Investigating the Impact of Derivatives on Stability in the Financial Performance of the Banking Sector of Pakistan

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**ABSTRACT**

**Purpose:** The aim of the paper is twofold, to contribute to the ongoing debate regarding highlighting the determinants of derivative usage by commercial banks specifically from a dual banking economy perspective, and to discuss the influence of derivatives usage on the value and stability in the financial performance of the banking sector of Pakistan.

**Design/Methodology/Approach:** The study used the Z-Score and CAMELS Index to compare the stability analysis from different dimensions. Further, the impact of bank-controlled variables on the use of derivatives has also been analyzed.

**Findings:** By conducting Panel regression models, the results revealed that derivatives used by banks reduce the profitability and ultimately stability of banking and increase the bank-specific risk.

**Implications/Originality/Value:** These findings point towards serious intentions regarding using derivative instruments in an economy where dual banking is practiced.

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**Introduction**

The financial stability and performance of the financial sector have been the most controversial areas for finance researchers in the last decades. Especially after the financial crisis's spread, many researchers have discussed the financial sector's stability in many ways (Claessens et al., 2015; Asif et al., 2018; Taşkin & Sarıyer, 2020). Resultantly, the discussion ended with a resolution to come out of the financial crisis by the inclusion of diversification in financial resources either in terms of financial innovation (Degl'Ippoliti et al., 2018), financial technology (Vives, 2017) or moving towards multiple income streams generation (Asif & Nasir, 2023; Asif et al., 2022). The movement of the financial sector in the search of earning from multiple income streams has incorporated many risks into the financial business. Further, the inclusion of multiple income sources ignored the basic revenue generation concept through the involvement of non-traditional income streams in their income portfolio. Many past researchers have argued that diversification of income sources has negatively influenced the banks’ performance (Sanya &
Wolfe, 2015; Asif, R. 2021). Therefore, the role of financial inclusion and involvement in other income sources is an important area to work on to determine the financial stability of the financial sector.

Banks are considered the most important players in the domestic economy regarding the transfer of financial resources and are also responsible for the spread of economic turmoil (Brunnermeier et al., 2020). Banks, to remain stable have always strived to provide multiple financial opportunities to their customers which not only enhance their income but also lead them towards risk injection in their financial portfolios (Bliss et al., 2017). Derivatives are considered one of the key tools to hedge risk exposure and also for producing alternative sources of income streams (Titova et al., 2020). On the other side, the use of financial derivatives has been argued extensively in the literature for impelling bank risk leading to banks’ failures (Chiaramonte & Casu, 2013) as experienced during the financial crisis of 2009.

Despite the negative consequences brought in by financial derivatives, their use has been actively continued to intensify both during as well as post-crisis period. Due to the integration of financial markets, financial risk management has been the most important tool for financial institutions in the past many years (Zeddoun & Bendima, 2022). So, financial institutions are always involved in risk management activities using financial derivatives for hedging and trading against fluctuations in asset prices and other financial risks (Farhi, & Borghi, 2009). Keeping in view the importance of financial derivatives in hedging financial risks, financial derivatives have gained much attention from finance researchers and emerged as an important finance research area.

Concerning past work on the role of financial derivatives, the majority of the prevailing evidence has focused on derivatives pricing and some studies also inspected the influence of the usage of financial derivatives specifically from the context of non-financial companies’ performance. Only limited studies tried to forecast the influence of financial derivatives usage on the banking business performance and still available evidence provides support for advanced countries’ banking systems. Even though the growth of financial derivatives markets is rapid in advanced as well as emerging economies for financial institutions, the empirical evidence regarding their impact on the stability of the institutions is still in the infancy stage. Thus, the need arises to inspect the influence of derivatives usage on the banking business stability specifically from the context of the economy where dual banking is in operation. The current research work will fill the gap by investigating the influence of the usage of financial derivatives on banking stability in Pakistan. So, the main research question is:

“Whether the usage of financial derivatives at the bank level enhance financial stability?”

**Literature Review**

Previous literature on the impact of financial derivatives provided contrary arguments in favor and opposition to the use of financial derivatives to measure financial performance using different performance measures (Said, 2011; Rivas et al., 2011; Egly & Sun, 2014; Au Yong et al., 2014; Shen & Hartarska, 2018; Keffala, 2019). In this regard, major empirical research has been conducted using data from the corporate sector while little evidence is available for the financial sector. To discover the motives behind the use of financial derivatives, Minton et al., (2009) have provided an empirical base using financial data of US banks. They suggested that US banks involved financial derivatives as a medium to hedge financial risk in the banking sector.

Further, said (2011) also investigated the impact of financial derivatives usage keeping in view the performance of the banking industry. They incorporated financial data from five big banks in the US and concluded that banks in the US have gained marginal benefits by employing financial derivatives as a risk mitigation strategy. The empirical investigation conducted by Rivas et al., (2011) has determined that the efficiency of the banks can be enhanced by the incorporation of financial derivatives into the European banking business. Au Yong et al., (2014) have determined the role of the usage of financial derivatives and suggested that the banks operating in the Asia Pacific region reduce the chances of financial distress and provide banks with high efficiency. Shen & Hartarska, (2018) examined the practice of financial
derivatives during and after the financial crisis period and found that the profitability of the banks is increased by the involvement of financial derivatives specifically during the wake of crisis period.

Since there is literature available that justifies the use of derivatives as beneficial for the banking industry. Still, there are many to claim that the usage of financial derivatives hinders banking performance. Keeping this hypothesis in view, Keffala et al., (2015) have provided empirical reasoning about the use of financial derivatives in emerging and some developed markets banks and found that derivatives involvement in the banking industry reduced banks’ performance and ultimately led to financial distress. Keffala (2015) also conducted another study on the impact of financial derivatives on banking sector stability. Using GMM panel data analysis, the researcher found that options derivatives and futures contracts hurt the stability of the emerging markets banking sector while swaps and forwards contracts are not found to have a stabilizing impact. Therefore, the derivatives in the emerging markets banking sector were found to have negative consequences on the banking sector stability.

Keeping in view the previous discussion, the majority of the literature was conducted using data from developing countries, and other incorporated data from the USA. Hence, scarce evidence is available to associate the involvement of financial derivatives and their impact on the performance of the emerging market banking industry. Further, limited investigation is available about the consequence of derivatives on the stability in financial performance from the viewpoint of commercial banks, while major studies have been dedicated specifically to non-financial firms’ viewpoint. The researcher of the current study justifies claiming that the limitations of the existing literature can be used as a building block to conduct a current investigation. Henceforward, the current research will prove useful in fulfilling the research gap to increase understanding of the use of financial derivatives in the emerging markets banking business, especially those where dual banking is applicable.

**Methodology**
The current research is explanatory and quantitative because the study variables and their connotation with an explained variable are constructed based on financial parameters. The secondary data sources are utilized for the measurement of the selected variables using published financial statements of the individual banking firms for a period from 2015-22 for each bank. Where necessary, the information was obtained from stock exchange websites, world development Indicators, and other related sources as well. The nature of data is panel because data entry is done by cross-section versus period method. The study population consists of 5 Islamic and 19 Conventional banks from Pakistan which is under the category of dual banking business. The reason to choose this sample is that Islamic banking is emerging more rapidly in these countries therefore, their effect on stability is important to determine in such countries.

The current work aims to consider the impact of financial derivatives usage on the stability of banking performance. Past studies have incorporated many measures to gauge the performance of the banking sector. Most of them analyzed the financial performance using the Z-Score indicator (Shaukat et al., 2020; Khan et al., 2021; Hanif et al., 2021). For this study, the study has used a different approach to measure the impact of financial stability. The stability is measured through the CAMELS index, considered the most reliable measure to gauge the financial performance of the banking industry. The dependent variable of financial stability is calculated using the following indicators to make a stability index.

<table>
<thead>
<tr>
<th>S. N.</th>
<th>CAMELS Indicator</th>
<th>Symbol</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Capital Adequacy (CA)</td>
<td>CA</td>
<td>Capital Ratio</td>
</tr>
<tr>
<td>2.</td>
<td>Assets Quality (AQ)</td>
<td>AQ</td>
<td>Gross Loans to Assets Ratio</td>
</tr>
<tr>
<td>3.</td>
<td>Management Efficiency (ME)</td>
<td>ME</td>
<td>Operational Expense to Assets Ratio</td>
</tr>
<tr>
<td>4.</td>
<td>Earnings Quality (EQ)</td>
<td>EQ</td>
<td>Net Income to Assets Ratio</td>
</tr>
</tbody>
</table>
Since the study aims to check the influence of the usage of financial derivatives on the financial stability of banking institutions, the study incorporated the notional value of derivatives used by a particular bank as a proxy for financial derivatives usage. Further, the study model used bank size, net interest margin, capitalization, liquidity, and income diversification as control variables. Table 2 provides a brief description of the study variables in brief.

Table 2: Description of Independent Control Variables

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Variables</th>
<th>Symbol</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Financial Derivatives</td>
<td>FD</td>
<td>The notional value of financial derivatives scaled by total assets</td>
</tr>
<tr>
<td>2.</td>
<td>Bank Size</td>
<td>BS</td>
<td>Log of total assets</td>
</tr>
<tr>
<td>3.</td>
<td>Net Interest Margin</td>
<td>NM</td>
<td>Net margin scaled by total assets</td>
</tr>
<tr>
<td>4.</td>
<td>Capitalization</td>
<td>CP</td>
<td>Total equity scaled by total assets</td>
</tr>
<tr>
<td>5.</td>
<td>Liquidity</td>
<td>LQ</td>
<td>Liquid assets scaled by total assets</td>
</tr>
<tr>
<td>6.</td>
<td>Income Diversification</td>
<td>ID</td>
<td>Non-interest income scaled by total assets</td>
</tr>
<tr>
<td>7.</td>
<td>Gross Domestic Product</td>
<td>GD</td>
<td>GDP growth rate</td>
</tr>
</tbody>
</table>

The rationale behind the main hypothesis rests mainly on the findings of Keffala (2019) who stated an optimistic correlation between derivatives usage and bank performance. On the same ground, the present study assumed that financial stability is also a function of involvement in derivatives usage. So, the current study proposed an enhancement in the financial stability of a particular bank as far as it gets more involved in the usage of financial derivatives. The study model is as follows:

\[
CAM = f\{FD, BS, NM, CP, LQ, ID, GD\} \quad \text{eq. 01} \ldots
\]

Financial Stability = \( f\{\text{Financial Derivatives, Bank Size, Net Interest Margin, Capitalization, Liquidity, Income Diversification, Gross Domestic Product}\} \)

The empirical model of the study is as follows:

\[
CAM_t = \alpha_0 + \beta_1 FD_t + \beta_2 BS_t + \beta_3 NM_t + \beta_4 CP_t + \beta_5 LQ_t + \beta_6 ID_t + \beta_7 GD_t + \epsilon_t \quad \text{eq. 02} \ldots
\]

Since the aim is to check the association among study variables, the previous literature defines that if financial stability is impacted by the use of financial derivatives, the intention to incorporate financial derivatives into the banking business is also dependent on the stability level of the banking institutions. This reverse causality seems to define the presence of endogeneity among study variables which can lead to biased estimates. To handle this issue, the present study aims to incorporate the panel generalized method of moment estimator (panel GMM) which is deliberated best to handle the issues of endogeneity in the model. The use of the GMM method allows the model to incorporate lagged dependent variables as an instrument to deal with reverse causality and endogeneity while all other variables are treated as endogenous. The final study model is as follows:

\[
CAM_t = \alpha_0 + \beta_1 CAM_{t-1} + \beta_2 FD_t + \beta_3 BS_t + \beta_4 NM_t + \beta_5 CP_t + \beta_6 LQ_t + \beta_7 ID_t + \beta_8 GD_t + \epsilon_t \quad \text{eq. 03} \ldots
\]

Results and Discussions

To check whether the applied model is consistent for the analysis, some of the model specification tests are run. To determine the stationary level of the variables, a unit root test is being performed trying three alternate assumptions e.g., with individual intercepts, with and without individual intercepts, and trend also. The results revealed that all variables are stationery at level therefore the null hypothesis for the unit root test is rejected.

Further, to check the presence of collinearity among study variables, correlation diagnostics are
performed. The results are specified in Table 3.

### Table 3: Correlation Diagnostics

<table>
<thead>
<tr>
<th></th>
<th>CAM</th>
<th>FD</th>
<th>BS</th>
<th>NM</th>
<th>CP</th>
<th>LQ</th>
<th>ID</th>
<th>GD</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAM</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FD</td>
<td>0.125*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.30</td>
</tr>
<tr>
<td>BS</td>
<td>0.425***</td>
<td>0.156**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.25</td>
</tr>
<tr>
<td>NM</td>
<td>0.208**</td>
<td>0.220*</td>
<td>0.365*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.45</td>
</tr>
<tr>
<td>CP</td>
<td>0.235**</td>
<td>0.185**</td>
<td>0.457*</td>
<td>0.356*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1.33</td>
</tr>
<tr>
<td>LQ</td>
<td>-0.185***</td>
<td>-0.216**</td>
<td>-0.032**</td>
<td>-0.032**</td>
<td>-0.112*</td>
<td>1</td>
<td></td>
<td></td>
<td>1.47</td>
</tr>
<tr>
<td>ID</td>
<td>-0.247**</td>
<td>-0.138**</td>
<td>0.368**</td>
<td>-0.424*</td>
<td>-0.114**</td>
<td>-0.321*</td>
<td>1</td>
<td></td>
<td>1.12</td>
</tr>
<tr>
<td>GD</td>
<td>0.168**</td>
<td>0.057***</td>
<td>0.436**</td>
<td>0.356*</td>
<td>0.325***</td>
<td>0.036**</td>
<td>0.529*</td>
<td>1</td>
<td>1.68</td>
</tr>
</tbody>
</table>

The collinearity diagnostic of the variables stated that there exists no problem of multicollinearity and this finding is also cross-checked by having VIF values which stated that multicollinearity is not a severe problem in this data concluding that data can be further used for statistical analysis. While discussing the model specification tests, the next test is to check the normal distribution of error term which is called heteroscedasticity. To check the heteroscedasticity, the Breusch-Pagan test is performed. The results of the test confirmed the presence of heteroscedasticity in the model. The findings are also confirmed by performing a white test which posit similar results and states that heteroscedasticity is present in the model. For having model specification, the current study also checked the presence of endogeneity among the variables the results of which clearly stated that the model is not free endogeneity problem. So, based on the findings of the specification tests, it is clear that due to the presence of heteroscedasticity and endogeneity in the model, the study can incorporate the dynamic panel GMM method to run the statistical analysis.

### Table 4: Dynamic Panel GMM Analysis

<table>
<thead>
<tr>
<th>Variables</th>
<th>Financial Stability (CAM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Stability Lag (CAMt-1)</td>
<td>0.032 (2.303)**</td>
</tr>
<tr>
<td>Financial Derivatives (FD)</td>
<td>9.825 (3.03)***</td>
</tr>
<tr>
<td>Bank Size (BS)</td>
<td>1.485 (3.018)***</td>
</tr>
<tr>
<td>Net Interest Margin (NM)</td>
<td>0.369 (3.187)***</td>
</tr>
<tr>
<td>Capitalization (CP)</td>
<td>1.658 (5.165)***</td>
</tr>
<tr>
<td>Liquidity (LQ)</td>
<td>-0.017 (-0.942)**</td>
</tr>
<tr>
<td>Income Diversification (ID)</td>
<td>-3.332 (-2.850)**</td>
</tr>
<tr>
<td>Gross Domestic Product (GD)</td>
<td>1.123 (0.356)**</td>
</tr>
</tbody>
</table>

No. of Observations 192

J-statistics 11.302

p-value J-statistics 0.062

AR (1) -1.355

AR (1): p-value 0.023

AR (2) 0.785

AR (2): p-value 0.386

***, **, * represents the significant level at 1%, 5% and 10% respectively. () denotes the t-stat estimates.

Table 4 defines the results obtained after applying the dynamic panel GMM method. As far as the value
of Hansen J-Stat is concerned, the obtained p-value is found to be greater than 5%, which states that the model is fit and the instruments of the model are valid for further analysis. Further, the test of autocorrelation for the error term showed the p-value obtained for second-order serial correlation AR(2) is found to be greater than 5% implying that the error term at first order is serially uncorrelated hence the moment's conditions are assumed to be specified correctly.

The lag of dependent variables is found to be positively and significantly associated with the financial stability of the current period. This finding is important and depicts that past period financial stability has an autoregressive effect on current period financial stability when measured in terms of the CAMELS index. The significant association of the lag-dependent variable with its current value further validates the application of the applied econometric model. The explanatory variable i.e. financial derivative usage is found to have a positive linkage with financial stability when stability is measured using the CAMELS index. This finding shows that the involvement of banks in using derivative instruments will provide banks with a competitive edge to perform better and ultimately enhance financial stability. These results are similar to those found in the study of Shaukat et al., (2020) who stated that the use of forward and swaps has a positive impact on the stability of commercial banks. The results of control variables further reveal the fact that bank size, net interest margin, and capitalization are positively linked to financial stability. This is so large banks are better able to control their consistency in performance owing to having large-scale operations and better market access. High-interest margin depicts the banking efficiency in terms of loan financing which is the major concern of commercial banks. High capitalization shows that banks have maintained a high cushion against unexpected losses to be stable. Therefore, all these three variables are found to be positively and significantly linked with the explained variable. The control variables of income diversification and liquidity are shown to have a negative association with stability. This is because high liquidity restricts banks from applying available cash in profitable ventures which reduces the profitability prospects and involvement of the banks in income diversification is itself risky if banks lack expertise in the area in which they are diversifying. So, both these variables are found to have a negative linkage with stability. In conclusion, the results of the current research reveal that commercial banks operating in a dual banking environment seem to enhance their stability through the use of financial derivatives.

From the findings of this research work, it can be concluded that using financial derivatives in an environment where dual banking is applicable tends to improve financial stability. Therefore, banking managers must incorporate derivatives instruments carefully so that these may not have a detrimental impact on the financial stability of the banking system. This research work’s contributions are several: firstly, the research work is based on the sample data from a financial system where dual banking is applicable. However, previous similar work has been conducted using data from GCC and other advanced countries and other emerging economies ignoring dual banking economies. So, the analysis provides a useful comparison of advanced and GCC countries as contribution to the existing literature.

The present work is also not free from some constraints for which the availability of financial derivatives and market data is the most important constraint to consider. The lack of data on derivative variables restricts the researchers to provide their analysis on each type of financial derivative. Therefore, future studies must try to have access to data sources and large study periods for each type of financial derivatives to have more concrete observations and findings on the topic of concern.

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