MONETARY POLICY AND HERDING BEHAVIOR DEVELOPED MARKET AND EMERGING MARKET COMPARISON

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Abstract
The research examines impact of monetary policy on herding behavior in the stock market. This study used OLS Regression, SUR, and Panel Regression Method. The results show that monetary policy affects herd behavior in stock market, specially in emerging market which have a specific characteristic such as low liquidity and low number of investor. Using SUR, this study show that common factors which affect the global herd behavior are not influential. Domestic stock market has its own variable that may initiate herd behavior.

Keywords*: monetary policy; stock market; herding behavior; developed market; emerging market*

INTRODUCTION

Monetary policy launched by monetary authority drives two important macroeconomic variables, interest rate and exchange rate which have a significant impact on stock market to targeted level in the future (Gong & Dai, 2017). Projected level of interest rate and exchange rate directly affect public company's future financial performance and its stock price traded in the market. Investors automatically adjust their expectation of fair price of all traded stock as new monetary policy announced by central bank and create a significant change in stock market return as a whole (Xu, et al., 2017). Monetary policy announcement is an important and an awaited event for all stock market investors which try to figure out crucial expected content of that announcement and make a suitable strategy to anticipate potential risk and opportunity in new macroeconomic environment. (Kurov, 2010).

Expansionary monetary policy which drives market interest rate to lower level will create a conducive, low cost of fund-financial environment for many corporations to execute their expansive business strategies, invest more money to increase their production capacities and increase their revenues and intrinsic value of their stocks. (Litimi, et al., 2016). Low market interest rate also pushes funds out from banks and bond market to increase their investment portfolio position in stock market which offer higher return. On the other hand, contractionary monetary policy drives market interest rate to other direction, higher interest rate make many corporation to cancel or halt their expansion, financial risk become higher, discount rate increases and seriously affect intrinsic value of stock (Kizys, et al., 2021). Stock market liquidity is also seriously affected by market interest rate changes, capital flows swing among financial markets and among countries following monetary policy announcement in each country (Neuhierl & Weber, 2019),. Meanwhile, monetary policy which drives exchange rate to a strong position against other currencies influences international competitiveness and threatens firm's revenue. Weak exchanges rate may induce significant capital flows out of a country. There are many research which focus on this topic and reveal interesting result (Fu & Wu (2021), Krokida, et al. (2020), Marinescu, et al., (2018), Isola Lawal, et al., (2018), Laopodis, (2013), Chatziantoniou, et al., (2013), Bouakez & Normandin, (2010), Karagiannis, et al.(2010).

Previous studies of behavioral finance show individual investor tend to follow reaction of other and majority investors (Fu & Wu, 2021). For individual investor, psychological pressure to imitate other dominant investor or majority of investors' behavior become stronger and highly influential in changing environment which make an uncertainty in the stock market. This massive imitating behavior produce, what is called in behavior finance paradigm as, herding behavior (Krokida, et al. (2020). Herding behavior in the stock market indicates individual investors ignore their own appraisal on impact of a event which may cause a significant changes in their future investment portfolio return and choose to follow the herd. This proposition contradicts with central argument

in financial economics that all market participants behave rationally: investor make a rational expectation based on factual and relevant economics data and always decide through a rational calculation (Marinescu, et al., 2018). Though, retail investors who have only a tiny portion of fund in the stock market may look herding behavior is a rational choice because take an opposite position against majority is definitely a risky choice. Herding behavior tends to have strong indication in the stock markets which have a high proportion of retail and unsophiscated investors (Kizys, et al., 2021).

New monetary policy which creates new direction of future macroeconomics variables makes a threatening uncertainty for unsophisticated retail investors (Rehman, et al., 2021). They who have low self-confidence and have no capacity to make a good appraisal of possible impact which may exerts from new monetary authority's stance try to protect their investment portfolio just by mimicking behavior of their friends or their role models. Irrational herding behavior in stock market create a unique and elusive problem for monetary authority in a country who try to estimate possible market reaction to new monetary policy announcement. Overreaction occurred in stock market may drives a new launched monetary policy misses its targets (Neuhierl & Weber, 2019). Monetary policy transmission through financial markets may be disturbed by an investors' herding behavior.

Behavior imitation process which creates a simultaneous and similar decision among majority of investors needs a moment and specific environment that give a platform and coordination mechanism for ordinary retail investor to feel secure in mimicking each other's behavior or following a opinion leader and some market trend setters. Investor sentiment plays a key role in initiating and nurturing herd behavior in stock market (Isola Lawal, et al., 2018). Monetary policy announcement sends a clear message to all market participants, but each investor may make a specific and unique interpretation based on his/her sentiment. Herd behavior suppresses any individual deviating judgement and pushes all actor in stock market to come to an informal agreement of informational content which exerts from a monetary announcement. If monetary authority has a strong and long- proven credibility and always exhibits decisive actions to secure all expected possibilities which disturb a publicly monetary target, herd behavior in stock market always follows a similar direction to those official monetary aims (Neuhierl & Weber, 2019). But if central bank has a low credibility which occasionally tolerate the financial markets has their own intepretation of monetary announcement and also set different goals, herd behavior may push stock market to different direction. Extreme and continuing herd behavior create economics bubbles which threaten macroeconomic stability.

Herd behavior, as an expression of irrational investor behavior in stock market show a life cycle (Caraiani & Călin, 2020). Irrationality always, in slow or fast speed, surely has an end. In the initial phase, herd behavior emerges in the market as a reaction of new information. If this new price movement attracts more investor to join into the moving band wagon, herd behavior become more evident and push the stock price to more extreme level. But, because human being is basically a rational being, an excessive price movement eventually make a majority of investor to realize this irrationality and start to correct their position in the market. Some investors just realize their return by selling or buying such irrational price moving stocks and automatically push those stock price back to their fair value. Economic bubble bursts, creates a high market volatility and destabilizes financial and economic system (Ngalawa et al., 2016) . Herd behaviors tend to exist and keep creating pump and dump phenomenon in the stock market unless monetary authority clear their message to market and make a corrective action in market to send a strong signal that new monetary stance will be achieved at a considerable cost.

Specific market characteristics and central bank credibility in each country play a key role in understanding relationship of monetary policy and herd behavior in the stock market (Neuhierl & Weber, 2019). Herd behaviors tend to exist and grow in illiquid and thin market. Mispricing created by herd behavior will be wiped out in liquid market which nobody can drive out a stock price from its fair value. Regulatory framework that gives permission to any body to implement arbitrage strategy, short selling overpriced stocks and long underpriced stocks, creates a market environment which push back all stocks to their fair value. Frictionless market, with low transaction cost, low taxes, and low information cost guarantees stock prices are always at their fair values. Emerging markets which usually have low liquidity and lack of working regulatory framework have high probability to experience bubbles because of herd behaviors (Laopodis, 2013). Central bank credibility also plays important role in initiating herd behaviors which, in uncertain condition, try to probe future macroeconomic variables and their impact to stock market. Some papers report different stock market reaction to monetary policy announcement between emerging market and developed markets (e.g Kizys et al., 2021;Caraiani & Călin, 2020); Chen et al., 2017). Herd behavior has a significant impact in this contradicting results.

Laopodis (2013) show that in some countries contractionary monetary policy have no significant effect on stock market liquidity. But some researchers who observed stock markets in developed countries find contradicting results, they find significant effect of monetary policy announcement to sock market value, liquidity and volatility (e.g Ioannidis & Kontonikas (2008) and Bjørnland & Leitemo (2009)). Their contradicting results may be better understood if we include level of herd behavior in each country. So, to fill this research gaps, this

paper observes herd behaviors occur in stock market in emerging markets and developed market and scrutinizes monetary impact on this behavior. To measure domestic monetary policy impact on domestic stock market in each country, this study also identifies and measures common factors in regional and global stock market returns. To achieve this goal, this study uses the Seemingly Unrelated Regression (SUR) model to test the existence of common factor among the stock markets.

METHODS

This study observes 2009-2019 data from 5 emerging which are Indonesia, India, Brazil, Russia and China and 7 developed countries (G7 countries). Observed monetary policy are interest rate and exchanges rate against US Dollar. Stock market return is obtained from broad market index in each country. The data is obtained through Data Stream Thompson Reuters which is accessed at PDEB FEB UI and online data extracted from the OECD website.

Identification and measurement of herd behavior is a crucial research problem in securing effectiveness of a monetary policy, detecting potential economics bubbles and preventing those bubbles to destabilize market. Some experts propose methodology to measure level of herd behavior occur in stock market. First method for identifying and measuring herd behavior was proposed by Christie and Huang (1995). They use simple cross-sectional stock returns. Christie and Huang (1995) show that standard deviation of average squared-excess returns of all stocks in a stock market is a good indicator of herd behavior. When herd behavior exists in a stock market, there are some stock that have an extreme deviation from market return because of mimicking strategy implemented by huge investor proportion in the market which drag those stocks to different price pattern compared to market portfolio. Cross sectionally standard deviation of squared-excess return (CSSD) becomes a widely accepted herd behavior measurement. Some other experts propose different methodology to measure herd behavior such as Kizys, et al., (2021) but their research also show that more complex method have a significant impact in their application because more assumptions should be checked carefully and anticipated its consequences to their accuracy.

Empirical model of this study is:

$$\text{Herding}_{i,t} = \text{Interest}_{i,t} + \text{Exchanges}_{i,t} + e_{i,t} \dots\dots\dots\dots\dots\dots\dots\dots(1)$$

Where, herding behavior is measured by CSSD formula which is proposed by Christie and Huang (1995):

$$\text{CSSD}_t = \sqrt{\frac{\sum_{i=1}^{N} (R_{i,t} - R_{m,t})^2}{(N-1)}} \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(2)$$

$R_{i,t}$ is individual stock return at day t. $R_{m,t}$ is broad stock market index of each country, Interest is the interest rate that reflects the monetary policy in each country, and Exchange rate is the exchange rate of each country against the US dollar. Model (1) is estimated by two estimation methods, Ordinary Least Square and Panel Data Model.

To test the existence of common factors that influence the movement of stock market price index returns, Using the Seemingly Unrelated Regression (SUR) model which is estimated by EViews software, this study empirically test the existence of common factors that influence the movement of monetary variables. Measuring correlation of error term produced by each equation in SUR system of equations we can identify existence and influence of those common factors.

RESULTS AND DISCUSSIONS

Herd behavior in stock market, measured by CSSD, in 12 sample countries during the 20-year observation period.

Table 1. Herding Behavior in Stock Market

	Indonesia	Brazil	India	Rusia	U.S	China
CSSD	6.54	2,4	10,5	3,84	0.59	5.14
Correlation with U.S Stock Market Return	0.79	0.65	0.86	0.37	1.00	0.67
	Italy	Japan	France	Canada	UK	Germany
Average	3.12	1.34	2.53	1.52	1.01	0.96
Correlation with U.S Stock Market Return	0.67	0.48	0.63	0.89	0.68	0.54

Herd behavior in emerging stock markets are higher than developed market. The strongest herd behaviors are found in India and Indonesia. On average, stock market in developed countries have low herd behavior indicators. US stock market is the stock market with lowest herd behavior. This results shows that stock market characteristics such as liquidity and number of investors, which obviously we find emerging stock market has lower liquidity and number of investor than developed stock market, play an important role in paving the way of herd behavior in stock markets.

The result also shows that all herding behaviors, not only in emerging stock market but also in developed market, are strongly correlated with the movement of U.S stock market returns. US Stock market, as the biggest stock market in the world, has a significant impact to other stock market. Market cointegration cause high global flow of funds among stock market, and spill-over the volatility and investor sentiment around the world (Mobarek, Muradoglu, Mollah, & Hou, 2016). Highest correlation between herd behavior in a stock market with U.S stock market are found in India and Indonesia which also stock market with the highest herd behavior indicator (CSSD). Canada, which has direct border and strong economic relation with US market also show high correlation. This result indicates a contagion pattern of herd behavior in global stock market. US stock market as an epicentrum of herd behavior movement among global stock market. Domestic stock market tend to have a strong correlation of herd behavior when there are a free flow of fund in and out of the country (Morana & Beltratti, 2008).

Table 2 shows empirical test of Model (1). We find signicant negative relation between herd behavior and interest rate all countries, except Japan. New monetary policy which induces increasing interest rate signals an uncertainty to investors who try to probe its impact to their investment portfolio. In uncertainty, unsophisticated investor tend to follow opinion leader or majority of investors (Kizys, et al., 2021). Market cointegration and better information which investors get make global movement of fund to stock market also has a similar pattern. In high uncertain period, global investors choose a similar reaction that avoid investing in high risky portfolio and protect their investment value by following majority of investors' decision. Japan, which experience abnormal macroeconomic condition, long stagflation with unconventional interest rate policy, such as negative market interest rate, has a different relation of herd behavior and interest rate. Further research are needed to reveal comprehensive and deep research of herd behavior induced by monetary policy in Japan stock market.

Table 2 also shows that exchange rates have a significant positive influence on herd behavior in stock market are only in developed countries. Exchange rate is a more important variable for corporate financial performance in developed countries which have export orientation and as multinational company than in emerging market. Uncertain future corporate financial performance and deteriorating investor sentiment drive a speculative investors' action which are imitated by majority of investor (Kurov, 2010). Further research are needed to scrutinize direct effect of monetary policy or just a investor's sentiment changes which initiate herd behavior in stock market (Bouakez & Normandin, 2010).

To reveal deeper what we find from above regression model, this study uses Seemingly Unrelated Regression which is able to identify common factors that influence all herding behavior in observed global stock market. These common factors are all omitted variables in Model (1). The joint driving factors between the stock market, exchange rate, and herd behaviors are unobservable variables so it requires a separate research to accurately measure and include it in robust empirical model. Common factor are global investor sentiment (Kurov, 2010), and global financial market contagion (Zare & Azali, 2015) which all are not an observable data and need a specific scientific method and procedure to measure it.

Table 3. Matrix of Residual Correlation (Seemingly Unrelated Regression)

	Brasil	Indonesia	India	Rusia	Cina	UK	Kanada	Italia	Jepang	Jerman	Perancis	US
Brasil	1,000											
Indonesia	0,523	1,0000										
India	0,825	0,444	1,0000									
Rusia	0,5303	0,3023	0,5692	1,0000								
Cina	0,6217	0,1825	0,7673	0,2543	1,0000							
UK	0,8765	0,4589	0,6626	0,4349	0,3459	1,0000						
Kanada	0,5627	0,3847	0,7766	0,4667	0,2393	0,7600	1,0000					
Italia	0,2437	0,4723	0,5442	0,3769	0,4728	0,6889	0,3644	1,0000				
Jepang	0,8565	0,6793	0,5222	0,2316	0,3683	0,3489	0,4749	0,4599	1,0000			
Jerman	0,5583	0,7462	0,1867	0,3455	0,4807	0,5890	0,4734	0,8316	0,2329	1,0000		
Perancis	0,8773	0,8357	0,5712	0,2433	0,2755	0,6797	0,7308	0,2131	0,4733	0,7838	1,0000	
US	0,921	0,7295	0,3689	0,3241	0,2862	0,4312	0,9515	0,2353	0,3299	0,8761	0,4583	1,0000

Breusch-Pagan test of independence: chi2(66) = 5476.500, Pr =0.0000

Table 3 show the correlation matrix of error term from twelve regression equations in Table 2. The strongest error-term correlation was correlation between US stock market and Canada and US stock market with UK stock market. Three countries has close economic relationship, even US-Canada has physical border. Other observed stock market in this study show an independent her behavior pattern induced by domestic variables.

To examine further the differences of herd behavior in stock market as a reaction to monetary policy between developing and developed countries more deeply, this study also estimate a separate panel data model between the two groups of countries. Table 4 shows that both in developed markets and emerging markets, interest rates and exchange rates significantly influence herd behaviors in stock market. Higher and unpredictable inflation rate in emerging markets drive a high possibility existence of herd behavior but effect of exchange rate have no significant impact in emerging market. Further research need to scrutinize this revealed facts that exchanges rate has no significant effect to herd behavior in emerging market.

Table 2. Regression Results

	Dependent Variables	Herding Behavior in Stock Market	
No.	Country	Interest Rate	Foreign Exchanges Rate
1	India	-0.8***	-1.3
2	Indonesia	-0.3**	1.4
3	Brasil	-1.1**	1.7*
4	Russia	-0.6*	2.2
5	UK	-0.1*	0.3
6	China	-0.3**	-0.4*
7	Canada	-0.6*	-0.3*
8	Japan	0.2	1.5*
9	Italy	-0.5*	-0.4
10	France	0.5*	-0.7*
11	Germany	-0.3**	-0.8*
12	U.S	-1.7**	--

*Significant at level of error 10%

** Significant at level of error 5%

*** Significant at level of error 1%

Table 4. Panel Data Model Estimation Result

Panel	Interest Rate	Foreign Exchanges Rate
G7	2,37**	8,89***
Emerging market	8,65**	12,37

*Significant at level of error 10%

** Significant at level of error 5%

*** Significant at level of error 1%

CONCLUSIONS

Monetary policy has an influential effect to initiation of herd behavior in the domestic stock market. Interest rate changes creates uncertainty of corporate future performance which drive a speculative movement in stock market. Effect of monetary policy to stock market is influenced by specific stock market characteristics such as liquidity and regulatory framework which play a key role in initiating herd behavior. Emerging markets which has lower liquidity and weaker regulatory framework that prevent speculative excessive market action and lower central bank credibility tend to have serious and market wide effect-herd behaviors.

This study reveal that common factors which influence the relation of interest rate policies and exchange rates with herd behavior in stock market are not influential, only in US-UK anda US-Canada relationship has a strong common factors. Further research are needed to reveal comprehensive pattern of this relationship.

The practical implication of the results of this research is that monetary policy which aimed at directing the development and development of the stock market is very difficult to implement because of existence of herd behavior in stock market reaction that may create a friction in interest rate pass through mechanism.

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