

Characteristics of Interest Rate Swap End-User Commercial Banks: Evidence from Pakistan

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Abstract

The research empirically investigates the characteristics of interest rate swap end-user commercial banks in Pakistan. Since 2003, financially engineered products are actively been pursued by the banks as a risk management and mitigating tool. There are prior studies on the determinants of the usage, the extent of usage of the interest rate and foreign exchange derivatives, but all have focused on the non-financial and listed companies in Pakistan. This study fills the gap and extends the prior research to the unstudied banking sector, by exploring four end-user commercial banks to determine the characteristics of the banks using interest rate swaps for hedging risk - based on the notional value of interest rate swaps using cross sectional pooled data for nine years (2005 – 2013). The study has adapted the empirical model used by (Carter & Sinkey Jr., 1998). It involves the application of OLS regression technique to examine the relationship between the independent variables (size, capital adequacy, liquidity, dividends, intermediation profitability, joint risk management & exposure to interest rate risk and the dependent variable (interest rate swap usage). The findings indicate that interest rate swap usage is statistically significant for size, liquidity and coordinated risk management. The size variable is negatively related which implies that the usage of swap derivatives by end-users banks in Pakistan is primarily a niche rather than a main line activity. For liquidity and joint risk management, the coefficients of interest rate swap usage are significant and positive relationship implying liquid banks make extensive usage of swaps to diversify risk exposure and these end-user banks in Pakistan practiced coordinated risk management because banks having more credit risks used more interest rate swaps.

Keywords: Authorized Derivative Dealers; Interest Rate Swaps; End-User Banks; Hedging; Interest Rate Risks.

Introduction

Financially engineered products namely derivatives are actively used by banks in Pakistan as a risk management and mitigation tool. (Afza & Alam, 2011) have written a number of research papers on interest rate

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and foreign exchange rate derivatives usage and the extent of usage by non-financial listed firms within Pakistan for hedging risk exposure. The present research study is based on the methodological approach adopted by (Carter & Sinkey Jr., 1998) and investigates the characteristics of interest rate swap end-user banks for hedging risk. This study examines the previously unstudied banking sector using notional value¹ of interest rate swaps².

Derivatives emerged in the international financial markets in the 1970s & 1980s and are used by both the financial and non-financial firms as an invaluable off-balance sheet risk management tool (Shiu & Moles, 2010; Hundman, 1999; and Hasnani, 1999). According to (Mallin, et. al., 2001) there has been an increasingly widespread usage of derivatives particularly by large companies since 1980s in countries endowed with developed financial markets.

Banks like any other organization are also exposed to a variety of risks (Hundman, 1999; Boukrami, 2002;). Banks face a number of risks in their normal course of business operation of traditional lending and borrowing activities. Foremost amongst them is the financial risk which is of immense importance for the banks. Financial risk comprises of four main risks - (1) market risk (namely price risk, interest rate risk & currency risk), (2) credit

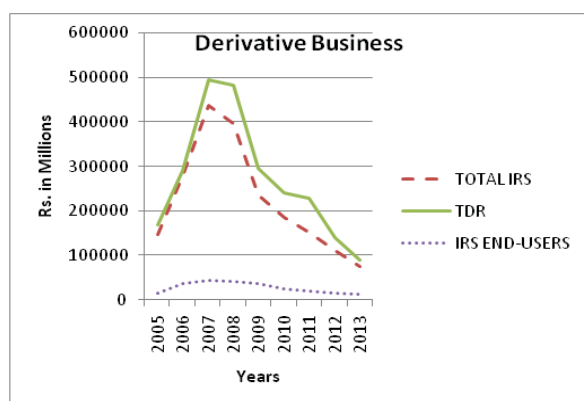
risk, (3) liquidity risk and (4) operational risk. Hence, financial derivatives evolved as a risk management tool to hedge these risks (Pande, 2012; Shen & Hartarska, 2013).

During the 1970s and early 1980s the fluctuations in interest rates were so volatile that it rocked many banking institutions on the account of credit risk, liquidity risk and operational risk crises. Consequently, financial derivatives evolved as a risk mitigation tool to manage the market risk exposure faced by the banks. Market risk made the banks' financial position vulnerable necessitating some form of protection (Hundman, 1999; Howcraft & Storey, 1990) and this led to the development and use of financial innovations namely derivatives by the banks. Normally banks trade in three types of financial derivative contracts – (1) Forwards & Futures³, (2) Options and Swaps (Husnani, 1999) and (3) Interest Rate Swap is the derivative product or instrument used for managing interest rate risk (Azariah, 2007; Kim & Koppenhaver, 1993).

Background - Origin of Derivative Business in Pakistan

During the past two decades, the financial markets in Pakistan also experienced many innovative developments and transformations attributable to financial sector reforms,

1. Notional Value of a derivative pertains to the par value of the underlying asset involved in the contract and not the amount exchanged.
2. An interest rate swap contract involves exchange between two parties of interest obligation or receipts in the same currency on an agreed amount of notional principal for an agreed period of time. Interest payments may be calculated on different basis over a period of time. One party makes fixed-rate payments while the other party's payment is based on floating rate such as KIBOR.
3. Forwards & Futures contracts are agreements between two parties to exchange a quantity of assets at a future pre-determined price.



deregulation and foreign exchange liberalization policies of the government. Global financial innovations accelerated the need in Pakistan for developing financial instruments' market and introducing new financial products such as mortgage backed securities and derivative instruments. The increasing use of financial derivatives in the International markets as a tool for hedging risk acted as a catalyst for Pakistani banks to initiate derivative transactions. Financial institutions in Pakistan have started using this tool since early 2000. Banks participation in the market for derivatives has grown rapidly since 2005. An overview of derivative business by banks in Pakistan is presented in Figure 1.1 and Table 1.1.

TABLE: 1.1

GROWTH OF DERIVATIVE BUSINESS IN PAKISTAN

Comparison between Total Derivatives and Interest rate Swaps

(Rs. in millions)

YEARS	TOTAL DERIVATIVE	INTEREST RATE DERIVATIVE	
	TD	IRS End-users	IRD TOTAL
2005	169,779	14,501	145,686
2006	291,105	35,436	278,391

2007	493,354	43,534	436,136
2008	480,784	40,731	394,680
2009	296,118	35,976	236,256
2010	240,016	23,780	185,982
2011	227,668	18,673	151,160
2012	141,191	15,375	111,622
2013	90,138	12,320	74,817

Total Derivative includes IRS, Cross Currency Swaps, FX Options.

Interest rate Derivative (IRD) includes IRS both for non-trading & trading purpose and Cross currency swaps.

Source: Annual Reports of Sampled banks.

Amongst the derivatives, highest contracts both in terms of number and volume have been executed for interest rate derivative (IRD), hence it has been the fastest growing category of derivatives in Pakistan (Agha, 2006; Banking Surveillance Department, 2006).

Based on the review of 22 research papers the banks specific characteristics of end-users of interest rate swaps are highlighted. Most of research studies covered in the review depicted Interest rate swap usage (SRATIO) as the dependent variable.

The existence of positive relationship between size and the use of interest rate swaps was evidenced by (Carter & Sinkey Jr., 1998; and Gunther & Siems, 1995). Various authors like (Boukrami, 2002; Fengyuan & Binghui, 2006; Hundman, 1999; Rivas, et. al., 2006, 2010; Kim & Koppenhaver, 1992; Hassan & Khasaweh, 2009; Brewer III, et. al., 2000; Purnanandam, 2007); Shiu & Moles, 2010; Shiu, et. al., 2009; and Brewer III, et. al., 2000 claimed that banks have cost related motives to use swaps hence these authors tested for the positive relationship between interest rate swaps and bank size. The cost motive

was contradicted by (Ahmed, et. al., 1997; and Balakrishnan, 2009; they observed significantly negative coefficient for size according to them large banks use their resources for risk management or risk diversification activities. This finding was also supported by (Gilkeson & Smith, 2006), they argued that irrespective of size banks had sizeable volume of interest rate swap and observed that large banks were using significantly less interest rate swaps. No positive size effect was also consistent with the prior research result proved by (Gorton & Rosen, 1995) cited in (Ahmed, et. al., 1997).

(Carter & Sinkey, 1998) indicated that banks with strong capital position were engaged in interest rate swap contracts. (Gilkeson & Smith, 2006) also evidenced that capital in terms of book value was positively related to interest rate derivatives. Additional literature by the authors (Boukrami, 2002; Jagtiani, 1995; Hundman 1999; Balakrishnan, 2009; Purnanandam, 2007; Brewer III, et. al., 2000; Rivas, et. al., 2006) concluded that bank capital significantly enhances the use of swaps. (Boukrami, 2003) elaborated his finding that positive capital to interest rate swaps relationship implied necessity of regulatory factor to maintain less risky swap market. (Ahmed, et. al., 1997; Brewer III, et. al., 2001; Fengyuan & Binghui, 2006; Kim & Koppenhaver, 1993; Rivas, et. al., 2010; and Hassan & Khasawneh, 2009) contradicted regulatory & market discipline hypothesis these authors found conflicting evidence and argued that the use of interest rate swaps reduced bank capital.

According to (Carter & Sinkey, 1998; Shiu, et. al., 2009; Shiu & Moles, 2010; Purnanandam,

2007; Robicheaux, 2005; Brewer III, et. al., 2000; Shiu, et. al., 2009; and Fengyuan & Binghui, 2006; Liquidity as an alternative to hedging has a significant negative relationship with interest rate swap usage. (Ahmed, et. al., 1997) described liquidity & hedging as substitutes consistent with the argument of (Carter & Sinkey, 1998) confirming it as an alternative to hedging. In addition, (Ahmed, et. al., 1997) claimed that positive coefficient also supported liquidity as substitute for hedging. While (Rivas, et. al., 2010) stated that because of positive relationship with interest rate swaps liquidity was not an alternative to derivatives. Banks with high liquidity were in a better position to take higher levels of risk and negotiate swap deals (Ahmed, et. al., 1997).

(Carter & Sinkey, 1998; Shiu, et. al., 2009; Shiu & Moles, 2010); tested for the dividend paid to have a significant positive relationship with interest rate swap usage but the result for the relationship between interest rate swaps usage and dividends paid was not statistically significant. Very few authors used dividend pay-out as bank specific characteristic. According to (Shiu, et. al., 2009) dividends is a substitute for risk management and it reduces the need for derivatives hedging.

(Carter & Sinkey, 1998) who argued that banks using interest rate swaps have low intermediation Profitability because they were negatively related. (Rivas, et. al., 2010) also evidenced NIM as negative and significant. Several authors in the review claimed that increased use of swaps increased bank's profitability. For instance (Jagtiani, 1995; Gilkeson & Smith, 2006); Shiu, et. al., 2009; Shiu & Moles, 2010; Fengyuan & Binghui,

2006) endorsed that banks that use interest rate swaps for hedging have high intermediate profitability indicating a significant & positive relationship between bank's profitability and interest rate swap usage.

(Carter & Sinkey, 1998; Sundaram, 2009, Balakrishnan, 2009) claimed that banks with more credit risk used more interest rate swaps according to these authors there is a significant positive relation between the use of interest rate swaps and joint risk management of interest rate and credit risk.

According to (Carter & Sinkey, 1998; Kim & Koppenhaver, 1993; Gilkeson & Smith, 2006; Balakrishnan, 2009); banks with more on-balance-sheet risk exposure have large maturity GAP and used swap derivatives. These authors tested for a positive relation between the use of interest rate swaps and interest rate risk exposure.

Prior literature by different authors examined the use of interest rate swaps, interest rate derivatives by end-user banks yielded a number of key findings First, Large end-user banks have infrastructure to indulge in interest rate swap derivative contracts. Second, end-user banks having strong capital are in a position to use interest rate swaps derivatives. Third, end-user banks' swaps usage supports joint risk management risk of credit risk and interest rate risk they have high loan charges-offs. Fourth, increase in banks use of interest rate swaps derivatives corresponded to greater interest rate risk exposure. Fifth, end-user banks have low intermediate profitability.

According to the model paper (Carter &

Sinkey, 1998) end-user banks of interest rate swaps are large, have strong capital position, high loan charges-offs supported joint risk management using swaps and have high exposure to interest rate risk (large GAP) but low net income margins.

Rationale of the Study

The inspiration for this paper is based on the fact that in developing countries highly reputable financial institutions became bankrupt and were either merged or liquidated because of excessive use of derivatives. In Pakistan banks have neither sophisticated infra-structure nor the expertise to deal in derivative business. Hence these banks are highly vulnerable and open to financial disaster. The researcher thus became eager and keen to know about swaps or derivative transactions by the Authorized Derivative Dealers (ADDs) and to examine the phenomena of Interest Rate Swaps (IRS) in the context of Pakistan.

Scope of the Study

The focus of the research is on interest rate swap usage in local currency by end-user banks for hedging or non-trading purpose.

Hypotheses

Following hypotheses have been generated on the basis of literature review, empirical model of (Carter & Sinkey, 1998), availability of reliable data and above all the research objectives:

H₀: There exists no relationship between the independent variables (LNTASS, EQRATIO, LIQUID, DIV, NIM, NETCO & GAP) and the dependent variable (SRATIO – interest rate swaps usage by banks).

H_A: There exists at least one statistically significant relationship between the independent variables (LNTASS, EQRATIO, LIQUID, DIV, NIM, NETCO & GAP) and the dependent variable (SRATIO – interest rate swaps usage by banks).

Research Methodology

This is a quantitative study based on archival data. The research paper has adopted the methodological approach of (Carter & Sinkey, 1998) for interest rate swaps by end-user banks in Pakistan.

Sample

The study examines the main category of interest rate derivative instrument - interest rate swaps for hedging risk. During the course of this research there were merger/amalgamation/acquisition of commercial banks this affected the sample size of end-users banks as such the number of sample banks available for analysis remained low. The sample size of the study comprises four Authorized Derivative Dealers (ADDs) that are end-user listed commercial banks executing interest rate swaps contracts. These sample banks have complete set of information for the period 2005 through 2013.

Data Source

The research is an archival study based on data collated from the annual reports of commercial banks involved in derivative business contracting interest rate swap deals. Other sources of data include SBP publications, newspaper supplement, banking journal and websites of respective banks for updated information.

Data Collection

The data for the study has been compiled by the researcher primarily from ADDs /banks Annual Reports containing both accounting and financial data.

The year-wise data forms a large cross-sectional pooled data set containing 9 observations (n = number of years), 8 parameters (k = number of variables) with sample size 4 (IRS end-user banks) hence there are 288 annual bank-firm observations to determine the relationship as per the hypotheses.

Variables

The researcher has replicated the methodology of (Carter & Sinkey, 1998) and identified, selected, explored & examined the dependent and independent variables. All the variables in this paper are expressed on annual basis, following calendar year and are in terms of Pakistan rupee.

Dependent Variable

Interest rate swap usage (SRATIO) the dependent variable, is regressed to test the relation with the banks specific characteristics.

Explanatory Variables

These variables are significant for explaining the interest rate swap usage for hedging or risk management, the independent variables considered in this paper are Size, Capital Adequacy, Liquidity, Dividends, Intermediation Profitability, Coordinated Risk Management and Interest Rate Risk Exposure. The summarization of all the selected parameters, variables and respective proxies is given in Table 1.2

TABLE 1.2

BANK SPECIFIC PARAMETERS, DESCRIPTIONS AND EXPECTED EFFECTS

PARAMETERS	VARIABLES	MNEMONIC	PROXY/ Definition	PREDICTED SIGNS
Swap usage	Dependent		Notional value of interest rate swaps deflated by Total assets	-
	Interest Rate Swap	SRATIO		
	Independent			
Size	Total Assets	LNTASS	Natural logarithm of total assets	Positive/ Negative
Capital Adequacy	Capital	EQRATIO	Equity capital / Total assets	Positive/ Negative
Liquidity	Liquid Assets	LIQUID	Liquid assets / Total assets	Negative (Alternative to IRS)
Dividends	Cash Dividends	DIV	Dividends paid / Total assets	Positive (Alternative to IRS)
Intermediation Profitability	Interest Spread	NIM	Net interest income / Total assets	Positive
Coordinated Risk Management	Credit Risk	NETCO	Net Loan charge off /Total assets	Positive
Exposure to Interest Rate Risk	Duration of Assets & Liabilities	GAP (1 year)	Rate-sensitive assets less rate-sensitive liabilities / total assets	Positive

Model Specification

Empirical Regression Model for hypotheses testing to evidence any relation between SRATIO (dependent variable) & the independent variables is given below:

Equation 1.1

$$SRATIO_{(i,t)} = \beta_0 + \beta_1 LNTASS_{(i,t)} + \beta_2 EQRATIO_{(i,t)} + \beta_3 LIQUID_{(i,t)} + \beta_4 DIV_{(i,t)} + \beta_5 NIM_{(i,t)} + \beta_6 NETCO_{(i,t)} + \beta_7 GAP_{(i,t)} + e_{(i,t)}$$

Results and Findings

Data has been analyzed using SPSS software. Summarized descriptive statistics on the variables, Pearson correlation matrix and Regression analyses have been reported to infer results about the hypotheses and draw

inferences for conclusion. Table 1.3 exhibits size, liquidity and joint risk management as statistically significant parameters of end-user banks based on hypotheses testing.

Negative association between size and interest rate swaps is inconsistent and contradictory to (Carter & Sinkey, 1998). Earlier research that runs counter to the cost motive but supports the present claim was by (Jagtiani, 1995; Ahmed, et. al., 1997; Gilkeson & Smith, 2006 and Balakrishnan, 2009) they observed significantly negative coefficient for size according to them this was consistent with the idea that large banks use their resources for risk management or risk diversification activities.

TABLE 1.3

DECISION ON HYPOTHESES TESTING

VARIABLES	Beta Value	Statistical T	P-values	Null Hypotheses Accepted	Null Hypotheses Rejected
SRATIO	-	-	-	-	-
LNTASS	-0.845	- 7.135	0.000	-	Ho
EQRATIO	0.226	1.032	0.311	Ho	-
LIQUID	0.345	3.041	0.005	-	Ho
DIV	0.015	0.084	0.933	Ho	-
NIM	-0.093	- 0.628	0.535	Ho	-
NETCO	0.307	2.659	0.013	-	Ho
GAP 6-12	0.039	0.407	0.687	Ho	-

J/;Excel 2003:Observed, Predicted, Theoretical SIGNS

Positive relationship between liquidity & interest rate swaps inferred in this finding is contradictory with the results of (Carter & Sinkey, 1998). They argued that liquidity as an alternative to hedging has a significant negative relation with interest rate swap usage.

The result is however, consistent with the prior research by (Ahmed, et. al, 1997). They claimed positive coefficient supported liquidity as substitute for hedging. They argued that banks with high liquidity were in better position to take higher levels of risk

and negotiate swap deals.

It is evident from the result that significant positive relationship exists between the use of interest rate swaps and joint risk management of interest rate & credit risk. This is the only finding consistent with (Carter & Sinkey , 1998), they found support for joint risk management. This implies that banks with high charge off used more interest rate swaps. Table 1.4 provides summarized presentation on the three explanatory variables that are significant and have definite relationship with interest rate swap (SRATIO) usage.

TABLE 1.4

SUMMARIZED CONCLUSION OF THE PARAMETERS

Parameters	Variables	Observed Relation	Predicted Relation	Theoretical Signs	Statistical Significance
Size	LNTASS	-	+	+/-	Yes
Capital Adequacy	EQRATIO	+	+	-	No
Liquidity	LIQUID	+	-	-	Yes
Dividend paid	DIV	+	+	+	No
Profitability	NIM	-	+	-	No
Joint risk management	NETCO	+	+	+	Yes
Interest rate risk exposure	GAP 6-12	+	+	+	No

Conclusion & Limitations

The current study analyzed the characteristics of interest rate swaps usage by the end-user banks in Pakistan for the period 2005 to 2013. By adapting (Carter & Sinkey, 1998) model, it was found that only three out of seven bank specific characteristics (defined parameters) had statistically significant relationship with interest rate swap usage namely Size, Liquidity and Coordinated risk management of both the risks - credit and interest rate risk.

Size has a negative coefficient this indicates that the use of interest rate swaps by banks is independent of size and these banks have no comparative advantage over other banks in the use of interest rate swaps to hedge risk. Interest rate swaps usage by banks in Pakistan is primarily a niche rather than a main line activity. The result negated cost motive concept.

This study documented a significant positive relationship between interest rate swap usage by sample banks with liquidity and joint risk management.

Except for Coordinated Risk Management of both credit and interest rate risk. The results of this research for size and liquidity are in contrast with the findings of (Carter & Sinkey, 1998), but are supported by a segment of authors covered in the literature. It is concluded that end-user banks in Pakistan

are liquid and have significant gain in hedging for joint risk management of both credit risk and interest rate risk using IRS.

This academic study contributes to the literature by being the first to provide evidence regarding the characteristics of end-users banks of interest rate swaps in the context of Pakistan. This research is the first evidence on interest rate swaps usage by financial firms, based on the notional value of swaps for non-trading purpose and determines the relation with the specific bank characteristics this will facilitate professionals working in commercial banks, other financial institutions, bank regulators, policy makers and academicians to understand the association between the usage of interest rate swaps by end-user banks.

Limitations of the study

Major limitation of the study is small number of participating end-users banks dealing in interest rate swaps transactions. The four end-user banks and short period of study (nine years) is not sufficient to shed light on the long term movement or fluctuations in interest rate. Non-availability of detail break - up in the annual reports of sample banks on the different types of swaps namely plain vanilla, fixed & floating swaps, index amortizing swaps and other exotic types of swap contracts confined the study to interest rate swaps (IRS) only.

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