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## Influence of Behavioral Biases on Investment Decision Making with Moderating Role of Financial Literacy and Risk Attitude: A Study Based on Colombo Stock Exchange

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### ABSTRACT

**Purpose:** This paper aims to analyze the influence of overconfidence bias and herding bias on investment decision making and the moderating role of financial literacy and risk attitude on overconfidence bias and herding bias on investment decision making in the Colombo Stock Market.

**Design/Methodology/Approach:** This paper collects data from a structured questionnaire survey carried out among 110 individual investors in the Colombo stock market. This paper used a multiple regression method to analyze the influence of overconfidence bias and herding bias on investment decisions with financial literacy and risk attitude as moderating variables.

**Findings:** Overconfidence bias has a significant influence on investment decisions. Results do not indicate that herding bias significantly influence investment decisions. Financial literacy significantly moderates the relationship between overconfidence in investment decisions. However, financial literacy does not significantly moderate the relationship between herding bias in investment decisions. Financial literacy and risk attitude do not significantly moderate the relationship between herding bias in investment decisions.

**Implications:** The findings of this paper would help to understand the influence of behavioral bias on investment decisions of individual investors in Colombo stock market.

**Originality/Value:** The research described in this paper study the moderating role of financial literacy and risk attitude on overconfidence bias and herding bias in making investment decisions (in Colombo Stock Exchange).

### KEYWORDS

Behavioral finance,  
financial literacy,  
Investment decisions,  
Herding bias,  
Overconfidence bias,  
Traditional finance, Risk  
attitude

### JEL

### CLASSIFICATION

G11, G41, G53

## I. Introduction

Traditional financial theories are built on the assumption that the rationality of humans plays a significant role in investment decision making. Efficient Market Hypothesis and Modern Portfolio Theory were used to assume all information was manifested in black and white absolutes and a rational investment is made (Victor Ricciardi and Helen K. Simon, 2000; Pompian, 2006). Though these theories create a platform to analyze investments and returns with minimum risk, in real life predictions and returns are different. Researchers have identified this gap as market anomaly. Behavioral finance tries to interpret these

anomalies by studying psychology of irrationality in making financial decisions (Bazerman, 1998; Hogarth, 1987; Kumar & Goyal, 2015; Ahmad et al., 2017); Behavior of investors in the stock market is determined by many factors, investment duration, participant standard performance, market instability and conjecture in stock markets (Chang et al., 2009).

Behavioral finance researchers have dedicated appreciable attention to understanding the behavior of market participants and biases associated with their actions when dealing with investment decisions. Evidence of these biases has typically come from cognitive psychology

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literature and has then been applied in a financial context. Disposition effect, herding bias, and overconfidence bias are a few (Linet al., 2011; Hirshleifer et al., 2012; Scharfstein and Stein, 1990).

Overconfident investors overreact to the private information signals while they ignore the publicly available information, (Daniel et al., 1998). Herding is a behavior where one follows the decision of the others instead of relying on movements of stock prices. Herding behavior reflects the decision based on some other factors like market conditions (Linet al., 2011). This behavioral bias influences the rational decisions of investors. Financial literacy, the ability to effectively manage one's finances to make sound financial decisions and be financially contended (OECD, 2009; Potrich & Vieira, 2018) also may influence the behavior of investors. Psychological variables like risk attitude also affect investor decision making. Financial literacy, risk attitude with respect to gender, work experience, class, and education is different.

In this context certain it is evident socio economic, psychological, and behavioral bias affects investor behavior. Behavioral bias affects more Asian investors as contrast to European investors (Yates et al., 1997). In considering the global context, the previous studies showed that much research on herding and overconfidence biases has so far focused on western countries (Yates et al., 1997). Most studies have concentrated on individualistic cultures and well-developed financial markets whereas very little is known about the conduct of individual investors in collectivist cultures and less developed markets. So, there is a significant gap, and this study helps to fill that gap in the literature by considering how the investors' behavioral bias affects the performance of the investment decisions in collectivist societies, particularly in Sri Lanka.

This study also studies the moderating role of financial literacy on overconfidence bias and herding bias and the moderating role of risk attitude on overconfidence bias and herding

bias in the Colombo stock exchange thus, to provide empirical evidence to the extant literature.

This study was undertaken to identify whether the behavioral bias influences the investment decision of individual investors in the Colombo Stock Exchange. Accordingly, a quantitative study was undertaken to meet the research objectives, which were to determine the influence of overconfidence bias and herding bias on investment decision making, and to determine the moderating role of financial literacy on overconfidence bias and herding bias and to determine the moderating role of risk attitude on overconfidence bias and herding bias in making investment decisions. The main findings provide evidence for the presence of overconfidence bias in investment decision making and the presence of moderation effect of financial literacy on overconfidence bias and investment decision making. However, the study did not indicate the presence of herding bias and the effect of the moderation role of financial literacy on herding bias and investment decision making. There was very limited evidence to support the moderating role of risk attitude on overconfidence bias and herding bias when making investment decisions in CSE.

Accordingly, the remainder of the study is organized as follows, section two discusses the literature of the study highlighting the empirical gap addressed. Section three of the study describes the methodology of the study undertaken, highlighting the design of the study, questionnaire development and analysis. Results of the analysis are elaborated in section four followed by the conclusion of the study in section five.

## **II. Literature Review and Hypotheses Development**

The traditional financial theory is where the decisions makers are rational (Humra, n.d., 2016). Financial decisions should be made upon financial theories to gain profitable investments (Zahera & Bansal, 2018).

Traditional finance is resolutely associated with the modern portfolio theory (MPT) and the efficient market hypothesis (EMH). “Modern Portfolio Theory”, the first systematic financial theory by Markowitz (1952), evaluates the return and risk in an investment, using the mean-variance pattern. The efficient market hypothesis (EMH) theory signifies that all information has already been reflected in a security’s price or market value. F. Fama, (1969) defines that in efficient markets prices “fully reflect” available information for investors. Behavioralists in finance seek to replace this “rational economic man” with a more-realistic model in the financial sector. Behavioral finance blossomed when the advances made by psychologists came to the attention of economists where people began to study the human side of economic decision making (Shefrin, 2010; Pompian, 2006). Sherfin, (2010) elaborates, that one extreme behavioral finance is a collection of findings of anomalies relative to efficient market theories while the other extreme behavioral approach already is encompassed with a systematic approach which includes psychological concepts with formal frameworks, hypotheses with empirical findings.

Sethi-Iyengar, Sheena & Jiang, Wei & Huberman, Gur. (2004). suggests that “individual investors fail to behave rationally even in quite simple situations” thereby leading to market anomalies. Chaffai and Medhioub, (2014) confirm that in an economic world where such irrational agents exit the market anomalies continue to persist leading to mispricing and limits to arbitrage. Attain a significant level of rationality while maximizing profit with minimum risk is not complete till the time investor is able to understand the psychological biases inherent in the decision-making process (Zahera & Bansal, 2018).

Investment decision making is not an easy process, the investment decisions may be affected by various factors. Tauni et al., (2017) clarify three possible ways in which

investors can gather information: hiring a financial expert, getting advice from peers and directly requesting information by themselves about the properties of investment. Baker et al., (2018) provides socio-economic factors influence on portfolio composition, signifying that the demographic profile of the investor too contributes to investment decision making. Main factors that could influence stock selection decision are three significant homogeneous variable groups; accounting information, advocates’ recommendations, and self/firm image (Gunathilaka, c.,2014). Cognitive bias and heuristics play an important role in decision-making process and the performance of individual investors (Kannadhasan and Nandagopal, 2010a; Shah et al., 2018)

Behavioral biases are defined abstractly in the same way as systematic errors in judgment (Pompian, 2006). Accordingly, there are several biases studied under heuristics such as representativeness, availability bias, and overconfidence, while regret aversion and mental accounting are some behaviors studied under prospect theory (Humra n.d.,2016). Balagobei., (2019) illustrates that the behavioral variables that influence the investment decisions of individuals are grouped into four factors in the reviewed theories: herding, heuristics, prospect, and market. In this study the focus is directed to overconfidence bias and herding bias in making financial decisions.

### ***Overconfidence Bias and Investment Decision Making***

The people susceptible to prediction overconfidence ignore risks associated with their investments while those who are susceptible to certainty overconfidence trade too much and maintain undiversified portfolios, they ignore the publicly available information, (Pompian, 2006; Daniel et al., 1998). Overconfidence may arise due to overestimation of ones’ accuracy of analysis and knowledge about securities (Odean, 1999). Russo and Schoemaker, (1992) recognize overconfidence bias as a failure to recognize the boundaries of one’s

knowledge. Due to overconfidence portfolios are inadequately diversified and traded excessively, such investors experience lower returns than well diversified investments (Odean, 2002). Bakar and Yi (2016) signify the presence of overconfidence bias has a significant influence on investors' decision-making while Shah et al., (2018) contribute that overconfidence bias has bad consequences for investment decisions and investor performance. Overconfidence is believed to improve determination, persistence mental ability and risk tolerance attitude (Kirchler and Maciejovsky.,2002). On the contrary, Kengatharan and Kengatharan (2014) suggest that overconfidence adversely affects investment-related choices and performance. Accordingly, the review of the literature led to the development of the following hypothesis of the research;

*H<sub>1</sub>: Overconfidence bias has a significant positive influence on investment decision making.*

### ***Herding and Investment Decision Making***

In finance, the term herding or herd behavior implies the process where economic agents are imitating each action of others instead of following their own beliefs and information. Herding is observable as correlated behaviors of a group of investors occurred consciously or unconsciously as they trade in the same direction at the same time (Hwang and Salmon, 2004; Spyrou, 2013; Bashir et al., 2013; Kumar, Satish & Goyal, Nisha. (2015).; Balagobei, 2019; Shantha, 2019). The irrational view focuses on investor psychology where an investor follows other investors blindly. Individuals are more likely to suppress their own beliefs in favor of the market consensus during periods of unusual market movements, (Christie & Huang, 1995; Wang, n.d).

Bikhchandani and Sharma (2000) distinguish between “spurious herding” where the investors take similar decisions because they face similar information sets and react the same to changes in fundamental factors, and

“intentional herding” where the investors copy each other's actions with the intention preserve reputation and protect their remuneration. Many authors relate herd behavior with the creation of asset bubbles and crashes (Spyrou, 2013; Shantha, 2019). Economists like Wang, n.d suggest inefficient markets may lead to bubble like episodes or market anomalies and herd behavior may emerge in periods of such market stress. Studies also indicate that herding behavior stems from informational limitations in financial markets (Fernández et al., 2011). Determinants of herding behavior and the impact of mass decisions on an individual's decision whether to buy or not stock was signified by Baddeley et al. (2010), according to his finding's individuals tend to show herding based on their gender, education level and age when making investment decisions. Further Kumar, Satish and Goyal, Nisha. (2015) also signifies that, male investors search for more information and evaluate more alternatives than females making them more prone to overconfidence and herding. Sewwangdi, (n.d.) in her study examines the effect of herding on bull and bear phases in the Colombo Stock Exchange, and was unable to provide evidence for herding behavior. In contrast, Kengatharan & Kengatharan, (2014) reveal a strong herd tendency at the aggregate market level and up and down-market days during the first half of the sample period (2000-2009) on Colombo Stock Exchange. Similarly, Shantha,(2019) who conducted studies on herding bias on the Colombo Stock Exchange clarified herding is evident during up-market days of the bubble period, whereas negative herding during down-market days when the bubble's burst occurred in the market.

Conclusively, the literature review of the study led to the development of the following hypothesis of this research.

*H<sub>2</sub>: Herding bias has a significant positive influence on investment decision making.*

### ***Moderating Role of Financial Literacy and Investment Decision Making***

Financial literacy is the ability and confidence to effectively manage one's finances to ultimately attain an efficient behavior to make sound financial decisions and be financially contented (OECD,2009; Potrich & Vieira, 2018). Individuals who lack financial literacy are susceptible to behavioral biases (Lusardi and Mitchell, 2007; Kahneman et al., 1991). Financial literacy is indicated as a key element to attaining economic, and financial stability for both an individual and the economy. Factors such as age, gender, and income determine the level of financial literacy (Lusardi & Mitchell, 2007; De Clercq & Venter, 2009; Weerasekara, 2018; Baker et al., 2018). Personal traits such as risk tolerance, biases and investment decisions are influenced by financial literacy (Raut, 2020) Might investors have more knowledge about financial terms and the behavior of the stock market, access to information or assistance (Rutherford & Devaney, 2009; Alsemgeest, 2015), they will be motivated in a manner which makes them able to depend more on the fundamentals of stocks rather than social influences. Potrich & Vieira, (2018) signifies financial literacy on behaviors investigated reveals that there is a greater impact on compulsive buying behavior or herding followed by a propensity to indebtedness. On the contrary Baker et al., (2019) reveal that financial literacy has a negative association with the disposition effect and herding bias. Dhar and Zhu (2006) signify financial literacy is unrelated to overconfidence bias. On the basis of this background in the literature review following hypotheses were established to study the moderating role of financial literacy

(a) on overconfidence bias and investment decision making;

*H<sub>3</sub>: Financial literacy has a moderating role in the relation between overconfidence and investment decision making.*

(b) on herding bias and investment decision making

*H<sub>4</sub>: Financial literacy has a moderating role in the relation between herding bias and investment decision making.*

### ***Moderating Role of Attitude Towards Risk on Investment Decision Making***

Market commentators often cite changes in investors' attitudes towards risk as a possible explanation for swings in asset prices. Over the years the investors, attitude toward risk is often cited as a determinant of asset prices (Pak & Mahmood, 2015; Markowitz 1952). Risk component shifts from risk tolerance to risk avoidance or risk averse (Pak & Mahmood,2015). The perception of risk continually varies depending on the attitudes against risk when making financial decisions. The investment style is often determined by the risk-taking attitude (Hunter and Kemp, 2004; Fellner & Maciejovsky, 2007). Pak & Mahmood (2015) clarifies that the high-risk taking is positively associated with the intention to invest in stocks. On the basis of this evidence in the literature review following hypotheses were established to study the moderating role of risk attitude

(a) on overconfidence bias and investment decision making;

*H<sub>5</sub>: Risk attitude has a moderating role in the relation between overconfidence and investment decision making.*

(b) on herding bias and investment decision making

*H<sub>6</sub>: Risk attitude has a moderating role in the relation between herding bias and investment decision making.*

### **III. Methodology**

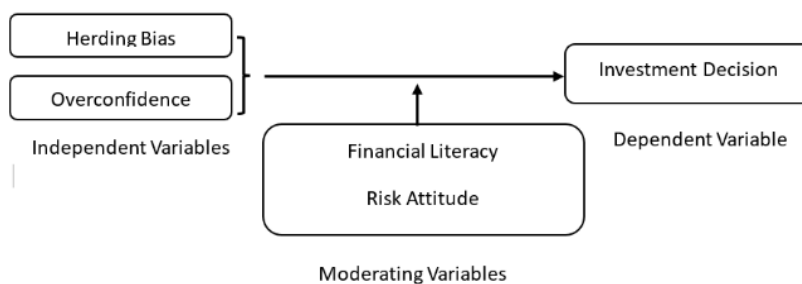
The study adopts a quantitative research method while using cross-sectional data for the analysis purpose. To achieve the research objectives and meet the research questions quantitative data was collected from a statistically viable sample. A total of 150 questionnaires were shared and 110 completed responses were received from individual investors invested in Colombo

Stock Exchange, using the simple random sampling technique. A structured questionnaire was forwarded to collect data to assess the relationship between variables and an ANOVA was performed. To measure the variables a five-point Likert scale where “1= Strongly Disagree” and “5= Strongly agree” was used. Techniques such as

electronic mail and forms were used to reach the investors.

Here, overconfidence and herding bias are independent variables of the study while investment decision making is the dependent variable of the study. Financial literacy and risk attitude are the moderating variables.

**Figure 1.** The conceptual mode of the study



Source: Author's work based on research

## IV. Results

### Descriptive Analysis

The correlation coefficient is a statistical numerical measure of the strength of the linear relationship between two different variables. Table 1 shows the correlation coefficients of the study conducted. Accordingly, the correlation among the dependent variable investment decision

making and the independent variable overconfidence and herding bias a positive low degree of correlation could be seen as the values lie between +0.143 and +0.198. The correlation coefficient relationship between the independent variables and the

moderating variables shows a similar degree of positive correlation as the coefficient lies between +0.166 to +0.105.

**Table 1.** Results of the Correlation coefficients of the variables of the study

|                      |    | Mean | SD    | IV     | OC      | HB      | FL      | RA |
|----------------------|----|------|-------|--------|---------|---------|---------|----|
| Dependent Variable   | IV | 1.85 |       | 1      |         |         |         |    |
| Independent Variable | OC | 3.28 | 0.776 | 0.198* | 1       |         |         |    |
|                      | HB | 3.24 | 0.837 | 0.143  | 0.689** | 1       |         |    |
| Moderating Variable  | FL | 2.53 | 1.000 | 0.166  | 0.519** | 0.471** | 1       |    |
|                      | RA | 2.56 | 1.119 | 0.105  | 0.480** | 0.650** | 0.651** | 1  |

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\*. Correlation is significant at the 0.01 level (2-tailed).

Source: Primary data.



Cronbach's alpha is the most used internal consistency measure. The closer Cronbach's alpha is to 1, the higher the internal consistency reliability. According to Nunnally (1978), coefficients are

indicated as  $\geq .9$  -Excellent,  $\geq .8$  - Good,  $\geq .7$  - Acceptable,  $\geq .6$  - Questionable,  $\geq .5$  - Poor and  $.5 \leq$  Unacceptable. The calculated scales proved to be the "Good" condition as presented in the table 2.

**Table 2.** Reliability test- Summary of the Cronbach's alpha results

|                      | Variable            | Cronbach Alpha | No. of items |
|----------------------|---------------------|----------------|--------------|
| Dependent Variable   | Investment decision | 0.864          | 11           |
| Independent Variable | Overconfidence bias | 0.811          | 4            |
| Moderating Variable  | Herding bias        | 0.843          | 6            |
|                      | Financial literacy  | 0.877          | 5            |
|                      | Risk attitude       | 0.905          | 5            |
| Total                |                     |                | 31           |

Source: Primary data.

### Regression Analysis

**Table 3.** Results of the Regression Analysis of the study

| Model     | R     | R2    | Beta  | T     | Sig.  |
|-----------|-------|-------|-------|-------|-------|
| OC        | 0.198 | 0.039 | 0.198 | 2.099 | 0.038 |
| HB        | 0.143 | 0.02  | 0.143 | 1.499 | 0.137 |
| OC and FL | 0.211 | 0.045 | 0.086 | 0.779 | 0.438 |
| HB and FL | 0.181 | 0.033 | 0.126 | 1.174 | 0.243 |
| OC and RA | 0.198 | 0.039 | 0.192 | 1.774 | 0.079 |
| HB and RA | 0.144 | 0.021 | 0.022 | 0.172 | 0.863 |

Note: OC = Overconfidence Bias, HB = Herding Bias, FL= Financial Literacy, RA= Risk Attitude. \* $p < .01$ .

\*\* $p > .01$ .

Source: Primary data.

According to table 3, the "P" value of overconfidence bias is  $0.038 < 0.01$  indicating the model for overconfidence bias is statistically significant in positive order under 10% confident significant level. Beta value of overconfidence bias is 0.198 (Sig. value= 0.038) and is statistically significant at a 90% confidence level, proving that investment decision making is positively influenced by overconfidence bias, there is a positive significant influence between overconfidence on investment decision making, the results are consistent with the findings of Metawa et al., (2019) based on the study on Egyptian stock market.

The "P" value of herding bias is 0.138 which is  $> 0.01$  indicating that the model for herding bias is statistically not significant under 10% confident significant level. Beta value of herding bias is 0.143 (Sig. value =0.137) it is statistically not significant at a 90% confidence level. The results did not indicate a significant influence on herding bias and investment decision making though the influence was positive, similar results were indicated in studies by Kengatharan & Kengatharan, (2014); Prosad et al., (2012) and Sewwangdi, (2016).

The “P” value of the model for overconfidence bias with financial literacy analysis showed a value of  $0.087 < 0.01$  indicating overconfidence bias with financial literacy is statistically significant. Beta value of overconfidence bias with the moderation of financial literacy is 0.153 (Sig. value = 0.168) and is statistically significant at a 90% confidence level. The model for herding bias is also not significant under the 10% confident significant level as the “P” value is  $0.168 > 0.01$ . The beta value of herding bias with moderation of financial literacy is 0.083 (Sig. value = 0.442) is statistically not significant at a 90% confidence level.

As table 3 indicates, the model for overconfidence bias with risk attitude is not significant under the 10% significant level as “P” value is  $0.117 > 0.01$ ; beta value of overconfidence bias with the moderation of risk attitude is 0.192 (Sig. value = 0.079) is statistically not significant at a 90% confidence level, though investment decision making is positively influenced by overconfidence bias. The model for herding bias is also not significant under the 10% confident significant level “P” value is 0.327 which is  $> 0.01$  indicating that the model for

herding bias is statistically not significant though the relationship is positive. The beta value of herding bias with the moderation of risk attitude is 0.129 (Sig. value = 0.309) is statistically not significant at a 90% confidence level. Thus, the results prove that investment decision making though influenced by overconfidence and herding bias with the moderation effect of risk attitude. The results of risk attitude were consistent with the findings of Bashir et al., (2013), who conducted a similar study on Pakistani stock market.

Thus, the results indicate that financial literacy does not moderate the relationship between overconfidence bias and herding bias and risk attitude does not moderate the relationship between overconfidence bias and herding bias. The results also did not indicate the presence of the moderation effect of financial literacy and risk attitude as the results were not statistically significant.

The summary of the results is indicated in table 4 highlighting the hypothesis. Accordingly, only H1 was statistically significant while there was no evidence to support H2-H6.

**Table 4.** Summary results

| Hypothesis   | Status        |
|--|---------------|
| H <sub>1</sub> Overconfidence bias has a significant positive influence on investment decision making.                   | Supported     |
| H <sub>2</sub> Herding bias has a significant positive influence on investment decision making.                          | Not Supported |
| H <sub>3</sub> Financial literacy has moderating role in relation between overconfidence and investment decision making. | Supported     |
| H <sub>4</sub> Financial literacy has moderating role in relation between herding bias and investment decision making.   | Not Supported |
| H <sub>5</sub> Risk attitude has moderating role in relation between overconfidence and investment decision making.      | Not Supported |
| H <sub>6</sub> Risk attitude has moderating role in relation between herding bias and investment decision making.        | Not Supported |

## V. Conclusion

The study is based on the evidence from Colombo Stock Exchange in Sri Lanka, a frontier market. The objective of this study was to determine the influence of human behavior in making financial decisions. The influence of behavior was analyzed using overconfidence and herding behavioral bias on investment decision making with the moderating role of financial literacy and risk attitude.

The main conclusion is that there exists the presence of behavioral biases in making financial decisions which address the empirical gap of this study. There is a positive significant influence between overconfidence in investment decision making, the results are consistent with the findings of Metawa et al., (2019) based on the study on the Egyptian stock market. However, a similar study conducted by (Bashir et al., 2013) did not provide any statistical significance of overconfidence bias on investment decision making. The results did not indicate a significant influence of herding bias and investment decision making though the influence was positive, the results are consistent with Kengatharan & Kengatharan (2014); Prosad et al., (2012); and Sewwangdi (2016). The results indicated that there is a moderation effect of financial literacy on overconfidence bias and investment decision making but there was evidence to support that financial literacy moderates the relationship between herding bias and investment decision making. The results did not indicate the presence of moderation effect of risk attitude as the results were not statistically significant on either overconfidence bias or herding bias. The results of risk attitude were consistent with the findings of Bashir et al., (2013), who conducted a similar study on the Pakistani stock market.

Accordingly, the findings of the study contribute that investors who are confident in themselves are less prone to imitate or herd toward other investors. And the investors who are financially literate are overconfident.

This study was conducted taking into consideration only the overconfidence and herding biases, there are several other biases in the behavioral finance paradigm. Future researchers can conduct studies on other behavioral bias such as representative, anchoring bias etc. to study what influences investment decision making. The study was conducted using financial literacy and risk attitude as moderator variables. It can be recommended for future researchers to conduct studies to determine the direct influence of such variables on financial decision making. Moderation and mediations of several other variables can be further studied for a better understanding of market anomalies. This study was conducted with individual investors in the stock market. It can be recommended to study the behavior of institutional investors in financial decision making in the Colombo Stock Exchange.

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