Interest Rate Risk Management and the Use of Derivative Securities

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ABSTRACT
This study aims to demonstrate the utility of derivative financial instruments for the management of interest rate risk that is faced by banks and financial institutions, and to provide an efficient flow of monitoring and control thereof. Banking institutions can now use a combination of balance sheet and off balance sheet measures, i.e. gap method, of interest rate risk management, in order to control exposure of short-term rates and derivatives to control the residual interest rate exposures.
The result of the study shows that banks can achieve better diversification and risk management using derivatives.

KEYWORDS: *interest rate risk, banking industry, derivative securities, risk management.*

JEL CLASSIFICATION: *G21; G28*

INTRODUCTION

One of the most important forms of risk that banks and financial institutions are facing is interest rate risk. Interest rate risk is at the heart of every silo of truly integrated risk management: credit risk, market risk, asset and liability management, liquidity risk and even operational risk. But where do interest rates come from? Interest rate risk arises from the differences of interest rate sensitivity of capital inflows and outflows. Monetary policy is the major driver of interest rates, since the prevailing view is that high interest rates are the best way to fight inflation. Monetary policy has a direct effect on the short end of the curve because central banks tend to act upon those rates.

An important function of financial institutions is to release capital, often involving the purchase of assets from the primary market and the issue of securities on the secondary market in order to finance the purchase of assets. Maturity and liquidity of capital inflows generated by assets are most often different from those of capital outflows generated by liabilities. Moreover, interest rate risk is found in any interest-bearing asset, such as a loan or a bond, due to the possibility of change asset value as a result of developments in interest rates. Consequently, the financial institution must deal with the need to manage this risk.

Most banks pay particular attention to interest rate risk as it can have a significant impact on stocks market. It also has a significant impact on the income of banks and / or on its market value. In addition, when interest rates fluctuate, the bank is also facing with the risk of damaging its market value. For example, when assets duration exceeds that of liabilities,

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an increase in interest rates will cause a greater decrease in the market value of assets as than that recorded by the passive elements.

Banking institutions are facing many kinds of interest rate risk:

- Basis risk – given by the differences between the maturity of assets and liabilities cost;
- The risk that arises from the difference between the rates of assets held short time and long-term detainees;
- The risk that arises from the revaluation of assets and liabilities at different times with different interest rates.

Fundamentally, the interest rate is nothing more than the cost that a person incurs when using someone else's money. When a person borrows from a financial institution, it must pay for the privilege. But when we talk about the impact on capital market, bring also into question the cost that banks pay to the central bank for their loans. It is a lever that central bank uses to maintain the economy into stable parameters.

Commercial banks use two major techniques to manage this type of risk: the first involves adjusting the sensitivity of assets and liabilities bearing interest rate risk as much as possible (balance sheet techniques) and the second imply the use of derivative securities (off-balance sheet techniques).

For interest rate risk measurement is used, both in specialized literature and in practice several techniques:

- Techniques based on the gap between sensitive assets and liabilities;
- Techniques based on maturity gap;
- Techniques based on duration gap;
- Techniques based on historical and dynamic simulation.

These methods are also recommended by the Basel Committee to be use in order to cover the exposure to interest rate risk. Traditionally banks use maturity gap to predict how their revenues will be affected by interest rate developments. This method assumes that an increase or decrease in interest rates will equally affect assets and liabilities. Therefore, in principle, a perfect match will leave the bank's market value unaffected by interest rate developments. Flannery and James (1984) demonstrate the importance of maturity gap by analysing the relationship of sensitivity to interest rate manifested by both profitability of ordinary shares and balance sheet assets and liabilities. Financial industry often uses as measure the annual maturity gap. Schrand (1997) indicates that this term reflects the maturity mismatch of assets and liabilities held by an institution.

Precisely because of interest rate risk management is, alongside credit risk, the most important risk that a bank faces, various tools have been created to manage it. Ever since the '80s, derivative securities began to be used to manage the exposure to interest rate risk. Worldwide, studies show that investment and hedging of products that have as underlying interest rate is now one of the large and liquid market segment. This increase in the use of financial derivatives is mainly due to the fact that they are cheaper. In theory, the existence of an active derivative market should increase the chance of banking institutions to achieve the desired level of exposure to interest rate. In 1984 Diamond has developed a theory of financial intermediation which states that banks have advantages in monitoring and risk

management compared to other financial institutions. He demonstrates that diversification that a bank can achieve reduce the cost of risk monitoring and generates net benefits of financial intermediation services. One implication of Diamond's model implies that banks should not take undiversified risk than if their management brings some clear advantages, superior to the assumed risk. Thus, banks should consider using derivatives to manage interest rate risk.

This study examines the management of interest rate risk by using various derivative instruments developed for this purpose and aims to provide an efficient flow of monitoring and control thereof.

Of course, as with any probable risk, there is always the option of doing nothing. But unforeseen circumstances, do not use hedging can be disastrous. Hedging involves a cost, but the cost of doing nothing can often be much higher.

Fortunately those seeking to hedge can choose from a variety of products:

- *Forwards* – is the simplest tool that can be used for interest rate risk management;
- *Forward Rate Agreement (FRA)* – following the conclusion of such a contract one party pays a fixed interest rate and receives from the counterparty a floating rate equal to one of the reference rate. Payments are calculated based on a notional principal amount and is paid at predetermined intervals;
- *Futures* – similar to the Forwards;
- *Swaps* – similar to a combination of FRA-s;
- *Options* – in this case can be used Caps, Floors and Collars. There are various ways of combining options on interest rates.

All these products offer to those interested methods of hedging interest rate and can be selected according to various scenarios.

1. CURRENT STATE OF RESEARCH

There are numerous studies that examine the relationship between exposure to interest rate and volume of derivatives traded by banks. Their history begins in 1984, with the increasing use of derivatives with underlying interest rate by banks. While interest rate risk is intrinsic to the process of maturity transformation, banks may hedge such exposure through the use of interest rate derivatives or limit its effects on interest income by making longer-term loans at floating rates. Moreover, the effect of interest rate changes on interest margins may be offset by changes in the noninterest components of revenues or expenses, such as income from fees or credit losses, or changes in the size and composition of bank balance sheets. These latter effects may be especially important because fluctuations in interest rates are, in general, correlated with cyclical changes in economic conditions that can exert their own influence on the different components of bank profitability. Indeed, as discussed below, the existing literature offers little consensus regarding the effects of changes in interest rates on the profits of financial institutions. Memmel (2011), using data from German banks' internal models, found that maturity transformation contributes importantly to bank income and exposes banks to interest rate risk, which varies systematically with the slope of the yield curve. Another exception in this strand of literature is den Haan et al. (2007), who found that increases in short-term interest rates lead

to substantial declines in the book value of aggregate bank equity, a result consistent with a reduction in earnings for the sector as a whole. Unlike the previous studies, however, den Haan et al. (2007) are concerned with the underlying cause of interest rate changes and rely on an identified vector auto regression to isolate changes in interest rates that are uncorrelated with current and lagged macroeconomic conditions. Under their identification assumptions, these interest rate innovations can be interpreted as "exogenous" monetary policy shocks, though this interpretation is not without controversy.

Derivatives are always constructed with prevailing market rates. Contracting a swap receiving the fixed rate will imply receiving the current fixed rate for the selected maturity. Contracting a swap receiving the variable rate will imply receiving the current rate for the selected short maturity of the variable rate. Therefore, derivatives influence both the nature of interest rates and the level of interest rates paid or received, hence the earnings (P&L) as well. Both impacts have to be assessed carefully before entering into a derivative transaction.

Although the advantage of using derivatives to hedge is universally recognized, increased use of these instruments has caused concerns to regulators. Most studies focus on the role of derivatives, but could not prove if they are used more for the purpose of hedging or in speculative purposes. Particular attention is paid to derivatives as risk generating tools and triggers of systemic risk. There are also a number of studies have focused on the relationship between the use of derivatives and banks' exposure to interest rate risk. The conclusions are mixed. Sinkey and Carter (1994), Tufano and Headley (1994) and Gunther and Siems (1995) demonstrated a significant negative relationship between the gap extent of exposure to interest rate and the amount of derivatives used by banks. These works issue the idea that with the increased use of derivatives by banks increases the exposure to interest rate risk. In agreement with this conclusion is also Hirtle that in 1997 studies a sample of 139 banks and shows that while the increased holding of derivatives increases the exposure to interest rate risk. Other authors, such as Minton, Stulz and Williamson (2009) conclude that the use of derivatives by banks for the purpose of hedging is limited due to adverse selection and moral hazard.

Contrary to the studies presented into the paragraph above, Brewer, Jackson and Moser (1996) finds a negative correlation between risk and the use of derivatives by financial and banking institutions. Ahmed, Beatty and Takeda (1997) show that for most users of derivative securities, they reduce exposure to interest rate risk. Schrand (1997) shows that trading derivatives is negatively associated with the sensitivity of shares price interest rate. In 2000, Brewer, Jackson and Moser assess the impact of derivatives on lending. Their conclusion is that involvement in the trading of derivatives help banks reduce costs by delegating the monitoring of contracts issued by the borrower, thus allowing banks to increase lending without experiencing an increase in the overall level of risk. The same authors analysed in 2001 the major differences between banks that use derivatives and those that do not. They prove that the final ones register a slower growth of the loan portfolio. The same conclusion is also found in Zhao and Moser (2009). These views are consistent with Diamond (1984) who considers granting of loans and the use of derivatives for hedging purpose as complementary activities.
Following the example of these studies, we raise the following question: Helps the use of derivatives with interest rate underlying banks to obtain a better control of interest rate risk exposure?

2. THE IDENTIFY, MEASURE AND CONTROL OF INTEREST RATE RISK

The steps that an institution must follow to manage interest rate risk are: identification, measurement and control of risk.

As regards interest rate risk measurement, Basel regulations allow several ways of measuring and calculating the capital required to cover this risk. Most standards are based on VaR measure as it's a solid one and became a good management practice. Banks may, however, use their own VaR measures to determine capital requirements.

Qualitative criteria underlying to the implementation of risk control measures are:

- The existence of an independent risk control department responsible for development and implementation of the Bank's risk management;
- Making regular back testing;
- If an internal model is use, its initiation and validation;
- The risk measurement model must be integrated into management decisions;
- The risk measurement system should be used in correlation with predetermined trading and exposure limits;
- Stress – testing;
- Risk measurement systems should be documented;
- Must periodically make an independent review of the risk measurement system by the internal audit;
- Active involvement of senior management and Administrative Board.

Banks should update the database at least once every three months to capture market developments and correlations.

As regards quantitative parameters, they are:

- ✓ VaR composition will be based on the following parameters: a horizon of 10 days, a confidence level of 99% and a minimum observation period of one year historical data;
- ✓ Knowledge of correlations between factors;
- ✓ Capital must be higher than the previous day VaR or the average VaR of the last 60 working days.

Market risk should be daily composed and monitored. Every day VaR should be compared with the profit or loss of trading. The recursive testing helps to improve the methodology. All these procedures will help the bank to effectively control market risk and be able to allocate the necessary capital.

Risk management is effective when senior management is actively involved and continuous informed of the risk department actions, department that must be independent and able to establish work rules and procedures so that the system to be operational.
The targeted objectives are a better risk management, continuous development of processes and encouraging innovation. The cope is to complete the integration process of risk management and capital with bank policies.

Dangers threatening an effective risk management process are:

- As regards the involvement of senior management: lack of cooperation, of transparency, lack of qualification and independence in decision making;
- In terms of formulating policies and procedures: the possibility of formulating policies and internal rules inconclusive and inconsistent with the targeted risk, achieving a much less developed infrastructure, rigid implementation and lack of communication;
- In terms of creating a division to deal with risk management: an inappropriate structure, inexperienced employees, and not least the lack of independence;
- In terms of achieving an integrated risk management, threats are: the inability to control the system, IT system and database and lack of appropriate tools.

It is important that risk division to be independent of the trading unit and to directly report to senior management in order to minimize conflicts of interest.

Impact and benefits of establishing a system of risk management:

- Better image of the bank and is a better understanding of both the customers and the employees due to the use of risk management;
- Accurate capital requirements and increased return on capital;
- Senior management will be better informed so that decisions are based on accurate information;
- Reduced operational costs due to efficiency coming from risk management.

The more sophisticated are the methods used for risk assessment, the better the risk ratio - return is. Using an internal model for the calculation of risk can benefit the institution in terms of better alignment with regulatory requirements, driving innovation that leads to improved competitiveness and especially a reduction in infrastructure costs by rethinking the modelling and analysis in conjunction with the regulators, rating agencies, analysts and shareholders. Weight in the implementation of an internal model lies in the lack of a framework and an environment full of changes. Essential is also its recognition.

A successful implementation can be achieved by integrating into a well-founded system. Regarding interest rate risk management must be established a number of factors corresponding to the interest rates for each currency for which the bank has breakthrough, for all balance sheet positions. Risk factors should be considered separately in order to "capture" the risk of spread.

The role of stress tests is to identify events that may impact on key components of the balance sheet of a bank, causing a loss of capital. Stress scenarios should cover a wide range of factors that can cause extraordinary losses or on contrary extraordinary gains to the trading portfolio, or to cause difficulties in controlling risk. The test must have quantitative and qualitative nature, incorporating both market risk and liquidity risk. The results should be regularly reviewed by senior management and should be reflected in the decisions, policies and limits set by the bank. Although much more subjective than the VaR calculation, they can help identify weaknesses of bank's portfolio.
Regarding the flow, it must be accessible and transparent. Valuation of derivatives should be conducted by a special committee established for this purpose. Diversification of risk is arbitrary. Must take into account that ignoring diversification will lead to higher capital requirements. The risk positions must be daily caught and not by period.

The standard method for assessing interest rate risk, which we will also use into this study, is to identify risk on maturity bands. Capital set for each risk class is designed to protect against adverse price developments. For interest rate risk, capital is an amount necessary to cover the total interest risk, both general and specific.

Back testing should be periodically performed to verify that losses are within VaR forecasts. Basel regulations provide a test by recording daily VaR exceptions in the last analysed year. Even if VaR consists in daily analysis, the testing is made by analysing several observations. Too many exceptions indicate that the model is not conclusive or that the bank is "unfortunate". But how do we decide?

3. GAP ANALYSIS AND USE OF FINANCIAL DERIVATIVES

Instructions on interest rate risk taken by banks apply to measure and control interest rate risk that occurs in both assets and liabilities and off-balance sheet. It also covers cash and non-cash activities of the bank.

Interest rate risk analysis is performed on maturity bands consisting of an IRGap type report, technique based on the gap between assets and liabilities sensitive at interest rate. Assets and liabilities are grouped in assets and liabilities with floating interest rate (or sense) or fixed on a given maturity band. The gap is calculated as difference between assets and liabilities in each maturity band.

IRGap report contains positions of both on balance and off balance sheet for each currency in which that entity has assets or liabilities. This type of report is usually drawn monthly. Bank report contains all scales and positions in and outside the balance sheet depending on the date of maturity, rate of change, the date of liquidation or early estimates where these variables are not known separately for each currency. Data used into the monthly IRGap report are collected into the last working day of the month. The IRGap report examines the positions on and outside the balance sheet by making them equivalent instruments for interest rate risk - Interest Rate Risk Equivalent Instruments (IRREI) - and distributing IRREI cash flows tape time.

Consider that "Next Interest Re-pricing data" – the next time at which the rate of interest for loans with variable interest, financial instruments (bonds), etc. changes. Suppose that a financial instrument's repayment schedule is shown in Table 1. We consider that the next updating (re - pricing) of interest rate is D_m:

Table 1. Repayment table for a financial instrument

Date	D_1	D_2	D_3	…	D_m	…	D_{n-1}	D_n
Principal	P_1	P_2	P_3	…	P_m	…	P_{n-1}	P_n
Interest	I_1	I_2	I_3	…	I_m	…	I_{n-1}	I_n

Source: the authors

For the purposes of the above, the financial instrument for inclusion in IRGap report will become in IRREI as shown in Table 2.

Table 2. Cash Flows (IRREI)

Date	D_1	D_2	D_3	…	D_m	…	D_{n-1}	D_n
Principal	P_1	P_2	P_3	…	$P_{tot} - \sum_{i=1}^{m-1} P_i$	…	P_{n-1}	P_n
Interest	I_1	I_2	I_3	…	I_m	…	I_{n-1}	I_n

Source: the authors

To make entries in EURO equivalent is used the FX rate issued by NBR.

To monitor interest rate risk, the bank can calculate two indicators: 12 months Weight ("12 month-weighted gap") and 10 years weighted equivalent ("Over 1 year - 10 year-weighted equivalent").

The report may contain additional information when using the limit exceeded 70% or if there are other significant risks. Whenever the limit is exceeded, the responsible and empowered persons must be informed to take corrective action.

In addition, stress tests may be performed, applied to possible negative developments in interest rates that can cause a negative evolution of on and off balance sheet assets and liabilities and off.

But how may be effectively use the derivatives to cover interest rate risk exposure? Finance theory suggests that capital market imperfections create incentives for firms (including banks) to use derivatives for hedging purposes. Derivative use for hedging purposes can reduce agency costs in two ways. (1) it can be a cost efficient way of aligning the interests of managers and stockholders, and (2) it can align the interests of bondholders and shareholders. Because of the potential for wealth transfers from bondholders to shareholders, firms must conciliate bondholders either through bond covenants or hedging (Myers and Smith, 1987; Nance et al. 1993). Since banks can use derivatives to hedge, they can reduce the volatility of their cash flow and pay out greater levels of income as dividends, ensuring their bondholders that sufficient cash flow is available for debt payment. Additionally, the use of derivatives for hedging helps alleviate the incentive and monitoring problems caused by managerial risk aversion (Carter and Sinkey 1998). Empirical evidence shows that derivatives decisions are positively related to exposure to interest-rate risk (e.g., the 12-month maturity gap). A bank decision to participate in derivative contracts is positively related to size. Banks have access to three types of derivative contracts: swaps, options and futures/forwards. A bank that uses one type of derivative contract is more likely to use other derivative instruments.

We consider the following example. Suppose an exposure of 228,142 EUR for assets with maturity up to 1 year and 39,628 EUR for assets with maturity up to 10 years. It can be covered as stated in the introduction to this study by several methods including derivatives. We also consider that the value of risk-weighted assets at interest rate is greater that the

value of sensitive liabilities. Next, I will show some ways.

a) Using FRA agreements:

In this case, as the value of risk-weighted assets at interest rate exceeds the value of sensitive liabilities, the bank receives a variable interest rate for granted loans but must pay fixed interest for liabilities. It shall therefore cover against a decrease in interest rates. The bank will sell in this case a FRA agreement.

Suppose the bank expects that the EURIBOR interest rate (6 months) will drop from 0.964% to 0.364%. It will trade a FRA agreement 3V9 into the following conditions: 10,000,000 EUR notional amounts, 0.964% FRA rate (EURIBOR 6 months at the date of the transaction). The contract period is 6 months.

When fixing, the EURIBOR rate reached a value of 0.364%, the buyer will pay the seller (in this case the bank) the amount of:

$$Amount = \frac{10000000 * \left(\frac{EURIBOR - 0.964}{100}\right) * \frac{183}{360}}{1 + \frac{EURIBOR}{100} * \frac{183}{360}} = 30{,}443.67\ eur \qquad (1)$$

b) Using Futures:

A sale of FRA equals to a purchase of an interest rate Futures. An increasing of interest rates will lead to lower Futures prices. By selling futures contracts and liquidate the positions at a lower price the bank will get a gain that will offset the loss of capital value (Dumitru, 2007). The number of futures contracts that will be sold depends on the duration of bank balance sheet gap.

The duration spread of the bank is positive:

$$DGAP = Assets\ duration - l * Liabilities\ duration = 2 - 0.9 * 1 = 1.1 > 0,$$

where l is the leverage.

If the futures price that has as underlying a 5 years bond is 4812.50, the number of futures contracts required to be purchased to hedge the interest rate is:

$$No\ Futures = (Assets\ duration - Liabilities\ duration * l) * \frac{Assets\ value}{Futures\ duration * Futures\ price} \qquad (2)$$

Therefore the bank needs 446 Futures.

The fear of using derivatives comes from some of the most popular financial losses from the early 90s. The risk of trading derivatives lies in the possibility of loss amplification. This is mainly due to the leverage that allows through a small amount of money, access to the several times higher underlying asset value. Another risk is caused by the lack of market liquidity which may lead to failure of mark to market of earnings or failure of loss

prevention. Any transaction involving derivatives implies risk that cannot be completely eliminated. The first warning came in January 1992 when Gerard Corigan, Fed Chairman stated: "*High-tech banking and finance has its place, but it's not all it's cracked up to be. I hope this sound like a warning, because it is.*" Financial institutions have realized that it is in their interest to promote a set of best practices to meet regulators actions. This led G-30[i] report from July 1993.

Barings bankruptcy from 1998 was followed by a detailed report of the Bank of England. Similarly, the financial collapse of Long-Term Capital Management (LTCM) was analysed in a report by Counterparty Risk Management Group (CRMPG) in June 1999. All these reports have added valuable knowledge to risk management practices.

To all these reports Basel regulations are added, agreement amended in 1996 in order to introduce capital requirements for market risk and implemented in January 1998. Capital requirement can be calculated by two methods. The first is the "standard", similar to that which determines the capital required to cover credit risk. This method provides a rough but conservative measure of market risk. The second is the internal approach (IMA) and it's based on bank's own system-based risk management, being more accurately and adaptable than the standardized set of rules. Are the first time regulators having confidence in the ability of banks to manage risk, but this approach is accompanied by a strong verification system based on back testing.

Other regulatory requirements have evolved in parallel. EU Capital Adequacy Directive (CAD) introduces a standardized model in 1993, expanded by the internal approach models in 1998.

Market risk to which the bank is exposed is primarily composed of portfolios exposed to interest rate risk (IR), the risk of share price development (EQ), foreign exchange (FX), commodity price developments (CO) and options price development (OP). Bank's total risk is then obtained by summing the risks entailed in the listed categories. Since the construction of the necessary hedging capital follows a structured and standardized process, this method was named Standard.

For material exposures to interest rate risk, there must be at least six factors for yield curve risk plus separate factors to model the spread of risk. For shares risk, the model must contain at least the term beta or an index. For risk from trading commodities, the model must include spot rates plus yields opportunity. Banks must also incorporate nonlinear options pricing feature, including the Vega risk. Correlations between different categories of risks are explicitly recognized. Once these criteria are met, the capital required to cover market risk is made according to the following rules:

- Quantitative parameters – composing a daily VAR must be based on a set of uniform quantitative rules.
- Horizon 10 working days, or two calendar weeks.
- A confidence interval of 99.9%.
- Observation period of at least one year of historical data, or an average of at least six months.
- Updated at least quarterly, or whenever prices are subject to materials change (sudden increase or decrease).

- Market risk assessment – general requirements of capital required to cover market risk should be set at the highest level of VAR calculated for the previous day, or VAR calculated as the average of the last 60 business days, multiplied by a multiplicative factor k. The exact value of the multiplicative factor will be determined by local regulatory and supervisory authorities, but has a limit of 3. The scope of this factor is twofold: once without this risk factor the bank would expect to have losses that exceed capital held in one to ten days in a given period of 100 days, or once every four years. It does not seem prudent. Second, the factor serves as a buffer against shortfalls that the model might have, for example assuming a normal distribution when it is flat tails.
- Plus factor – represents a penalty component that is added to the multiplicative factor k if after verification indicates that VAR forecast shows that banks systematically underestimate risk. The purpose of this factor is to penalize the bank that proves a too optimistic projection of market risk to which it is exposed. Also provides a feedback mechanism that rewards proper internal monitoring and stimulate the construction of a sound system of risk management.

Finally, the SRC is the amount of specific capital, which acts as a buffer against idiosyncratic factors, including the risk of default and the event of a bond or individual actions. Banks using the internal approach can incorporate specific risk VAR, as long as (1) satisfy additional criteria, (2) can demonstrate they can handle an event of default.

In conclusion, we can say that the last decade has been marked by a constant concern due to exchange rate volatility, interest rates and generally commodity prices, higher volatility than previously recorded. These fluctuations had a significant effect on the prosperity of companies. Management became aware of the effect of all these events, and shareholders' expectations regarding the ability to prevent and act to reduce the negative effects on capital rose. The possibility of protection against these aversive was facilitated by the innovative derivative securities.

CONCLUSIONS

Overall, the result of our study indicates that the use of derivatives increases the efficiency of banks. This result is consistent with the argument that banks can use derivatives to improve their efficiency by reducing the explicit cost of financial distress and the probability of bankruptcy (Mayers and Smith, 1982; Smith and Stulz, 1985; Merton, 1995). It contributes to the current literature by emphasizing the steps to a strong interest rate risk management, impact and benefits of establishing a system of risk management and proves the benefits of using derivative securities. The study aims to examine the issue of efficiency and the uses of derivatives and to offer a flow to efficient manage the interest rate risk by using derivative securities. Although the contributions of this study are significant and important to policy-makers, investors, and bank executives, they have to be interpreted with caution due to the limitation of the variable derivatives. Future studies should analyse the effect of derivatives on banks taking in consideration the difference between interest-rate derivatives and currency derivatives, and/or the different types of derivatives such as swaps, futures, forwards, and options.

We agree with Merton (1995) that argues that financial innovations (derivatives) can improve economic performance by lowering transaction costs or increasing liquidity, and by reducing agency costs. The use of derivatives allows banks to improve their capital buffers that absorb risk and this result in lower costs and greater value (Mayers and Smith, 1982; Smith and Stulz, 1985; Merton, 1992). The proper use of derivatives can lower banks financing costs, and consequently improve their efficiency. Unfortunately the press pays today less attention to the capacity of derivatives to be a risk management tool, but focuses on speculative transactions and the damages resulted from improper use. Studies that continue to appear are trying to raise awareness of the derivatives ability to protect the value and change the attitudes towards these tools.

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[i] Group of 30 (G-30) is a non-profit, private organization, composed of outstanding members of the public, private and academic environment. After derivatives disaster in the early 90s, the G-30 issued in 1993 a report which became the cornerstone of risk management.