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Herd behaviour in foreign exchange market

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Abstract

This study examines the presence of herding behaviour in the forex market of Pakistan. By analysing the daily returns of the top six traded currencies from January 2015 to December 2019, the current research explores the behaviour of investors towards investment in currencies. Data is analysed using the model proposed by Chang et al. (2000). Results of estimation techniques provide evidence of herd behaviour among investors. Findings suggest that investors do not rely on their own decision-making; rather they follow the patterns of others. Furthermore, this imitating behaviour in same in up and down market events. Findings of this study provide significant insights for future researchers about decision-making of investors in forex market.

Keywords: Efficient market hypothesis, Behavioural finance, Herding, Asymmetric behaviour

JEL Classification: G2, G4

1 Introduction

People are influenced by the actions of others and this pattern is followed in financial markets also. Financial markets are expected to aggregate all information, but imitative behaviours do not allow to take benefits from information symmetry (Romano 2009). It is a general concept that the decisions of irrational investors cause inconveniences in markets. Academic research on social learning and behavioural convergences has assisted in the understanding of such issues (Bikhchandani et al., 1998). Theoretical development in this area has revealed that what often seems irrational is actually a rational decision in a certain natural context (Hirshleifer and Hong Teoh 2003). Decision-making of individuals is affected by certain phenomenon which controls the contexts in which decisions are made. Herding is one example of this kind of phenomenon (Bikhchandani and Sharma, 2001). The end result of herding is the conformance of behaviours on a single point.

In finance, efficient market hypothesis (EMH) considers markets as a fair place where stocks, currencies or other commodities are traded according to market demand and supply. According to this concept, value of an asset is calculated based on readily available market information. So, an investor can buy stock at the fair price only (Rossi and Gunardi 2018). On the other hand, this assumption of rationality often fails in capital market, that leads to the concepts of behavioural finance. Traders of these two fields are classified as fundamentalists and chartists,

respectively (Kaltwasser 2010). Herding behaviour is one example when investors behave irrationally in markets.

Specifically, herding is the physical clumping or convergence of actions. It is defined as “a process where economic agents are imitating each other’s actions and/or base their decisions upon the actions of others” (Spyrou, 2015, p.175). According to Spyrou, these may include market participants whose trading is in the similar direction in one time, investors ignoring their analysis and initial trade and follow the trends of others, mutual imitation, single behaviour convergence at one point, a correlated behaviour, or a group of investors following each other. Banerjee (1992) developed a simple model to explain herding behaviour with a common real-world example and showed how easy it is to follow the decisions of others in decision-making.

Foreign exchange market is full of dynamic trends. Herding is a phenomenon of developing and frontier markets (Economou, 2016). In forex market, investors tend to imitate the behaviour of others for investment in foreign currencies. Most of the research focuses on describing the trends among stock markets, but forex market has not received much attention, especially with reference of herding. Since last two years, herding in cryptocurrencies are in more focus of researchers (Ajaz and Kumar, 2018; Stavros and Vassilios 2019; Bouri et al. 2019; Kaiser and Stöckl 2019; Ballis and Drakos 2019). This fact cannot be denied that cryptocurrency has attracted investors in Pakistan like rest of the world. The underlying problem is that cryptocurrency has not gained the legal status in the legislation of Pakistan. A number of significant factors are affecting the right use of virtual currencies in the country [see (Yasir and Ahmed 2021)]. For this reason, present study observes herding behaviour of traditional currencies only, as investors are not encouraged towards cryptocurrencies and exchange rate of conventional currencies is the main reason of economic up and down.

Forex market is affected by home country investors, companies involved in import’s business and the remittances from foreign countries (Khurshid et al. 2017). In Pakistan, exchange rate is highly affected by increased imports, political situations and the labour population residing in other countries. This motivates home country investors to invest in foreign currencies. In different times, market displays unexpected returns due to behaviours of investors. Considering this issue, the aim of this study is to expand literature on herding, by exploring herding behaviour in Pakistani Forex market. Researchers have found no other study specifically contributing towards herding literature in currencies in Pakistan. Currencies under study are listed for trading in top platforms. Herding behaviour of home country investors is analysed in current study. Thus, our empirical analysis uses prices of six currencies, over a period of 5 years and examines whether these currencies exhibit herding behaviour or not.

This research paper is organized in five sections. Introduction of the article talks about behavioural finance and the need of studying herding behaviour in Pakistan forex market. Literature review builds up theoretical background and describes empirical literature on herding. Methodology section contains description of models to be analysed, statistical and estimation techniques. Section 4 discusses results of estimations. At the end, conclusion is presented in last section.

2 Literature review

2.1 Theoretical literature review

The roots of efficient market hypothesis (EMH) are traced in the work of Fama (1965) and Samuelson (1965). According to the concept of efficient market hypothesis, the term 'efficiency' implies the fact that investors cannot earn abnormal profits based on the efficiency of market. Any decision taken by investor fully reflects the true condition of market (Hamid et al. 2010). The weak form of efficiency suggests that prices display random walk as they reflect all historical information. Semi-strong form of efficiency suggests that prices of securities show historical information as well as any new public information. So there is no way that an investor can earn more profit by any technical or fundamental analysis. Strong form of EMH incorporates all historical information (weak form of EMH), public information (semi-strong form of EMH) and any kind of private information regarding assets. In this way, all kinds of information are readily available to investors and they can make decisions rationally.

In finance literature, there has been much debate on the validity of EMH and this debate dates back to origin of this concept (Delcey 2019). There is one stream of literature that validates its authenticity while other poses questions on the efficiency of markets. Tıřan (2015) reviewed theoretical and empirical literature on EMH and found that one main reason of market inefficiency is inattentive investors. Investors do not pay attention to market information which causes under-pricing of securities. Moreover, the models which reject EMH itself are biased and provide erroneous results. Another proponent of random walk Malkiel (2003) also argues that economic data must be significant to provide substantial results for EMH.

While the work on EMH in finance went on, there emerged another field of behavioural finance. This presented the fact that human mind controls the decision-making of investors. Behavioural finance answers the questions that how and why markets become inefficient despite the availability of information (Hong 2007). This field has gained much attention in recent years and it grabs concepts from sociology and psychology (Ahmed and Karira 2019). Research in this area has led to the concepts of heuristics, informational cascades and herding. People tend to follow the choices of others in markets and thus base their decisions on their beliefs. Avery et al. (1998) stated that the presence of uncertainty causes herd behaviour leading to short-run mispricing in market. Considering these two concepts related to investment decision, authors of this research article have tried to explore the fact whether traded currencies in Pakistan show herding behaviour (imitating trends among investors) or they follow principles of EMH.

2.2 Empirical literature review

Herding behaviour has received wider attention of researchers in economics and finance (Ballis and Drakos 2019). There are different opinions of researchers regarding the presence of herd behaviour in varying times and markets. For example, Chang et al. (2000) and Gleason et al. (2004) rejected the presence of herd behaviour in US stock market. But existence of herd behaviour in different developed countries was supported by Chiang and Zheng (2010) and Khan et al. (2011). Chang et al. (2000) in their study found evidence of herd behaviour in emerging markets of South Korea and

Taiwan. Study of Chiang and Zheng (2010) is in contrast to previous studies of Chang et al., (2000) and Demirer and Kutan (2006) which showed no evidence of herding in advanced markets.

There is a variety of literature on herding regarding stocks in markets. For example, Chang et al. (2019) has recently studied herding regarding short selling in stocks. Rompotis (2018) examined exchange-traded funds (ETFs) for herding behaviour. They found no evidence in support of biasness among investors regarding investment in ETFs. Christie and Huang (1995) explained that when individual returns of equities follow principal returns of portfolios, they show herding behaviour. During phase of market stress or markets decline, herding behaviour is an important aspect showing investor's movements towards equities. Investors depend upon informational cascades and sentiments for investment in crypto currencies. Thus, herding behaviour is more prominent in crypto currency market (Kaiser and Stöckl 2019).

Asad et al. (2018) based their research on behavioural portfolio theory and concluded that behaviour factors are responsible for decision-making of investors. In another study by Mahmood et al. (2016), primary data were used to test the impact of behavioural factors on investment performance. In this regard, they found that heuristics and herding are positively related to investment decisions. If prices of stocks adjust all the available information, then herding behaviour tends to disappear (Romano 2009). It implies that herding behaviour occurs due to asymmetry of information in market.

There is another stream of literature which finds out herding effect during some specific time period. For example, Gavriilidis et al. (2016) studied the behaviour of investors with respect to social moods in the month of Ramadan. This article reported significant impact of herding among investors' moods during this month.

Some research articles also use primary data from investors to test herding behaviour. For example, Shaikh (2019) found that professional investors are more prone to overconfidence and herding while investing in securities. He also reported that older investors show more herd behaviour than younger ones.

Javaira and Hassan (2015) analysed stock returns of Karachi Stock Exchange in period of 2002–2007. They found no support for the presence of herding behaviour among investors. Only support was found in year 2005, when there was liquidity crisis and information asymmetry. Zafar and Hassan (2016) tested herding in Karachi Stock Exchange for the period of 2000 to 2014 and found evidence in favour of herding in both up and down markets. In a similar nature of study by Ahmed and Karira (2019), there is no evidence of herd behaviour in Pakistan Stock Exchange. This study used daily market returns of 387 stocks from period of 2009 to 2017. Their results showed herding behaviour only in four sectors of Pakistan Stock Exchange. Another study by Yousaf et al. (2018) reported presence of herd behaviour in Pakistani stock market during financial crisis of 2007–2008 as there was greater degree of uncertainty among investors. Shah et al. (2017) examined herding behaviour in Pakistan stock exchange from different facets and reported that individual firms do not herd towards market index.

There are a few studies available which test the presence of herding among currencies. Sherman (2012) studied herd behaviour in currencies. Results of his study found

the presence of herding in less traded currencies just as the herding is more prevalent in smaller stocks. Carpenter and Wang (2007) also related price impact of Australian dollar with behaviours of market participants.

Although there are different studies available on herd behaviour in stock market, a few works have been done on herding in forex market. Specifically, no research has been done to check the trends of investors' herding in currencies in Pakistan. This study is an attempt to fill this gap by examining herd behaviour in Pakistan for the period of 2015–2019. The research will describe the reasons of high exchange rates among top traded currencies in Pakistan. Results of this study will guide both investors and economists in understanding how the devaluation of rupee is also a result of imitating behaviour among investors.

3 Methodology and data

3.1 Methodology

This research article estimates herding behaviour by describing cross-sectional standard deviation (CSSD) model by Christie and Huang (1995) and cross-sectional absolute deviation (CSAD) model by Chang et al. (2000). Chang et al. (2000) proposed absolute values of returns for removing the effect of outliers among observations in the model of Christie and Huang (1995). After this, Hwang and Salmon (2004) suggested a state-space model to estimate herding on macro-levels. But their approach requires low-frequency data. In this research, we prefer to use daily observations of currencies, i.e. high-frequency data. Besides, Demirer et al. (2010) considered model of Chang et al. (2000) as effective as Hwang and Salmon (2004)'s model. Therefore, this research paper uses CSAD method. Herding behaviour is estimated by using Newey and West's heteroscedasticity and autocorrelation consistent standard errors to solve any multicollinearity problem (Newey and West 1987).

3.2 Data collection

Christie and Huang (1995) mentioned that herding behaviour is displayed in high-frequency data. Therefore, this study utilizes daily prices of top six traded currencies in Pakistan. Selected currencies are on the top of the list in all major exchange platforms. Prices are taken from January 1, 2015 to December 31, 2019, generating a total of 1305 observations. Data of Saturday and Sunday were excluded as the trading is closed on weekend. Currencies under study are: (1) Pound Sterling (UK), (2) Dollar (US), (3) Euro (European Union), (4) Yen (Japan), (5) AED (UAE), (6) Riyal (Saudi Arabia).

3.3 CSSD and CSAD herding models

In 1995, Christie and Huang proposed the following cross-sectional standard deviation (CSSD) method to capture the dispersion among assets:

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

where $R_{i,t}$ represents stock return of the firm i at time t , $R_{m,t}$ is the cross-sectional average return of the N returns in the equally weighted market portfolio at time t , and N is the number of stocks in the market portfolio.

CSSD method becomes sensitive to outliers. To solve this issue, Chang et al. (2000) proposed cross-sectional absolute deviation (CSAD) instead of CSSD. CSAD model uses absolute values of returns to remove the effects of outliers in the observations. This method is represented as:

$$CSAD_t = \frac{1}{N} \sum_{i=1}^N |R_{i,t} - R_{m,t}|. \tag{2}$$

In this approach, absolute values of returns are calculated. $R_{m,t}$ represents the average of returns in market portfolio which are generated by investors' behaviour. Difference of $R_{i,t}$ and $R_{m,t}$ specifies the dispersion of returns. Therefore, CSAD equation capturing the dispersion and herding effects as suggested by Chang et al. (2000) is given below:

$$CSAD_{(t)} = \alpha + \gamma_1 |R_{m,t}| + \gamma_2 (R_{m,t}^2) + \varepsilon_t, \tag{3}$$

where $|R_{m,t}|$ is the absolute equally weighted market return, and $R_{m,t}^2$ is the squared market return.

This equation identifies herding behaviour by establishing a link between CSAD and $R_{m,t}$. Presence of herding behaviour among stocks or currencies is manifested by statically significant negative coefficient γ_2 . It means high correlation between individual returns of currencies. If there is no presence of herding behaviour among returns, there will be an increase in dispersion.

3.4 Asymmetric effects in herding models

Previous studies of Christie and Huang (1995), Chang et al. (2000), Demirer et al. (2010), Rompotis (2018), and Ballis and Drakos (2019) discussed in their studies that cross-sectional average of returns varies in high and low-volume trading days. Therefore, this study also examines effect of asymmetry in returns of currencies in market.

Asymmetry between the relationship of CSAD and market returns can be estimated by the following two equations, as proposed by Chang et al. (2000):

$$CSAD_t^{UP} = \alpha + \gamma_1^{UP} |R_{m,t}^{UP}| + \gamma_2^{UP} (R_{m,t}^{UP})^2 + \varepsilon_t \text{ if } R_{m,t} > 0, \tag{4}$$

$$CSAD_t^{DOWN} = \alpha + \gamma_1^{DOWN} |R_{m,t}^{DOWN}| + \gamma_2^{DOWN} (R_{m,t}^{DOWN})^2 + \varepsilon_t \text{ if } R_{m,t} < 0, \tag{5}$$

where $|R_{m,t}^{UP}|$ ($|R_{m,t}^{DOWN}|$) is the equally weighted average return of the N currencies in the market available on day t when the return is positive (negative). Similarly, $CSAD_t^{UP}$ is the $CSAD_t$ on the day t , where $R_{m,t}$ is positive and $CSAD_t^{DOWN}$ is the $CSAD_t$ for the day t , where $R_{m,t}$ is negative.

For the purpose of this paper, firstly daily return of each currency is calculated as suggested by Ballis and Drakos (2019):

$$R_{i,t} = \ln \frac{P_{i,t}}{P_{i,t-1}}, \tag{6}$$

where i represents each currency, t is the time period and P shows the closing price of each selected currency.

Table 1 Results of estimation using Newey–West standard errors for Eqs. (3), (4) and (5)

| $CSAD_t = \alpha + \gamma_1 R_{m,t} + \gamma_2 (R_{m,t}^2) + \varepsilon_t$ | | $CSAD_t^{UP} = \alpha + \gamma_1^{UP} R_{m,t}^{UP} + \gamma_2^{UP} (R_{m,t}^{UP})^2 + \varepsilon_t$ | | $CSAD_t^{DOWN} = \alpha + \gamma_1^{DOWN} R_{m,t}^{DOWN} + \gamma_2^{DOWN} (R_{m,t}^{DOWN})^2 + \varepsilon_t$ | | | | |
|---|----------------------|--|----------------------|--|-----------------------|----------------------|----------------------|-----------------------|
| α | γ_1 | γ_2 | α | γ_1^{UP} | γ_2^{UP} | α | γ_1^{DOWN} | γ_2^{DOWN} |
| 0.0019 (0.000)*** | 0.1765 (0.000)*** | -2.9366 (0.001)*** | 0.0020 (0.000)*** | 0.1231 (0.000)*** | -1.9444 (0.001)*** | 0.0016 (0.000)*** | 0.3311 (0.000)*** | -7.2060 (0.000)*** |
| Obs | F(2, 1300) | Prob > F | Obs | F(2, 670) | Prob > F | Obs | F(2, 627) | Prob > F |
| 1303 | 1.224 | 0.0000 | 673 | 6.98 | 0.0010 | 630 | 8.46 | 0.0002 |

*, **, *** represent significance of coefficients at 10%, 5% and 1% level

Table 2 Results of GARCH model for Eqs. (3), (4) and (5)

| $CSAD_t = \alpha + \gamma_1 R_{m,t} + \gamma_2 (R_{m,t}^2) + \varepsilon_t$ | | $CSAD_t^{UP} = \alpha + \gamma_1^{UP} R_{m,t}^{UP} + \gamma_2^{UP} (R_{m,t}^{UP})^2 + \varepsilon_t$ | | $CSAD_t^{DOWN} = \alpha + \gamma_1^{DOWN} R_{m,t}^{DOWN} + \gamma_2^{DOWN} (R_{m,t}^{DOWN})^2 + \varepsilon_t$ | |
|---|-----------------------|--|-----------------------|--|----------------------|
| α | γ_2 | α | γ_1^{UP} | α | γ_1^{DOWN} |
| 0.0018 (0.000)*** | -3.0180 (0.000)*** | -0.0051 0.917 | 0.4137 (0.000)*** | .0015 (0.000)*** | 0.3658 (0.000)*** |
| ARCH (lag 1) | GARCH (lag 1) | ARCH (lag 1) | GARCH (lag 1) | ARCH (lag 1) | GARCH (lag 1) |
| 0.3244 (0.000)*** | -0.0183 0.712 | 0.0478 0.240 | -1.7723 (0.000)*** | 0.6469 (0.000)*** | 0.4166 0.030 |
| Obs | Wald chi2 (2) | Obs | Wald chi2 (2) | Obs | Wald chi2 (2) |
| 1303 | 498.19 | 673 | 69.84 | 630 | 293.89 |
| | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | Prob > F | Prob > F | Prob > F | Prob > F | Prob > F |

*, **, *** represent significance of coefficients at 10%, 5% and 1% level

CSAD is calculated using Eq. (2), and herding behaviour is analysed by regression Eq. 3. Similarly, Eqs. (4) and (5) are also estimated when market returns are high and low. Analysis is run in STATA using Newey–West standard errors and other time-series techniques.

4 Results and discussion

For the estimation of herding, Eqs. (3), (4) and (5) are analysed. Equation (3) assesses whether herding behaviour prevails in Pakistani currency market or not. As mentioned above, a statically significant and negative coefficient of $R_{m,t}^2$ shows the presence of herding in currencies market. Similarly, Eqs. (5) and (6) examine whether herding behaviour moves asymmetrically in upward and downward market movements. For the adjustment of standard errors of regression for heteroscedasticity and autocorrelation, Newey and West (1987) estimator is used. This study also uses Generalized Autoregressive Conditional Heteroscedasticity model, GARCH (1,1) model 7 by Bollerslev et al. (1992). This will cover for heteroscedasticity in data.

Estimation results of the model are presented in Tables 1 and 2. Table 1 contains results of OLS estimator using Newey–West standard errors and Table 2 contains GARCH model.

In first model of $CSAD_t$, coefficient γ_1 is positive and statistically significant at 1% level in both Newey–West estimation and GARCH model. For the analysis of herding behaviour, main parameter is γ_2 . As mentioned above, a statistically significant negative value of this coefficient shows the presence of herding among returns. In the first model, this value is -2.9366 , and significant at 1% significance level (Table 1). Value of γ_2 in GARCH model is -3.0180 at 1% significance level (Table 2). These results strong imply the presence of herding behaviour among currencies.

Second and third models aim at analysing $CSAD_t$ with a focus on assymetric reaction between upward and downward movements of returns. While analysing this model with Newey–West estimation and GARCH model, results of our variable of interest turn out to be negative and statistically significant at 1% level in both $CSAD_t^{UP}$ and $CSAD_t^{DOWN}$. Value of γ_2 is -1.9444 (1% significance level) for $CSAD_t^{UP}$ and -7.2060 (1% significance level) for $CSAD_t^{DOWN}$ using Newey–West estimation (Table 1). In the case of GARCH models, these values are -1.9565 and -8.1781 (significant at 1% level), for $CSAD_t^{UP}$ and $CSAD_t^{DOWN}$, respectively (Table 2). Our results support herding in both upward and downward movement of returns in currencies in Pakistan. When comparing two-point estimates in both Newey–West estimation and GARCH model, the value of γ_2 coefficient in $CSAD_t^{DOWN}$ is higher than values of $CSAD_t^{UP}$. These findings provide indication that down-events market return dispersion follows the movement of markets at a higher speed than up-event market dispersions. With reference to literature, Ballis and Drakos (2019) tested for asymmetric behaviour of herding in cryptocurrency market and found more evidence of asymmetry in the case of upward market trends. Similarly, Rompotis (2018) found this relation in case of negative market trends of exchange-traded funds.

5 Conclusion

The aim of this research article was to examine the decision-making of investors in Pakistan in forex market. The purpose was to explore whether herding behaviour prevails in market or investors rationally make their decisions based on true market information. Study used daily prices of top six traded currencies in Pakistan for a period of 2015–2019.

Results of this study indicated strong evidence in the favour of herding behaviour. As mentioned in the methodology section, γ_2 coefficient is of importance for analysis. Results of this coefficient strongly support the presence of herding behaviour. Both estimation techniques generated same results. Even this study reports significant herding in up and down market movements, i.e. herding in asymmetric market movements of returns.

Overall, findings of this study suggest that Pakistani investors do not rationally make their decisions while investing in currencies. Returns of currencies show imitating behaviour of investors. Investment in currencies follows random patterns based on irrational choices. There are reasons of this imitating behaviour. First, there is a lack of financial literacy in Pakistan. People are unaware about the risk and return strategies and are illiterate about the causes of fluctuating exchange rates. World economy, international market crisis, change in exports and imports put a significant impact in forex market. But investors, with unknown facts, follow the patterns of others for their decision-making. Secondly, as opposed to efficient market hypothesis, markets play inefficiently and not according to demand and supply patterns. Asymmetry of information leaves investors nowhere but to see and track what is prevailing in market. As a result, private information is disregarded, and behaviours of others dominate.

Following above results and their reasons, this study suggests that there should be increased efforts to enhance financial literacy among people. Herding in upward market trends leads to high exchange rates, and thus, devaluation of currency. Such an impact is harmful for a developing country like Pakistan. Investors should be aware of market analysis and trends to rationally decide for their investment behaviours.

This paper generates new insight to the concept of herding in Pakistan by stating its evidence in currencies market. According to researcher's best knowledge, no previous research has studied herding in forex market of Pakistan. Our results confirm the presence of herding among behaviours of investors while investing in currencies. From practical point of view, this study adds knowledge for investment community with regard to forex market in Pakistan. Present research also has some limitations. Most important is that events like large remittance from foreign countries in the form of donations and gifts also effect exchange rate of PKR. This effect should be considered in future research. Moreover, current research has studied herding in market only. There might be impact of herding behaviour by business entities involved in trading. Future research should consider this effect also.

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Availability of data and materials

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy restrictions.

Declarations

Competing interests

The authors declare that they have no competing interests.

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