesia. A total of 120 observations were taken in the monthly period of 2005 to 2014 and were processed using VAR estimation in several stages. We use a stationary test phase, co-integration test, estimated VAR, impulse response analysis, analysis of variance decomposition, and causality test to detect herding behavior.

#### IV. DISCUSSION AND RESULTS

In the stationary test, which is a preliminary procedure to ensure that the data used in this study stationary or not. The results shows that the data is stationary at the level or in difference. So we have a regular VAR models (unrestricted VAR) and co-integration test phase also passed and continue to the next phase is the VAR estimation. In the VAR estimation phase, the T-test results shows that the activity has T value count is smaller than the value of T table 5%. This shows that there was a herding activity on the occurrence of financial crisis in Indonesia. Based on F-test, the results shows significantly of the herd affect the financial crisis F-count 2,611. The results of this research support the result of research on financial crisis in capital market Argentina by reference [1], the financial crisis Asia in 1997 to 1998 in the Indonesian capital market on reference [2], [3] and [4].

Impulse response analysis to track the response of the endogenous variables in the VAR system for their shocks or a change in the disturbance variable. Where the shock that occurred in the variables responded by similar types of investors. Based on the impulse response test show that herd activity against financial crisis (EMPI) have relatively small shocks compared to EMPI against herd. This suggests that herding activity that occurs on the financial crisis spread with a relatively quick period of time but did not provide any noticeable effect.

Variance Decomposition shows the percentage of responses on herding behavior against financial crisis (EMPI). Based on the results of variance decomposition VAR, shows the effect of not greater than 30%, this showed that there were small effect of herd behavior influence the financial crisis in accordance with predetermined parameters.

The relationship between two variables can be seen from the results of Granger causality test. It has relations to other variables by using 10% of the level of confidence. Based on Granger causality test, the results shows that on the lags 1 shows same directional relationship. At the lags 2 shows the same directional relationship between herd behavior and financial crisis (EMPI), and also a bidirectional relationship. At the direction of lags 3 shows same directional relationship.

At lags 4 shows same directional relationship between herd behaviors to financial crisis (EMPI).

#### V. CONCLUSION AND LIMITATIONS

We have conclude that there is an effect of herding behavior in Indonesia capital market in the period January 2005 to December 2014. The herd behavior are affecting the occurrence of financial crisis or can be said the effect is very small with a view of the parameters used.

The results of this study provide additional evidence in previous research that the phenomenon of herding in the market. It means that the public investors in capital markets consider the actions carried out other investors in making investment decisions.

This study has limitations, among others; the data that used for the number of investors who trade is using a whole investors so that the measurement in herding hard to determine who first trigger herd behavior. And also the research sample are not grouped into homogeneous economic conditions.

#### ACKNOWLEDGMENT

The authors wish to thank to God, my wife for full support, and to all my colleague in STIE Perbanas Surabaya Indonesia for the information regarding opportunities in research publications. This work was supported by internal research funding of STIE Perbanas Surabaya, Indonesia.

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