



Environmental Uncertainty and Information Asymmetry: Does Conservative Financial Reporting Moderates the Results

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ABSTRACT

Abstract: This research work examines the effect of uncertainty on information asymmetry moderated by conservative financial reporting Asymmetric information (spread), whereas uncertainty is calculated using a measure of the environmental scanning method. This method divides the sample into 'inert' and 'alert'. 'Inert' firms are not scanning the environment, and 'alert' for firms who are constantly engaged in observing and scanning their environment while the coefficient of variation in sales is applied for robustness check of environmental uncertainty. A proxy developed by Khan and Watts is applied for accounting conservatism. The sample size of this research is taken from firms registered on the Pakistan Stock Exchange while the time period of study is 2010 to 2021. The statistical output reinforces the hypothesis of the study. The statistical results are evidence that conservative financial reporting may be helpful to reduce asymmetric information during uncertainty. Empirical estimations provide implications for all stakeholders e.g. investors, regulatory authorities, and researchers.



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1. Introduction

Identifying and analyzing uncertainty is an important issue as it is a fundamental reality of economic life. Both people and corporations face uncertainty while making decisions and creating strategies. In this research work, I analyzed the relation of micro-level environmental uncertainty and information asymmetry and then analyzed the moderating role of conservative financial reporting. Due to uncertainty, there may be less dependence on financial information, which results in an increased net benefit of gathering particular information and lead to a rise in the collection of private information which aggravates asymmetric information between investors (Hadhri, 2023; Li, Xia, Chen, Ding, & Wang, 2021). According to Lu and Trabelsi (2013) that conservative reporting improves financial information and promotes the concept that accounting conservative is favorable for financial data as it provides comparatively reliable facts.

The link between accounting numbers and economic realities is diminished by ambiguous accounting information, which increases information asymmetry. As a result, environmental uncertainty makes it harder for financial reports to convey business information while also leading to an uneven distribution of that information among market participants. To increase the reliability and clarity of financial information, financial statements are based on specific accounting standards. The goal of such guidelines is to deliver data that can protect creditors' rights, the optimum behavior of management, and shareholders' interests. Conservative reporting is one of these accounting principles that seeks to maintain equilibrium between the parties with an interest in using accounting information.

Conservatism is a crucial component of higher-quality financial data. Conservatism is commonly used to evaluate the exacting standards of business financial data since the 20th century, it has been the most fundamental and significant aspect of financial accounting (Basu, 1997; LaFond & Watts, 2008). However, there has been very limited empirical evidence in the literature to date to back up the notion that financial reporting can be done in an uncertain environment. Especially, moderating role of conservatism with information asymmetry during firm level environmental uncertainty. Moreover, Rashidi (2021) reported as a significant factor in reducing the phenomenon of information asymmetry is accounting conservatism. Similar findings are reported by Isniawati, Rahmawati, and Gunardi (2018).

According to LaFond and Watts (2008) conservative reporting may help to lessen benefits of management and potential to manipulate and hence reducing asymmetric information. In literature, numerous studies states that conservative accounting have an effect on information asymmetry. In spite of a study by LaFond and Watts (2008) reports that asymmetric information can be changed When expanding investments and growth possibilities cannot be validated. Their research documents that a high accounting conservatism is correlated with a significant degree of asymmetric information. To lessen information asymmetry and preserve the integrity of their organization, managers eventually tend to be more conservative for financial decision making.

A similar study conducted by Hashim and Mohammed (2022) reported significant impact of conservative accounting on information asymmetry. But so far very less research work is available for moderating role of conservative reporting and asymmetric information(IA) during uncertainty. The objective of research is to understand the relation of uncertainty, information asymmetry and the moderating role of accounting conservatism. The logic for conducting this research in Pakistan being an emerging economy with less rate of saving, higher uncertainty, and weaker protection for investors. The unique situation supports the need for the study and could influence policymaking.

This research work contributes to literature in multiple ways. This research work builds up the theoretical literature for predicting effect of uncertainty on asymmetric information. The empirical output indicates that information asymmetry increases during the increasing micro level uncertainty. To the best of my knowledge, very less research work is available on the relationship between uncertainty and information asymmetry. This work also contributes broadly on the literature of conservative accounting and information asymmetry and particularly moderating role of conservative reporting for information asymmetry during the face of uncertainty, which is particularly important to accounting and environmental uncertainty can signal the risk which is foist for the stockholder.

For my research, Khan and Watts (2009) model is used for measurement of conservatism. Following the Hsieh, Ma, and Novoselov (2019) 'inert' firms are defined as firms who are not continuously observing their surroundings and 'alert' are defined as organizations who continually scan firm's environment and can observe signs of changing environment early and, hence, have a lot of time to analyze, investigate and understand the issue and finding the possible solution. As a result, it is possible for such firms to reduce uncertainty. In other words,

firms grouped as 'inert' faces higher uncertainty as compared to firms grouped as 'alter' and for information asymmetry spread is applied.

Following the previous related research work, I studied (i) asymmetry and environmental uncertainty (ii) the link conservatism and asymmetry (iii) the moderating role of conservatism on information asymmetry during environmental uncertainty. Our theoretical hypothesis is reinforced by statistical output. Firstly, 'inert' organizations have a positive and statistically significant relation with information asymmetry. Second, estimations report negative impact of high conservatism on the information asymmetry. Third, statistical output reports that moderating relation of environmental uncertainty and conservative accounting has statistical significant relation with asymmetric information.

Details and discussion of literature review and hypothesis development is in section 2. Section 3 is about sample and variables is discussed, Section 4 for empirical results and discussions, and last Section for conclusion and recommendations.

2. Literature Review

Easley and O'hara (2004) examined how the information content of nonpublic and public sources differs. They argue that traders who are not highly educated maintain fewer assets because they are aware of their poor informational status. This further increases information asymmetry by lowering the price of assets with a greater level of nonpublic data. They come to conclusion that private data creates a new type of systemic risk and investors demands bigger return for it. According to Lin, You, and Huang (2012) basic information environment can be a significant influence on business behavior. In other words, investors raise the level of risk they place on information if information uncertainty penetrates the market. They want bigger returns as risk rises, as a result cost of capital raises.

According to Cormier, Houle, and Ledoux (2013) and Leblebici and Salancik (1981) informational risk is that stage of variability that investors must deal with. The presence of an environment that disclose data results in less uncertainty and, as a result, improves the capacity of investor to assess and forecast projected output and return. Bushman Robert and Smith Abbie (2001) states that the linking of accounting statistics and economic data is not reliable in unstable circumstances as a result of the increased ambiguity of accounting facts and data, which also increases information asymmetry. As a result, environmental uncertainty makes it harder for financial reports to convey firm information while also leading to an asymmetrical allocation of such information among market players. Therefore, environmental unpredictability causes further uncertainty and ambiguity. The symmetrical distribution of knowledge in effective information settings minimizes managers' opportunistic cash inflows and outflows for self-benefits. Summing up, lowering environmental uncertainty raises the company's intrinsic value

H1: Environmental Uncertainty results in higher Information Asymmetry

Feltham and Ohlson (1995) described that accounting conservatism is a determination of underestimating the book value of the firm, involving that market value is greater than the book value. Fundamentally, in this research paper, Dhole, Liu, Lobo, and Mishra (2021) investigated the association presented among firm's goodwill, accumulation accounting and evaluation of an impartiality of a company. The instigators defined the many conceptions, operating activity, book value, goodwill, firm's equity as well as unusual income market value. Conservative financial reporting reduces information asymmetry because of the following reasons. On the other side, conservatism demands timely identification of losses, which lessens managers' incentives to hide bad news, while demanding high verification for identifying earnings, which reduces incentives of managers obtained due to inflate earnings. Thus, conservatism compels managers to make tough decisions and disclose more transparent and reliable financial information to its users.

According to LaFond and Watts (2008) On the other side, data from financial annual reports encourages all investors to assess company performance now and in the future using soft data from various sources. As a result, conservatism enhances firm stock prices and performs an informational role in the capital market. Accounting conservatism due to timely recognition of losses reduces information asymmetry not only in debt market but also in equity market Wittenberg-Moerman (2008). Hsieh et al. (2019) states that because of less information asymmetry, conservative reporting helps to decrease the timelines and frequency of forecasts or predictions by managements. El Ghouli, Guedhami, Kim, and Yoon (2021) reported that in equity market, firms following conservative financial reporting faces lesser negative returns and also have fewer issue of information asymmetry.

H2: There is inverse relationship between conservative financial reporting and asymmetric information

A critical function of disclosing financial details and reports is to reduce agency issue by minimizing the difference between investors and management (Beyer, Cohen, Lys, & Walther, 2010; Mora & Walker, 2015). Conservative financial reporting may facilitate to mitigate asymmetric information. According to Balakrishnan, Vashishtha, and Verrecchia (2019) due to incomplete information, investors must analyze their investment returns using a conservative estimate of net assets. Conservative accounting The signaling component of conservative accounting is based on factors such as control of risk and minimizing asymmetric information between outsiders and management. Xu, Rabinovich, Dughmi, and Tambe (2015) reports that Conservatism reporting might take as an alternate for a governance system to minimize ineffective managerial judgements and short-term managerial decisions. Empirical findings of Fu, Kraft, Tian, Zhang, and Zuo (2020) and show that good financial reporting lowers information asymmetry and capital costs, and hence highlighting the advantages of accounting conservatism. According to Akins (2018), conservative reporting reduces the amount of asymmetric information that can be exploit and decrease the profits savvy investors can earn. Burgstahler, Hail, and Leuz (2006) and LaFond and Watts (2008) states that conservatism helps to mitigate asymmetric information. Applying accounting conservatism can decrease investor asymmetric information and raise returns. However, this benefit does not result from a reduction in information asymmetry; rather, it happens because improving the standard of publically disclosed data raises the average validity of investor knowledge (Frenkel, Guttman, & Kremer, 2020). As a result, information asymmetry should also be decreased by applying conservatism that the information quality compensates for the benefits investors obtained due to asymmetric information.

H3: Conservatism moderates the relation between environmental uncertainty and asymmetric information.

3. Material and Methods

3.1. Sample

This study analyzed the companies registered on Pakistan Stock Exchange in Pakistan. Initial sample was 4,785 observations from 2010 to 2021. Data of all variables of study has been obtained from published annual published reports and website of PXS. All financial institutions were excluded because of different regulatory and different cash holding requirement. I excluded all observations which do not have data for all variables of study. Therefore, sample ended with 2,425 observations.

3.2. Measuring Environmental Uncertainty

Previous studies about uncertainty proves that all firms have different perceptions of uncertainty irrespective of working in same environment in comparison to firms whose

environment is ceaselessly changing and working on the environment to explore emerging issues (Bourgeois III, 1985). Following the Hsieh et al. (2019) 'inert' firms are defined as firms who are not continuously observing their surroundings and environment while 'alert' are defined as firms who continually scan firm's environment and can observe signs of changing environment early and, hence, have a lot of time to analyze, investigate and understand the issue and finding the possible solution. As a result, it is possible for such firms to reduce uncertainty. In other words, firms grouped as 'inert' faces higher uncertainty as compared to firms grouped as 'alter'.

3.2.1. Decrease in Capital Investment

Following measure is applied to calculate decrease in capital investment (Hsieh et al., 2019; Titman, Wei, & Xie, 2004). Moving average for three years is a benchmark for decrease in capital investment.

$$\Delta CI_{t-} = CE_t - (CE_{t-1} + CE_{t-2} + CE_{t-3})/3 \quad (1)$$

Where CE_t is capital expenditure. CI_t is for indicator of investment and equal to 0 when CI_t is positive and 1 otherwise.

3.2.2. Freeze in Hiring

Moving average for three years is used as a benchmark to calculate freeze in hiring. Hsieh et al. (2019) documents that in order to respond uncertainty mostly firms reduce its payroll. Ratio is measured as follow:

$$\Delta TE_{t-} = TE_t - (TE_{t-1} + TE_{t-2} + TE_{t-3})/3 \quad (2)$$

Where TE_{t-1} for total employees. ΔTE_t is indicator for employee and is 0 for positive and 1 for negative. To check robustness an alternate measure is applied for environmental uncertainty. It is calculated as coefficient of variation of sales and it is according to conditions of capital market (Bergh & Lawless, 1998) and, hence, sales are accumulated for three periods and standard deviation for this period is calculated. For firm level, environmental uncertainty is calculated by using historical data for three years (Sun & Price, 2016).

3.3. Measuring Information Asymmetry

Following previous studies Leuz and Verrecchia (2005); Petersen and Plenborg (2006); (Wasan & Boone, 2010) spread is applied to measure information asymmetry. Spread is defined as difference of highest and lowest purchase price which buyer is willing to pay and seller is ready to accept. According to Kaspereit, Buchholz, and Lopatta (2016) and Goel, Tripathi, and Agarwal (2021) spread is the difference of the purchase price (ask) and the lowest sale price (bid). Bid-ask spread is obtained as follows:

$$IA_{it-} = (ask_{it} - bid_{it}) * 100 / \left(\frac{ask_{it} + bid_{it}}{2} \right) * 100 \quad (3)$$

Where;

ask_{it} : the highest price of shares for days i and t

bid_{it} : the lowest bid price of shares for days i and t

3.4. Accounting Conservatism measure (C score and G score)

A measure developed by Khan and Watts (2009) is applied for conservatism

$$\frac{E_{it}}{P_{it}} = B_0 + \beta_1 D_{it} + \beta_2 R_{it} + \beta_3 D_{it} R + \varepsilon_{it} \quad (4)$$

Where: E_{it} / P_{it} = Per share Earnings , $D_{it} = 0$ if R_{it} is positive and 1 otherwise , R_{it} = Rate of return . β_2 represents timeliness measurement for good news β_3 for timelines of bad news. G-G_score for good news and C-score for bad news are calculated as follow:

$$G_Score = B_2 = \mu_{1t} + \mu_{2t}SIZE + \mu_{3t}MTB + \mu_{4t}LEV_{it} \tag{i}$$

$$C_Score = \beta_3 = \lambda_{1t} + \lambda_{2t}SIZE + \lambda_{3t}MTB + \lambda_{4t}LEV_{it} \tag{ii}$$

SIZE for natural log of Total Assets, MTB is calculated as dividing market price of equity by book price of equity, and leverage (LEV) and is measured by dividing total of long- and short-term debt by accumulated current and fixed assets.

G score in equation (i) and C _ score in equations (ii) are for estimations of firm-year timelines respectively. Output from equations (i) and (ii) are used to find cross sectional linear regression model. The following equation (5) is for cross sectional model and is applied to measure c-score i.e. timelines for bad news and G_score i.e. timelines for good news.

$$\frac{E_{it}}{P_{it}} = \beta_0 + \beta_1 D_i + R_i(\mu_1 + \mu_2 SIZE_i + \mu_3 MTB_i + \mu_4 LEV_i) + D_i R_i(\lambda_1 + \lambda_2 SIZE_i + \lambda_3 MTB_i + \lambda_4 LEV_i) + (\delta_1 SIZE_i + \delta_2 MTB_i + \delta_3 LEV_i + \delta_4 D_i SIZE_i + \delta_5 D_i MTB_i + \delta_6 D_i LEV_i + \varepsilon_{it} \tag{5}$$

4. Empirical Output

To test formulated hypotheses of study, following statistical model is applied.

$$IA_{it} = \beta_0 + \beta_1 uncertainty_{it} + \beta_2 \sum control_{it} + \varepsilon_{it} \tag{6}$$

$$IA_{it} = \beta_0 + \beta_1 AcctConv_{it} + \beta_2 \sum control_{it} + \varepsilon_{it} \tag{7}$$

$$IA_{it} = \beta_0 + \beta_1 AcctConv_{it} + \beta_2 Uncertainty_{it} + \beta_3 AcctConv_{it} * Uncertainty_{it} + \beta_4 \sum Control_{it} + \varepsilon_{it} \tag{8}$$

For hypothesis H1, model 1 is applied where IA_{it} is for asymmetric information and is calculated by spread(bid-ask). $EUncertainty_{it}$ Environmental uncertainty is equal to 0 for 'inert' firm otherwise 1. Control for all control variables of study which include: $Size_{it}$, $MktLev_{it}$, $PrtB_{it}$, ROA_{it} , $Cycle_{it}$.

Table 1
Empirical Output H₁ : Environmental Uncertainty and Information Asymmetry

| Variables | Information Asymmetry(dependent variable) | | | |
|-----------------------------|---|----------------------|---------------------|----------------------|
| | Model(1) | | Model(2) | |
| | C1 | C2 | C1 | C2 |
| EUncertainty1 _{it} | 0.912*** (0.013) | 0.214** (.171) | | |
| EUncertainty2 _{it} | | | 0.110** (0.012) | 0.063*** (1.24) |
| ROA _{it} | -0.563*** (0.001) | -0.342*** (0.002) | 0.231*** (0.203) | -0.030*** (0.24) |
| Size _{it} | -0.636 (0.240) | -0.245*** (0.005) | 1.24*** (0.575) | -0.010 (0.82)*** |
| Cycle _{it} | 0.443*** (0.045) | 0.005 (0.246) | 0.543 (0.544) | -0.0545*** (0.22) |
| PrtB _{it} | | 0.243*** (0.146) | | -0.240 (-0.53) |
| MktLEV _{it} | | 0.240*** (0.984) | | -0.134 (-0.64)*** |
| MktShare _{it} | | -0.345 (0.978) | | 0.452 (-01.25) |

Note: * for 0.1 significance, ** for 0.05 significance, *** for .01 significance, Standard Error (SE) reported in parenthesis.

For hypotheses H2, the relationship of conservative accounting on asymmetric information, model 2 is applied where Khan & Watts model is applied for conservatism (Khalilov & Osma, 2020; Thijssen & Iatridis, 2016; Zadeh, Askarany, & Asl, 2022). For hypothesis 3, moderating role of conservative accounting, statistical model 3 is applied. Control variables includes *Size*, *Market Leverage*, *PrtB*, *ROA*, *cycle*, *sales* and *market share*.

Table 2
Empirical Output H₂: Accounting conservatism and Information Asymmetry

| Variable | Information Asymmetry (Dependent Variable) | | | |
|------------------------|--|---------------------|---------------------|-------------------------|
| | C1 | C2 | C1 | C2 |
| AcctConv _{it} | 0.0431*** (0.461) | 0.025** (0.413) | | |
| ROA _{it} | 0.632*** (0.375) | 0.452*** (0.541) | 0.562*** (0.354) | 0.553*** (0.242) |
| Size _{it} | 0.783 (0.367) | 0.532*** (0.556) | 0.677*** (0.64) | 0.683*** (0.253) |
| Cycle _{it} | 0.783*** (0.475) | 0.643*** (0.646) | 0.672 (0.245) | -0.782*** (0.363)*** |
| PrtB _{it} | 0.362*** (0.276) | 0.883*** (0.435) | 0.256** (0.462) | -0.366** (0.224) |
| MktLEV _{it} | | 0.865*** (0.343) | | 0.256* (0.254) |
| MktShare _{it} | | -0.865 (0.322) | | 0.255 (0.251) |

Note: * for 0.1 significance, ** for 0.05 significance, *** for .01 significance, Standard Error (SE) reported in parenthesis.

Table 3
Empirical Output H₃: Accounting Conservatism, Information Asymmetry and Environmental uncertainty

| Variables | Information Asymmetry (Dependent Variable) | | | |
|--|--|----------------------|----------------------|----------------------|
| | C1 | C2 | C1 | C2 |
| AcctConv _{it} | 0.034** (0.458) | 0.3471*** (0.248) | | |
| EUncertainty1 _{it} | -0.778** (0.855) | -0.663*** (0.639) | | |
| EUncertainty2 _{it} | | | -0.645** (0.666) | -0.463*** (0.369) |
| AcctConv * EUncertainty1 _{it} | 0.566** (0.424) | 0.403** (0.783) | | |
| SIZE _{it} | 0.663*** (0.457) | 0.743** (0.643) | 0.643** (0.644) | 0.664* (0.464) |
| Sales _{it} | 0.641*** (0.536) | 0.754** (0.765) | 0.755*** (0.636) | 0.567** (0.755) |
| Cycle _{it} | -0.567*** (0.684) | -0.752** (0.356) | -0.765*** (0.443) | -0.563** (0.647) |
| ROA _{it} | 0.785** (0.657) | 0.643** (0.553) | 0.865** (0.463) | 0.263** (0.535) |
| PrtB _{it} | | 0.564** (0.434) | | 0.435** (0.355) |
| MktLEV _{it} | | 0.644* (0.965) | | 0.466 (0.361) |
| MktShare _{it} | | 0.654** (0.668) | | 0.242** (0.638) |

Note: * for 0.1 significance, ** for 0.05 significance, *** for .01 significance, Standard Error (SE) reported in parenthesis.

5. Discussion of Estimations

Empirical output of model 1 are reported in table 1. The results of statistical estimations are inline to assumptions. C1 in Table 1 reports the estimations output for accounting measures

for book value and C2 is for both measures combining together. Statistical finding is reported in C2 as it includes all variables. Mod (2) reports the robustness results. Mod (1) is for environmental scanning by dividing firms into 'inert' and 'alter' firms while Mod (2) is for another measure of uncertainty by applying coefficient for sales variation. There is significantly positive link between uncertainty and IA (information asymmetry) as supported by literature (Isniawati et al., 2018; Lei & Luo, 2023). For Mod(1) and Mod(2) mostly control variables are showing significant output.

Empirical estimations of hypothesis 2 are shown in table 2. The results of statistical estimations support the assumptions of study. C1 in Table 1 reports the estimations output for accounting measures for book value and C2 is for both book and market measure. Statistical finding is reported in C2 as it includes all variables. Mod (2) reports the robustness results. M1 is for environmental scanning by dividing firms into 'inert' and 'alter' firms while Mod (2) is for another measure of uncertainty by applying coefficient for sales variation. There is negative and significant relationship between accounting conservatism and information asymmetry as discussed in literature (Dai & Ngo, 2021; Odia, 2018; Wang, 2013). For Mod (1) and Mod (2) mostly control variables are showing significant output.

Table 3 presents the output of hypothesis 3. The output in Table 3 are in line to predictions. Statistical output is supported by results of previous studies (Guay & Verrecchia, 2006; Watts, 2003) that conservatism reduces asymmetric information in wake of environmental uncertainty. Moreover, moderating term of environmental uncertainty and accounting conservatism reports a significant and positive impact on IA and, hence, shows that conservative reporting during environmental uncertainty may contribute to reduce IA (Dai & Ngo, 2021).

6. Conclusion

My study is about link between environmental uncertainty, information asymmetry and impact of conservative reporting. Statistical output support the hypothesis of study that environmental uncertainty has impact on information asymmetry and conservatism reduces uncertainty and hence asymmetric information. This study report significantly positive effect of environmental uncertainty on information asymmetry and an inverse relation among information asymmetry and conservative financial reporting as supported by previous studies (LaFond & Watts, 2008; Odia, 2018).

Earlier research reported that conservative accounting reduces uncertainty by means of reliable and good quality financial information and, hence, reduces the benefits investors might obtain due to inside information. Due to high conservatism the impact of collecting private financial information and participation in share trading is minimal. However, if conservatism is low, the effect of information asymmetry can be quantifiable and significant. Investors are willing to invest in such firms that have transparent information or they receive signal that disclosed data and information is transparent. Accounting conservatism has direct impact on the credibility of a firm. Higher accounting conservatism also helps to decrease the processing cost of information disclosures. The empirical results extend the previous literature by highlighting the importance of accounting conservatism. The study reports that conservative accounting helps to mitigate asymmetric information. My results are in line with other researches that support the idea of information asymmetry and conservative accounting (Rashidi, 2021).

6.1. Research Implications

The empirical results can be helpful for standard setters and regulatory authorities. Empirical estimations report the benefits of informational role of conservative accounting and estimations are beneficial for use of conservative accounting. The output of this work suggest

that regulatory authority should consider conservative accounting for disclosure of financial data as EU (environmental uncertainty) weaken the relation of financial and economic data and hence, increases the asymmetry (Bushman & Smith, 2001). Hence, presence of conducive environment for financial information increases the reliability of financial information and reports and at same time facilitate more equal dissemination of financial information among all stakeholders.

6.2. Limitations and Further Research Avenues

Like all researches, this study also has few limitations. First, generalization is an issue, as this research is conducted only non-financial firms taken from PSX, so results obtained are specifically applicable to non-financial sector and are not applicable on financial sector.

Furthermore, other measures of financial reporting quality (e.g. relevance and reliability) could also be used to respond uncertainty and their role in resolving the issue of asymmetric information. In order to have stronger conclusion, future research should also consider cross country research specifically from the region of South Asia.

Author contribution

Huma Fatima: Introduction, literature review, methodology, data analysis, results discussion, conclusion and proofreading

Conflict of Interests/Disclosures

The authors declared no potential conflicts of interest w.r.t the research, authorship and/or publication of this article.

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