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The Impact of Financial Derivatives on Stability of Financial Institutions; Empirical Evidence from Financial Sector of Pakistan

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ABSTRACT

Managers are risk averse therefore, mangers want to minimize the risks of the firm. So, they use the financial derivatives to hedge the risk. The question is to address either use of financial derivatives increases the stability of the financial Institution or use of financial derivatives leads to instability of the financial Institution. Z-Score measures the stability of financial institutions on using of financial derivatives. Blundell and Bond proposed GMM while using panel data. Panel data of 50 financial firms' has been used in this study for the time period starting from 2010 to 2020. Swaps has negative impact on the financial institution stability and Forward contracts has positive impact on the financial institution stability statistically significant at 1%. Contrary, Swaps impact negatively to financial institution stability. Conclusively, forward contract is recommended to hedge risk. AR test shows no serial correlation and Hasen Test depicts the validity of the instruments.

Keywords: Financial stability, financial institutions, forward contracts, Swaps, GMM.

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1. INTRODUCTION

Managers are risk averse. Therefore, managers want to hedge so that the risk of the firm can be minimized (Stulz 1984, Allayannis and Weston 2001). Financial performance, as defined by Naz, Ijaz, and Naqvi (2016), "is a tool for businesses to determine profit and maximize shareholder wealth in the given time period". Financial derivatives are used to hedge financial risk. The risks are particularly associated with the exchange of commodity prices, oil, gold, gasoline, interest and foreign exchange rates (Fetimi and Luft 2002). Financial derivatives are used for their benefit to minimize risk. Derivatives risk, on the other hand, causes risk and cost to the firm (Stulz 2004). The question is to address whether the use of financial derivatives increases the stability of the financial institution or, contrary to that, leads to instability of the financial institution. The current global recession of 2009 and the financial scams of Enron and WorldCom have raised the significance

of how managers manage firms to achieve specific objectives. The well-functioning of financial institutions is a smooth function of the economy. If there is a disruption in financial institutions, it ultimately leads to a financial crisis.

According to Al-Matari *et al*. (2014), financial performance reveals that different measures have been used by different researchers to measure the firm's financial performance through accounting and market-based indicators. So, the firm's financial performance can be stable if the firms involved in derivative markets hedge the risk. Most of the financial sector's capital has been invested by the general public, and how the financial sector firms involved in investing those funds is a great concern of the public interest. According to Cole (2009), the use of financial management tools in companies has grown exponentially in recent years because of the situation created by the impact of banks at the world's extremities. The emergence of high-pressure vehicles in banks has affected the activities of banking enterprises during and after the global economic downturn (Whitemann, 2003; Cole, 2009). Today, many banking enterprises, including banks, use external financial instruments like notes payable, bonds, and shares. There is a need for financial institutions to make better use of them to promote customer value and share capital (Kruase, 2007). Release instruments are contracts for the purchase or sale of underlying assets in the future and the amount and quantity in the present. Commercial banking services in real estate are over the counter, and as a result, there is a very high level of stakeholder participation in Pakistan, as Pakistani stock is currently trading in commodities on this exchange. As trading is usually in-the-counter, it is disclosed naturally in a high-automatic bet (gambling). This situation has led to money laundering using bankers to manage wagers in Pakistan. Some of the products available to banks used by operations in the banking service region include futures, options, exchanges, franchise agreements (FRA) and forwarding.

In Pakistan, the Financial Derivatives Business Regulations (FDBR) have been exercised by the State Bank of Pakistan under the Banking Companies Ordinance 1962 and the Foreign Exchange Regulations Act 1947. in order to permit, regulate, and supervise financial institutions entering into derivative transactions. The well-functioning of financial institutions is important for the economy if there is a disruption in financial institutions that leads to a financial crisis.

Previous research like Keffla (2015) was done to check the impact of financial derivatives on banks' stability in the Pakistan context. Most of the financial sector capital has been invested by the general public and how the financial sector firms involved in managing those funds to overcome financial crisis. However, Keffla (2015), check impact of financial derivatives (Options, forward contracts, future contracts and Swap) on banks stability. That's why this study is an attempt to examine Impact of financial derivatives on stability of financial Institution in context of Pakistan. The sample comprised of 50 financial institutions, it includes Banking, Insurance and Modaraba sectors companies listed on Pakistan stock exchange. Panel data has been used in this study for the time period starting from 2010 to 2020. The estimation techniques are done by using GMM (Generalized methods of moment) through Stata.

Financial Derivatives

Financial derivatives are defined by the World Bank as "a financial contract in which the value of the underlying asset is determined when the buyer agrees to purchase the said asset on a specified date at a specified price". Commonly, financial derivatives are used for commodities like oil, gold, and gasoline. Secondly, it is used for interest and exchange rates. There are four types of financial derivatives: swaps, future contracts, forward contracts, and options.

Financial Institution Stability

Fu *et al*. (2014) define the fragility of a bank by the probability of bankruptcy and the bank's z-score. They argue that a higher level of z-score value means less bank overall risk and greater bank stability. Additionally, Lvicic *et al*., 2008; Laeven and Levine, 2009, have calculated the stability of financial institutions through a formula of z-score which is as follows:

$$\text{Z-score: } = {}^{[\text{ROA} + \text{EQTA}]}/_{\text{std ROA}}$$

Where EQTA = Equity/Total Assets

Research Gap

Existing literature regarding the impact of financial derivatives on a bank's stability exists. Fewer studies have been conducted on the stability of financial institutions, particularly in the context of Pakistan. Because the financial derivatives market is an emerging market in Pakistan, Moreover, Taskin and Sariyer (2020) worked on the use of derivatives, financial stability, and performance in the Turkish banking sector. In addition, Babar *et al*. (2019) studied the financial stability index for the Pakistani financial sector by using the financial reports for the period of 2001–2011.

However, Keffla (2015) checks the impact of financial derivatives (options, forward contracts, future contracts, and swaps) on banks' stability. That's why this study is an attempt to examine the impact of financial derivatives on the financial institutions' stability in Pakistan.

Research Question

Do financial derivatives have any impact on the stability of the financial sector in Pakistan?

Research Objective

The objective of this research is to empirically investigate the impact of financial derivatives on the stability of the financial sector of Pakistan.

Formulation of Hypotheses

H1: There is a statistically significant impact of **forward contracts on the stability** of financial institutions.

H2: There is a statistically significant impact of **Swaps** on Stability on financial institutions.

Significance of Research

The use of the financial derivatives increases or decreases the stability of the financial institutions. Conversely, the use of the financial derivatives causes the instability of the financial institutions. Ultimately, leads towards financial crises. Either forward contracts or Swap increases the financial stability. Contrary, which one of financial derivative (forward contracts and Swap) decreases the financial stability?

2. LITERATURE REVIEW

The International Monetary Fund (1998) defines derivatives as the result of complex bank contracts that are valued on the underlying assets. Basically, the findings are an agreement between the buyer and the seller stating how much the price of the goods will change over time (IMF, 1998; Cole, 2009). In this regard, the basic commodity can be an asset such as oil, gasoline, or gold. Generally, most derivatives are based on stocks or bonds (IMF, 1998), while other entities use funds, particularly the US dollar, as their primary asset (IMF, 1998; Whitemann, 2003).

The instability of the banks remained a political and economic aspect in the world due to the financial crisis. Both the credit crisis and the debt crisis contain emphasis that needs to be evaluated properly. As a substance off act, the subsistence of information asymmetries and banks' confined to disclosing information only to the capability of stakeholders like financial analysts, depositors, investors, and borrowers to recognise that the bank's jeopardises the failure of it. The world's attention has been drawn to the stability of financial institutions as a result of the recurring financial crisis. The IMF is trying to promote and develop a stable financial system in the developing countries. As a result, numerous studies like Kaminsky *et al*. (1998) and Berg and Pattillo (1990) were published for the development of institutions that are stable.

Moreover, Shaukat *et al*. (2020) noted that financial derivatives such as forwards and swaps affect the extreme constancy of the conventional bank, while options and futures affect harmfully the bank's routine. The consequences, on the other hand, differ in the Islamic style of bank. Swaps and options improve performance, whereas forward and future contracts destabilise banks. Sajjad, Noreen and Zaman (2013), studied the risk association with financial services sector that are appropriateness of derivatives to handle risks in Pakistan. It reveals that derivatives allow firms hedge both the systematic and non-systemic risk. According to Tng and Kwek (2015), explore that the association between monetary stress and fiscal behaviour through financing methods. The elevated monetary stress leads to vagueness in financial system. Resultantly, it leads to anxiety in financial and monetary markets.

According to Poghosyan and Cihak (2011) and Vazquez and Federico (2012), samples from 12 banks in European countries from 2001 to 2011 were used by using probit analysis models. Conclusively, they found that Z-score is a significant tool for predicting the stress of the banks' capabilities. consistent both over the period of years 2001 to 2011 and during the crisis period of years 2008 to 2011. Furthermore, they observed results that were similar to components of the Z score: return on assets, volatility of proceeds, and equity over total assets. MELS variables were added to the Z score, which improves the ability of the model to predict distress of the bank only for the whole period. As a result, its use is increasing. Even the banks have had weak performance during the economic and financial slowdown. Substantially, both the models give similar results in predicting bank distress.

According to Keffala (2015), the swap has a negative impact on the bank’s stability pre-financial crisis, during and post-crisis. Contrary, forward contracts have a positive impact on the bank’s stability pre-financial crisis, during and post-crisis. Moreover, Cavallaro *et al*. (2011) studied the issue of financial instability in Argentina and faced a severe recession that led to a financial crisis and, as a result, the cessation of currency board arrangements in the country. Similarly, Akyuz and Boratav (2003) find that the financial system in Turkey is fragile due to irresponsible policies and a lack of coordination by the state government. This is due to deregulation and without effective supervision. Cole (2009) also provides similar evidence from a multi-regional perspective and economics. In Nigeria, similar evidence is provided in connection with the non-banking activities carried out by Muhtala and Ogundeji (2013). In addition, Venkatachalam (1996) argues that the general bank during the period 1993–1994 reduced its access to betting using its assets, even though more than half the banks in Venkatachalam's study used it. Various pragmatic studies King and Levine (1993), Levine (1997), Khan and Senhadji (2000), Bader and Qarn (2008), Samargandi *et al*., (2014) and Shahbaz *et al*., (2017) have found positive association among monetary growth indicator and fiscal enlargement in emerging economies. Monetary liberalisation helps to increase economic activities and improve the economic growth.

Most of the studies have been conducted to check derivatives' effects on banks' stability, particularly at the world level. That’s why this study is an attempt to check the impact of financial derivatives on the stability of financial institutions through empirical evidence from the financial sector of Pakistan.

Theoretical Justification of the Hypothesis

Empirical literature shows that the effect of derivatives on financial institutions varies from instrument to instrument and from period to period. Similarly, the expected signs of forward contracts and swaps also vary from period to period.

Keffala's (2017) study reveals that derivatives instruments are not considered to be troubling factors in emerging countries except future contracts. Similarly, Bendob *et al*. (2019) reveal that the use of financial derivatives decreases banks' systematic risks. While the performance index effect is not obvious, it differs between a negative and a positive effect. Moreover, Bazih and Vanwalleghem (2021) stated that financial derivatives are responsible for reducing the risk associated with the emerging and developing market banks' value, but they do not affect the overall risk of banks. Moreover, emerging market banks and institutions can reduce the risks of bank instability by using derivatives instruments.

3. RESEARCH METHODOLOGY

The sample consists of 50 financial firms from the banking, insurance, and modaraba sectors listed on the Pakistan stock exchange. Panel data has been used in this study for the time period starting from 2010 to 2020. The data has been collected from the annual reports, yahoo finance, State Bank of Pakistan and Pakistan stock Exchange.

The objective of this research is to empirically investigate the impact of financial derivatives (swaps and options) on the stability of the financial sector of Pakistan.

So, the choice of the variables was taken from Chiaramonte *et al*. (2013), and he used these variables in his conceptual model.

Forward contracts and options are used because the State Bank has allowed a limited number of derivative products such as swaps and options to the derivative market participants with certain reporting standards and disclosure obligations. Furthermore, the market participants can use derivatives only for hedging purposes. Forward contracts and options were used by the majority of Pakistani financial firms.

$$SFI_{it} = \beta_0 + \beta_1 FRC_{it} + \beta_2 SW_{it} + \beta_3 LG_{it} + \beta_4 AG_{it} + \beta_5 EPS_{it} + \beta_6 TOBQ_{it} + \varepsilon_{it}$$

The above Acronyms shows as; SFI=Stability of Financial institution as dependent variables, LG=Leverage TOBQ=Tobin Q investment, EPS= Earnings per Share and AG=Age, term 'i'=Company's, t =time, β0=Intercept, β =Slope, ε=Error term, Financial derivatives; FRC=Forward contracts, SW=Swaps, as; Independent Variables and LG, EPS, EPS, TOB Q and AG are Controlling Variables.

Summary of the Variables

The below table describes the variables used in the research from a few studies which have adopted this model, e.g., Lvicic *et al*., 2008; Laeven and Levine, 2009 have calculated financial institution stability through a formula of z-score.

$$\text{Z-score: } {}^{[\text{ROA} + \text{EQTA}]}/_{\text{std ROA}}$$

According to Bodnar *et al*. (1998) and Bartram *et al*. (2009), leverage is used to capture the effect of imperfect information regarding capital structure as a controlling variable. The years show the time effect. ROA and ROE are used to hedge the commodity price, and ROE is for the cost of equity for the operation of a business (a component of Duo point). Gross profit margin is significantly affected by stock price fluctuations (Carter *et al*., 2006; Jin and Jorion, 2006). For firm market value, the Tobin Q investment theory is used (Allayannis and Weston (2001), Bartram *et al*. (2011), and Jin and Jorion (2006).

Category	Variable Name	Description
Independent Variable		
	Financial Derivatives	Forward contracts / total assets and Swaps / total assets
Dependent Variables		
	Stability of financial institution	**Z- Score** Z-score = [ROA+ EQTA]/std ROA Where EQTA = Equity/Total Assets
Controlling Variables		
	a. Firm Age (AG)	Number of year after Incorporation to Date
	b. Leverage (LG)	Long term debt to total assets
	c. Tobin's q (TOBQ)	Capitalization ratio / Total Asset
	d. Earnings per Share (EPS)	Earnings per Share before Tax

Econometric Estimation Techniques

Two generalized methods of moment (GMM) are used for the estimation of the model because the panel data of 50 firms is used. Secondly, in order to avoid unwanted assumptions, particularly the distribution of errors, The diagnostic test AR is used to test serial correlation and the Hasen Test checks the identifying restriction validity of the instruments used in GMM. Panel data has been used for the years 2010-2020 for 50 financial firms in Pakistan.

4. RESULTS AND DISCUSSIONS

Descriptive Statistics

The average of Swap, Forward contract, age of firm, EPS, Tobin's Q, Z score are 2.5, 5.4, 31.41, 4.5, 0.29 and 1.25. The average with respect to position of Swap, Forward contract, age of firm, EPS, Tobin's Q and Z score are 0, 0, 25, 2.15, 0.13 and 1.3. The minimum observation of Swap, Forward contract, Tobin's Q are 0. Whereas, minimum observation of age of firm, EPS and Z score is 1, -9.7 and -1.5. The maximum observation

of Swap, Forward contract, age of firm, EPS, Tobin's Q and Z score are 85, 44, 87, 24, 1.96 and 4.8. The dispersion from mean of Swap, Forward contract, age of firm, EPS, Tobin's Q and Z score are is 9, 7.8, 21, 5.8, 0.36 and 0.999. All variables are right skewed. Swap, Forward contract, EPS and Tobin's Q are platykurtic because kurtosis value greater than 3, age of firm and Z score are less than 3. Therefore, it is leptokurtic.

The results of the study show that dependent variables such as swaps have a negative impact on the stability of financial institutions and are statistically significant at 1%. When swaps increase by 1%, then financial institution stability decreases by 6.8% on average, keeping the effects of other variables constant. Forward contracts have a positive impact on the stability of financial institutions and are statistically significant at 1%. When forward contracts increase by 1%, then financial institution stability increases by 32.3% on average, keeping the effects of other variables constant. Leverage has a positive impact on the stability of financial institutions and is statistically significant at 1%. When leverage increases by 1%, then financial institution stability increases by 25.8% on average, keeping the effects of other variables constant. Age of Firm has a negative impact on financial institution stability and is statistically significant at 1%. When firms' age increases by 1%, financial institution stability decreases by 0.23% on average, keeping the effects of other variables constant. EPS has positive impact on the Financial institution stability but statistically insignificant. Tobin's Q investment has positive impact on the Financial institution stability and statistically significant at 10%. When Tobin's Q investment increases by 1% then financial institution stability increases by 4.1% on average, keeping the effects of other variables as constant.

Descriptive Statistics

	SW	FRC	AGF	EPS	TOBIN_S_Q	Z Score
Mean	2.555643	5.485676	31.41712	4.559450	0.291254	1.25
Median	0.000000	0.000000	25.00000	2.150000	0.130000	1.3
Maximum	85.60363	44.91600	87.00000	24.90000	1.960000	4.8
Minimum	0.000000	0.000000	1.000000	-9.700000	0.000000	-1.5
Std. Dev.	9.087860	7.862056	21.05049	5.791063	0.364363	0.999
Skewness	5.600923	1.096519	0.901327	1.573229	1.999359	0.179
Kurtosis	43.27929	3.346456	2.602030	5.235031	7.040399	2.5

GMM RESULTS		
Variables	**Coefficient**	**T-Statistics**
Constant	0.726*** (0.011)	63.77
SW	-0.068*** (0.0003)	-18.51
FRC	0.323*** (0.0002)	156.59
LG	0.258*** (0.103)	24.89
AGF	-0.0023*** (0.00028)	-7.95
EPS	0.0363 (0.081)	40.94
TOBINQ	0.041*** (0.0114)	1.60
*** ** * indicates significance level at 1%, 5% and 10%. The bracket values show Standard error		

Diagnostic Tests

The following diagnostic tests are applied to check whether the model is error-free or not. The Arellano Bond test (AR) is used to check the serial correlation of the variables. The result suggests that there is no serial correlation after the first difference up to two lags. The p-value is 0.463, which is greater than 0.1. So we don't reject Ho, where Ho means that there is no serial correlation among the variables. The Hansen test checks the validity of over-identifying restrictions of the instruments used in GMM. Ho shows variables are exogenous. As the P value is 0.221, we do not reject Ho. It shows satisfactory results that the instruments used are exogenous and the instruments are valid.

Diagnostic Tests	**Tests Co-efficient and Probability Values**
AR (2) **Z**	-0.73 (0.463)
HANSEN TESTS **CHI SQUARE**	1.49 (0.221)
Bracket values indicate probability values	

Results Discussion

The results study has been confirmed by Keffala (2015), the swap has negative impact on the bank's stability pre financial crisis, during and post crisis. Contrary, Forward contracts has positive impact on the bank's stability pre financial crisis, during and post crisis. The leverage shows that the effect of imperfect information regarding capital structure is minimal. The results are also matched with the Bendob *et al*., (2019), Keffala *et al*. (2012), De Peretti (2013) and Keffala (2015). EPS has positive impact on financial institution's stability. The ROA hedges the commodity price and ROE is for cost of equity for operation of business (component of Duo point), gross profit margin is significantly effected through stock price fluctuations and finding confirmed by Carter *et al*., (2006) and Jin and Jorion, (2006). Tobin Q investment has positive effect on financial institution's stability and its market value. It is supported by Allayannis and Weston (2001), Bartram *et al*. (2011) and Jin and Jorion (2006).

5. CONCLUSION

The smooth operation of financial institutions is critical to the smooth operation of the economy. If there is disruption in financial institutions, it ultimately leads to disruption in the economy. To empirically check the relationship between financial derivatives and the stability of financial institutions Blundell and Bond proposed GMM for panel data. AR is used to test serial correlation, and the Hasen Test checks the identifying restriction validity of the instruments.

According to the findings of the study, swaps have a negative impact on the stability of financial institutions, while forward contracts have a positive impact on the stability of financial institutions. Results of this study have been supported by Keffala (2015), Bendob *et al*. (2019) and De Peretti (2013). The swap has a negative impact on the bank's stability pre-financial crisis, during and post-crisis. Contrary, forward contracts have a positive impact on the bank's stability pre-financial crisis, during and post-crisis. The controlling variables have a positive impact on the stability of financial institutions in Pakistan, except for EPS. Diagnostics tests show that there is no serial correlation among variables and that variables are exogenous.

Policy Implications

The policy recommendations are based on the research findings that forward contracts have a positive impact on the stability of financial institutions. Therefore, this finding motivates firms to use forward contracts for

hedging of the risk. Conversely, the swap has a negative impact on the stability of financial institutions. The study's findings discourage firms from using it to hedge their risk. The development of the financial derivative market in Pakistan has significantly boosted the use of financial derivatives by firms.

Direction for Future

The direction of future study can be as financial derivatives markets are not developed in Pakistan. So, there should be studies on the impediments and development of the market for financial derivatives. Secondly, a comparative study of the usage of financial derivatives by manufacturing and non-manufacturing firms was conducted. Finally, a comparison of the financial derivatives instrument and the volume of its usage. Fourth, a comparison of the financial performance of financial derivative-using firms and non-financial derivative-using firms is presented. Finally, the categorization of the firms using financial derivatives and their risk mitigation is finally complete.

DISCLOSURE

This paper is extracted from author's own research thesis.

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