5-18-2007

The Determinants of Off-Balance-Sheet Banking Risk: The U.S. and International Evidence

Ahmad Y. Khasawneh
University of New Orleans

The Determinants of Off-Balance-Sheet Banking Risk: The U.S. and International Evidence

A Dissertation

Submitted to the Graduate Faculty of the
University of New Orleans
in Partial fulfillment of the
requirements for the degree of

Doctor of Philosophy
in
Financial Economics

By

Ahmad Y. Khasawneh

B.A., Yarmouk University, 1999 – Jordan
M.A., Yarmouk University, 2002 – Jordan
M.S., University of New Orleans, 2006

May 2007

Dedication

I dedicate this work to my loving, loyal and supportive wife, Feda.
You have been my insight from the beginning of this journey, you have provided me with your support, care and encouragement, and sacrifices during the last four years and I couldn't have done it without you.

To my little sons, Abdel Rhman and Amr

Acknowledgment

Before everyone else, I would thank first Allah for his help in bringing this research to fruition. I am indebted to my parents, Yousef Khasawneh and Shaikha Khasawneh, for their continuous prayers and moral support. I also thank my brothers, sisters and friends for their encouragement.

I would like to thank my supervisor, Dr. M. Kabir Hassan, for providing expert guidance throughout the process of writing my dissertation. Dr. Hassan has been a great professor, friend, and brother. I also would like to thank my committee members, Prof. John Altazan, Prof. Oscar Varela, Prof. Atsuyuki Naka and Prof. Gatherine Gleason for their helpful comments and great guidance.

It is my pleasure to acknowledge the valuable knowledge and information I have received from all the professors in the department of Economics and Finance at the University of New Orleans. I would also thank every person who helped me in completing this Ph.D. Finally, I would like to extend my great thanks to The Hashemite University – Jordan, as the institution, management, and colleagues who offered me a scholarship to study the Ph.D. and provided me with all needed facilities that enabled me to complete what I started.

Table of Content

Chapter Three: The Determinants of OBS Derivatives Activities in U.S. Commercial Banks

Chapter Four: The Determinants of World Commercial Bank's Off-Balance Sheet Activities: World Regions Comparison

List of Tables

Chapter Two

Chapter Three

Chapter Four

List of Figures

Chapter One

Introduction

1.1. Motivations:

The last several decades have witnessed increasing risk, increased competition and deregulation in the banking industry. These factors have resulted in the foundation of off-balance sheet (OBS) activities. These activities generate a new fee income source that is beyond a bank's balance sheet activities. Off-balance sheet activities have developed into one of the major income generators for banks as they have become more widely used, they now overweight banks on-balance sheet notional amounts. Another reason banks engage in these activities is to avoid regulatory costs and taxes since these activities are not shown on bank's balance sheet under current accounting standards. Banks also engage in these activities as a risk management instrument against increasing credit risk, interest rate risk, and foreign exchange risk. The increasing usage of OBS activities can be seen from the numbers reported in table (2-1) which provides evidence about OBS activities in U.S. commercial banks. For example, for the U.S. banking system in 2005 the notional value of on-balance-sheet items was $9.0 trillion compared to $108.5 trillion of OBS items in the same year. Further, OBS activities grew from $10.2 trillion in 1992 to $108.5 trillion in 2005, a rate of change of 341.2%.

OBS activities have both risk-reducing as well as risk-increasing attributes and the net impact of the risk will depend on the ability to manage the risk resulting from

engaging in these activities. The use of derivatives contracts accelerated during the 1992–2005 period and accounted for much of the growth in OBS activities.[1] For example, the notional amount of derivatives increased from $8.7 trillion in 1992 to $101.9 trillion in 2005. The significant growth in derivative securities activity by commercial banks has been a direct response to the increased interest rate risk, credit risk, and foreign exchange risk exposure they have faced, both domestically and internationally. These contracts offer banks a way to hedge these risks without having to make extensive changes to their on-balance-sheet activities.

The global financial system always attempts to move with the trend, especially when we consider the revolution of globalization. As an important part of this global integration, the financial systems for each party must directly or indirectly follow the innovation trend in the system or they will not be able to get at least the minimum benefits from globalization. One of these innovations that we have seen in the last two decades is OBS activities, which were adopted by almost all financial systems in the world. Like the banks in the United States of America this adoption was very extensive and noticeable in different regions of the world. However, globally the extent of OBS activities remains below the level of U.S. commercial banks. The reasons that each bank is engaging in OBS activities are the same as those for U.S. commercial banks. Banks engage in OBS activities hoping to earn additional fee income to compensate declining margins or spreads on their traditional lending business and/or to avoid regulatory costs or taxes since reserve requirements and deposit insurance premiums are not levied on OBS activities. Given the fact that OBS activities are being used extensively in almost all

[1] See figure (3-1) & (3-2) and refer to table (3-2) for more evidence.

banking systems in the world and given that each region in the world has its own political, technological and economic characteristics, we believe that the determinants of bank's OBS activities will be different from one region to another based on the distinguishing characteristics of each region. For example, given the differences between the banking system in Africa and the banking system in Europe, different factors will affect the banks' decision about the use of OBS activities in both regions.

1.2. Off-Balance Sheet Activities in Brief:

Off-balance sheet (OBS) items are contingent assets and liabilities that may affect the future status of a financial institution's balance sheet. Although OBS activities are now an important source of fee income for almost all banks and bank holding companies (BHCs), they have the potential to produce positive as well as negative future cash flows. OBS activities include issuing various types of guarantees, commitments, and derivatives:

Letters of Credit (LC): banks deal with two types of LC, Commercial Letters of Credit (CLC) and Standby Letters of Credit (SLC). The LCs are essentially guarantees to underwrite performance that a depository institution sells to the buyers of guarantees, causing the depository institutions to add to their contingent future liabilities. Although both CLCs and SLCs have the same type of risk exposure, default risk, they are different in the severity of the risk exposure. In the case of commercial letters of credit, the bank's role is to provide a formal guarantee that payment for goods shipped or sold internationally or do mestically will be forthcoming regardless of whether the buyer of the good defaults on payment. While the bank's role with standby letters of credit is to

provide a formal guarantee of payment to cover contingencies that are potentially more severe and less predictable like bond performance SLCs, which means a higher level of default risk exposure. At the same time LCs also have a risk reducing impact through the diversification effect.

Commitments: a loan commitment agreement is a contractual commitment by a bank to loan to a customer a certain maximum amount at given interest rate terms. The commitment contracts also define the period over which the customer will be able to utilize his contracted loan. It is true that the banks will generate fee income for making these commitments to the borrowers, but it will also generate more credit and liquidity risk.

Derivatives: derivatives contracts that are being used by banks and included in this study are futures, forwards, options and swaps contracts. Banks can be either a user of derivatives contracts for trading purposes (hedging and other purposes) or dealers (non-trading purposes) that act as counterparties in trades with customers for a fee.

Contingent credit risk is likely to be present when banks expand their positions in futures, forwards, options, and swaps contracts. This risk relates to the fact that the counterparty to one of these contracts may default on payment obligations, leaving the bank unhedged and having to replace the contract at current interest rates, prices, or exchange rates, which may be relatively unfavorable. In addition, such defaults are most likely to occur when the counterparty is losing heavily on the contract and the bank is in the money on the contract. This type of default risk is much more serious for forward contracts than for futures contracts. This is because forward contracts are nonstandard

contracts entered into bilaterally by negotiating parties, such as two banks, and all cash flows are required to be paid at one time (on contract maturity). Thus, they are essentially over-the-counter (OTC) arrangements with no external guarantees should one or the other party default on the contract. By contrast, futures contracts are standardized contracts guaranteed by organized exchanges such as the NYSE. Futures contracts, like forward contracts, make commitments to deliver foreign exchange at some future date. If a counterparty were to default on futures contracts, however, the exchange would assume the defaulting party's position and payment obligations.

Options contracts can also be traded over the counter or bought/sold on organized exchanges. If the options are standardized options traded on exchanges, such as bond options, they are virtually default-risk free. If they are specialized options purchased over the counter, such as interest rate caps, some elements of default risk exist.

In swaps contracts, two parties contract to exchange interest rate payments or foreign exchange payments. If the interest rate or foreign exchange rates move a good deal, one of the two parties will face considerable future loss exposure, creating incentives to default. Similarly, swaps are OTC instruments normally susceptible to default risk. In general, default risk on OTC contracts increases with the time to maturity on the contracts and the fluctuation of underlying prices, interest rates, or exchange rates.

Derivative contracts also have a favorable impact on total bank's risk when they are used to hedge against the future uncertainty of interest rates and exchange rates. Several studies have reported a favorable impact of swaps on a bank's total market risk.

Moreover, derivative contracts will have another favorable impact on a bank's risk when they are treated as diversification in the bank's asset portfolio[2].

1.3. Literature Review:

An extensive body of literature related to OBS activities exists, in which several hypotheses have been considered to explain the OBS activities phenomenon. These hypotheses are:

i. The regulatory tax hypothesis: this hypothesis shapes a positive relation between a bank's OBS activities and the regulatory taxes on on-balance-sheet assets and liabilities. The regulatory taxes usually impose a constraint on a bank's reserve, deposit insurance premia, and capital. These constraints will encourage banks to substitute off-balance sheet activities for on-balance sheet activities.

ii. The moral hazard hypothesis states that banks with high breakdown probabilities have greater moral hazard incentives and therefore more incentive to engage in OBS activities. It proposes that both underpriced, fixed-rate deposit insurance and capital requirements provide incentives to increase financial leverage through the issuance of OBS activities that are not subject to regulation. This hypothesis argues that capital-constrained banks are projected to engage in more OBS items than less constrained banks. Moreover, banks that are about to be unsuccessful will prefer to have OBS items that are out of accounting rules consideration which allow them to book income from these activities immediately, whereas income from the on-balance sheet items cannot be booked until the interest is earned.

iii. The market discipline hypothesis argues that because OBS activities are uninsured dependent future claims which are related to other claims on the banks, banks with safer positions will engage in more OBS activities which will reduce the

[2] Definitions of OBS items are taken from, FDIC website:
http://www.fdic.gov/regulations/safety/manual/section3-8.html}

banks risk. Bank customers will value these claims more when banks are safer, therefore those banks which are already OBS items issuers will have an incentive to decrease their risk position and issue additional OBS items.

1.3.1. U.S. Research:

Following are summaries of the most important literature. Pavel and Phillis (1987) examine the determinants of commercial loan sales activities. They conclude that diversification, capital, binding capital constraints, and reserve requirements all have an important impact on loan sales. Moreover, this study proposes that banks start selling loans when capital ratios are low and charge-offs are high. Avery and Berger (1988) support the moral hazard hypothesis and they suggest that standby letters of credit have a positive impact on banks' risk exposure.

Benveniste and Berger (1986, 1987) maintain that as banks approach failure, SLC issuance decreases. In addition to the market discipline hypothesis they also support the regulatory hypothesis by stating that there is a positive relation between SLCs and leverage.

Pavel (1988) declared that there is no relation between loan sales and bank risk. Koppenhaver (1989) considered more OBS activities (loan commitments, SLCs and CLCs) and studied the determinants of OBS activities employing Logit models. The results suggest that bank size, amount of reserves, and loan losses are important factors for banks to engage in OBS activities, while capital constraint factors are insignificant for banks' OBS activities decisions.

Berger and Udell (1990) and Avery and Berger (1990) conclude that there is a negative relationship between loan commitments and bank risk. Avery and Berger (1991) consider more risk measures and suggest that SLCs have a positive impact on small banks' risk, and a positive impact on large banks' risk. This result supports the market discipline hypothesis for large banks.

Berger (1991) examines actual bank performance instead of stock market prices to counter for the equity effect of disciplining banks' risk-taking. The results reveal that higher capital ratios for both small and large banks are related to higher future earnings, lower probability of bankruptcy, and better bank performance.

Koppenhaver and Stover (1991) claim that the existing empirical research encounters a simultaneous equation bias, and they employ a granger causality test. They find that SLCs have a positive impact on bank leverage, while their leverage has a negative impact on SLCs.

Hassan (1992) studied the riskiness of CLCs from the stockholders and bondholders point of view. The results suggest that stockholders consider CLCs as bank risk-reducer while debtholders are indifferent about CLCs activities. This suggests that more constrained capital requirements are not appropriate for some of OBS activities for large commercial banks. Hassan, Karels and Peterson (1994) used a contingent valuation model to test the market discipline hypothesis of OBS activities for bank subordinated debt. Their results support the market discipline hypothesis for most OBS activities, and suggest that debtholders and equityholders regard OBS activities as bank risk reducers.

1.3.2. International Research:

The empirical evidence on OBS activities in international banking systems is not extensive. The existing international evidence is mainly concerned with the market discipline hypothesis.

Hassan, Lai, and Yu (2001) studied the risk implications of Canadian banks' letters of credit by employing several market measures of risk from one-factor and multi-factor models. Their results indicate that the various market measures of risk and letters of credit are negatively related. Also, banks with greater portfolio risk, measured in terms of equity and asset risk, as well as high leverage and interest rate risk, are less likely to issue letters of credit.

Khambata and Hirche (2002) describe OBS credit risk of the top 20 European commercial banks. Their results suggest that loan commitments are the largest source of credit risk among traditional OBS instruments. However, the notional amounts of derivative activities make up around 95 per cent of the total OBS exposure. An analysis by country of origin points to national differences in the use of derivative leverage. In comparison with U.S. commercial banks, European banks use fewer OBS activities as a multiple of on-balance sheet assets. In a similar paper Khambata and Hirche (2003) repeat the descriptive study on OBS credit risk across the top 20 Japanese banks. The results suggest that financial derivatives were heavily used by the top four banks and that loan commitments are the largest source of credit risk among traditional OBS instruments. The notional amounts of derivative contracts make up 92 percent of total OBS activities. As compared to U.S. and European banks, Japanese banks use fewer OBS

instruments as a percentage of their assets. This implies that Japanese banks are in general more conservative and risk averse than their U.S. or European counterparts.

Lieu, Yeh and Chiu (2005) implement a stochastic cost curve method to inspect the influence of OBS activities on the cost efficiency of Taiwan's banks. They estimate and compare cost inefficiency with or without OBS outputs of 46 Taiwanese commercial banks during the period 1998 through 2001. Their results suggest that omitting OBS outputs in estimating the cost frontier function of banks results in an underestimation of bank efficiency by approximately 5 percent. Also, cost efficiency and OBS usage are positively related with bank size. Banks with higher employee productivity are also more cost efficient. Finally, their results support the existence of economies of scale in both models with and without OBS specification in Taiwan's bank system. And they conclude that economies of scope between loans and OBS outputs are also practical.

Angelidis, Lyroudi (2005) investigate the impact of banks' OBS activities on the productivity of decision-making units. Their study covers 11 European countries for the period 1995-2002. They also employ the data envelopment approach to calculate the Malmquist indices of total factor productivity change. Their results indicate that productivity varies according to both approaches (with and without OBS) since for some countries productivity is enhanced while in some other countries it is worsened. However, when OBS items are not included as an additional variable the predicted total factor productivity indices fit better than the actual total factor productivity indices.

Sinha (2006) compares Indian commercial banks (public and private banks) with respect to their ability to generate income out of off-balance-sheet activities by using the Data Envelopment Approach. Moreover, the author employs a panel data framework to test the impact of operating efficiency, capital adequacy and NPA incidence on OBS risk-taking behavior of Indian commercial banks. The results show that public sector commercial banks are lagging behind the private sector commercial banks in terms of OBS activities. Almost all the commercial banks exhibited decreasing returns to scale, which is not very encouraging for the banking sector. Moreover the results indicate that OBS activities are positively related to operating profit ratio and negatively related to NPA ratios, which reinforces the market risk hypothesis.

1.4. Research Questions:

1) What are the motivations behind the usage of OBS activities in the U.S. and international banking systems? Is it the regulatory tax hypothesis? Is it a risk reduction tool? Are they bank specific characteristics? Are they macroeconomic factors?

2) In the U.S. commercial banking system, are OBS usage motivations different between OBS guarantees and OBS derivatives?

3) In the global commercial banking system, are OBS usage motivations different between developed and developing countries?

4) Do OBS guarantees and derivatives follow the financial innovations diffusion model in the U.S. and global commercial banking systems?

5) How do market participants evaluate OBS activities in their market risk evaluations? Are OBS guarantees risk reducing (increasing) factors? Are OBS derivatives risk reducing (increasing) factors?

6) Does bank size matter when the market evaluates OBS activities' impact on systematic and unsystematic risk?

7) What is the impact of on-balance sheet variables on market risk?

1.5. Research outline:

Chapter two will discusses the determinants of OBS guarantees activities in U.S. commercial banks. We will employ the logistic diffusion model developed by Mansfield (1961)in order to test the regulatory hypothesis and check whether OBS guarantees are considered financial innovations or not. Chapter three will utilize the same logistic diffusion model to examine the determinants of OBS derivatives contracts for the U.S. commercial banking industry.

In chapter four there will be two levels of investigation. First, we will check the determinants of OBS activities in the global banking industry represented by the major regions and classified into developed regions (North America, Europe, etc.) and developing regions (The Middle East, Africa, etc.). Second, we will look at the impact of some other quantitative variables like political environment and technological endowments for each region in the decision to use OBS banking activities.

Chapter five deals with the risk exposure of OBS guarantees by large bank holding companies (BHCs) in the United States of America. In this part a two-stage

analysis will be developed. In stage one we will estimate our dependent variables, which include three market risk measures (1) the systematic market risk (from CAPM, β), (2) the standard deviation of a bank's equity return (σ_E), and (3) the implied asset volatility from the Ronn-Verma option model (σ_V). The second stage will be to regress these dependent variables on the on- and off-balance-sheet risk variables using panel econometric techniques for the bank holding companies (BHCs) sector.

Chapter six will follow the same models and analysis to study OBS derivatives contracts (futures, forwards, options, and swaps) in U.S. BHCs. In this chapter a two stage analysis will be employed as in chapter five. Finally, chapter seven includes a discussion of the most important conclusions and gives some policy implications from these conclusions.

Chapter Two

The Determinants of OBS Guarantees Activities in U.S. Commercial Banks

Abstract

This study employs the logistic diffusion model of financial innovations. In order to trace the determinants of OBS guarantees we consider that OBS guarantees in the banking industry as a financial innovation follows a time diffusion trend. In addition to the time trend factor we include a regulation pressure factor to test the bank regulatory hypothesis and non-regulatory bank-specific factors to test the market discipline hypothesis. We also include macroeconomic factors to test for the general economic notion impact on U.S. banks' OBS guarantees. The results reject the regulatory tax hypothesis and conclude that regulations have no major impact in determining banks OBS guarantees usage. Another major result is that banks OBS guarantees are decreasing over time and it is no longer considered as a financial innovation in the U.S. banking industry; banks seem to have replaced guarantees with other OBS activities like derivatives. While the banks' regulatory factor is not a major determinant of OBS guarantees, bank's non-regulatory and macroeconomic factors are significant in determining OBS usage.

The Determinants of OBS Guarantees Activities in U.S. Commercial Banks

2.1. Introduction:

During the last few decades banks started generating a new fee income source that is beyond their balance sheet activities. Off-balance sheet activities have developed into a major fee income generator for banks, as they have become more widely used, they now overweight banks on-balance-sheet notional amounts. Another reason that banks engage in these activities is to avoid regulatory costs and taxes since these activities are not shown on a bank's balance sheet under current accounting standards. Banks also engage in these activities as a risk management instrument against increasing credit risk, interest rate risk, and foreign exchange risk. The increasing use of OBS activities can be seen from the numbers reported in table (1) which illustrates OBS activities in U.S. commercial banks. In 2005, the notional value of on-balance-sheet items was $9.0 trillion compared to $108.5 trillion in OBS items for the U.S. banking system. Further, OBS activities grew from $10.2 trillion in 1992 to $108.5 trillion in 2005, a rate of change of 341.2%.

OBS activities include issuing various types of guarantees, like letters of credit, which often have a strong insurance underwriting element, and making future commitments to lend. Both services generate additional fee income for banks. OBS activities also involve engaging in derivatives transactions, such as futures, forwards, options, and swaps. A loan commitment is a contractual commitment to loan a certain maximum amount to a borrower at a given interest rate over some period in the future. A

letter of credit is a guarantee that banks sell to underwrite the future performance of the buyers of guarantees. A commercial letter of credit is used mainly to assist a firm in domestic and international trade. The bank's role is to provide a formal guarantee that it will pay for the goods shipped or sold if the buyers of the goods default on its future payments. Standby letters of credit cover contingencies that are potentially more severe, less predictable or frequent, and not necessarily trade related. Loans sold are loans that banks originate and then sell to other investors that (in some cases) can be returned to the originating institution in the future if the credit quality of the loans deteriorates. Derivatives are a position taken in the form of swaps, options, futures, and forwards contracts by the banks for hedging and trading purposes[3].

This study will focus on OBS guarantees activities in the banking industry. The model specification and empirical exploration will follow. In section three and four we will have the data source and empirical results. And section five will conclude the study.

2.2. The Model

Mansfield (1961) shows that the adoption pattern of real innovations often follow a logistic time curve, and these innovations will grow over time until they reach a 100% occupancy. Many of the financial activities have been considered as an innovation and were studied using the Mansfield model. Since OBS activities are one of the major banking activities during the previous two decades, I follow Jagtiani et al. (1995) by

[3] Definitions of OBS items are taken from, Anthony Saunders and Marcia Millon Cornett, "Financial Market and Institutions, a Modern Perspective", Second Edition, Mc Graw Hill, Irwin, 2004.

considering OBS activities as real financial innovations and test the determinants of these innovations following the Mansfield model.

This study differs from Jagtinai et al. (1995) in several aspects. They consider only SLCs, loan sales from OBS guarantees and three other derivatives items. Here in addition to SLCs and loan sales we will consider CLCs, both unused commitments and participations. The latter includes loans sales and some other items.[4] Second, we will employ the regulatory pressure concept - Jacques and Nigro (1997) - to measure for capital regulations, rather than considering dummy variables to present the important changes in capital requirements during the period of study. (A detailed discussion of the regulatory factor will follow). Third, Jagtinai et al.'s (1995) study is old relative to the long period of OBS guarantees existence. We will consider a more recent period that will cover the period of 1996 to 2005, which will check the trend of OBS guarantees in U.S. commercial banks. Fourth, in addition to the capital requirement factor and bank specific features we will add macroeconomic conditions as a determinant of OBS activities. Moreover, bank-level panel data is constructed and panel estimation techniques are used. One of the main benefits of panel data is that it enables us to identify and measure effects that are not determined in pure cross-section or pure time-series data.

2.2.1 The Logistic Diffusion Model:

Mansfield (1961) introduced a deterministic model to answer two questions: Why firms were so slow to install some innovations and so quick to install others? What factors seem to govern the rate of imitation? His model assumes that the number of firms

[4] Refer to the table (2-7) at the end of this chapter.

adopting an innovation between time t and time t+1 depends on several factors. First, the number of firms that have previously adopted the innovation. The increases in the proportion of firms already using an innovation would increase $\lambda_{ij}(t)$. As more information and experience accumulate, it becomes less risky to begin using it. Moreover, competitive pressures mount and "bandwagon" effects occur. Second, the profitability of installing the innovation would also be expected to have an important influence on $\lambda_{ij}(t)$. the more profitable this investment is relative to others that are available, the greater is the chance that a firm's estimate of the profitability will be high enough to compensate for whatever risks are involved and that it will seem worthwhile to install the new technique rather than to wait. Third, for equally profitable innovations, $\lambda_{ij}(t)$ should tend to be smaller for those requiring relatively large investments. One would expect this on the grounds that firms tend to be more cautious before committing themselves to such projects and that they often have more difficulty in financing them. Finally, for equally profitable innovations requiring the same investment, $\lambda_{ij}(t)$ is likely to vary among industries (depending on the risk aversion attitude in each industry). Below is the formal derivation of Mansfield (1961) model.

Let n_{ij} be the total number of firms which adopted the j^{th} innovation in the i^{th} industry, $m_{ij}(t)$ be the number of these firms having introduced the innovation at time t, π_{ij} be the profitability of installing this innovation relative to that of alternative investments, and S_{ij} be the investment required to install this innovation as a per cent of the average total assets of these firms. $\lambda_{ij}(t)$ is the proportion of "hold-outs" (firms not using this innovation) at time t that introduced it by time t+1, i.e.,

$$\lambda_{ij}(t) = \frac{m_{ij}(t+1) - m_{ij}(t)}{n_{ij}(t) - m_{ij}(t)} \text{..................................(1)} \quad \text{and,}$$

$$\lambda_{ij}(t) = f(\frac{m_{ij}(t)}{n_{ij}}, \pi_{ij}, S_{ij}, ...) \text{.............................(2)} \text{From the discussion above.}$$

Assume that the number of firms having introduced an innovation can vary continuously rather than only one integer value, and assume that $\lambda_{ij}(t)$ can be approximated adequately within the relevant range by Taylor's expansion that drops third and higher order terms. Assuming that the coefficient of $(\frac{m_{ij}(t)}{n_{ij}})$ in this expansion is zero, we have

$$\lambda_{ij}(t) = a_{i1} + a_{i2}\frac{m_{ij}(t)}{n_{ij}} + a_{i3}\pi_{ij} + a_{i4}S_{ij} + a_{i5}\pi_{ij}\frac{m_{ij}(t)}{n_{ij}} + a_{i6}S_{ij}\frac{m_{ij}(t)}{n_{ij}} + a_{i7}\pi_{ij}S_{ij} + a_{i8}\pi_{ij}^2 + a_{i9}S_{ij}^2 + \ldots\ldots\ldots, \text{...............(3)}$$

Thus,

$$m_{ij}(t+1) - m_{ij}(t) = \left(n_{ij} - m_{ij}(t)\right)\left(a_{i1} + a_{i2}\frac{m_{ij}(t)}{n_{ij}} + \cdots + a_{i9}S_{ij}^2 + \ldots\right) \text{.........(4)}$$

Assuming that time is measured in fairly small units, we can use as an approximation the corresponding differential equation

$$\frac{dm_{ij}(t)}{dt} = \left(n_{ij} - m_{ij}(t)\right)\left(\theta_{ij} + \beta_{ij}\frac{m_{ij}(t)}{n_{ij}}\right) \text{.............................(5)}$$

The solution of which,

$$m_{ij}(t) = \frac{n_{ij}\left[e^{\alpha_{ij}+(\theta_{ij}+\beta_{ij})t} - \left(\theta_{ij}/\beta_{ij}\right)\right]}{1+e^{\alpha_{ij}+(\theta_{ij}+\beta_{ij})t}} \ldots\ldots\ldots\ldots\ldots\ldots.(6)$$

Where α_{ij} is a constant of integration, θ_{ij} is the sum of all terms in (3) not containing $\frac{m_{ij}(t)}{n_{ij}}$, and β_{ij} is the coefficient of $\frac{m_{ij}(t)}{n_{ij}}$

$$\beta_{ij} = a_{i2} + a_{i5}\pi_{ij} + a_{i6}S_{ij} + \cdots \text{ , } \ldots\ldots\ldots\ldots\ldots\ldots\ldots (7)$$

Add another assumption, as we go backward in time, the number of firms having introduced the innovation must tend to zero, i.e.,

$$\lim_{t\to-\infty} m_{ij}(t) = 0 \ldots\ldots\ldots\ldots\ldots\ldots\ldots (8)$$

It follows, $P_t = m_{ij}(t)/n_{ij} = \left[1+e^{(-\alpha_{ij}-\beta_{ij}t)}\right]^{-1} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(9)$

Thus, the growth over time in the number of firms having introduced an innovation should conform to a logistic function. The logistic time curve, equation (9), predicts that the proportion of the population which has already adopted the innovation will increase at an accelerating rate until 50 percent adoption achieved, this is attained at t = -(α/β). Thereafter, the adoption will increase at a decelerating rate and 100 percent adoption is approached asymptotically.

If equation 9 is correct, it can be shown that the rate of imitation is governed by only one parameter β_{ij}. Assuming that the unspecified terms in (7) is uncorrelated with π_{ij} and S_{ij} and that it can be treated as a random error term, then it follows from 9

$$\ln\left[P_{it}/(1-P_{it})\right] = \alpha + \beta t \text{.......... ....}(10)$$

where P_{it} is the ratio of OBS items (in nominal terms) to the nominal value of total assets (defined as on-balance sheet assets + OBS items) of bank i at time t. this definition follows Jagtiani et al. (1995) which enables us to counter for the scale on which bank introduce OBS items.

2.2.2. The Empirical Model:

Starting from equation (10), I add two factor vectors, one to encounter the bank-specific characteristics and the other to capture the macroeconomic conditions. The choice of these factors is based on both theoretical literature and from policy discussions. Accordingly, equation (11) is the modified econometric model from equation (10).

$$LGTGUAR_{it} = \ln\left[P_{it}/(1-P_{it})\right] = \alpha_i + \beta t + \gamma X_{it} + \delta Y_t + \varepsilon_{it} \text{.......... ....}(11)$$

where i = 1,2,3,….,N denotes the number of banks and t = 1,2,3,…T denotes the number of time periods. The dependent variable, $LGTOGUAR_{it}$ is the logistic transformation of P_{it}, where P_{it} is the ratio of OBS items (in nominal terms) to the nominal value of total assets (defined as on-balance sheet assets + OBS items) of bank i at time t. this definition follows Jagtiani et al. (1995) which enables us to counter for the scale on which banks introduce OBS items. The explanatory variables are the time trend (t) which accounts for the autonomous diffusion, X_{it} is a vector of bank-specific

characteristics, Y_{it} is a vector of general macroeconomic conditions, and the intercept α is a bank-specific constant.[5]

Bank-specific characteristics are classified into regulatory and non-regulatory variables. The non-regulatory factors are bank size, loan ratio, profitability, and the net charge-off. The anticipated effect of bank size has a two-side effect and the net effect of these two determines the net impact of firm size on OBS activities. On the one hand, a bank has to be of a certain size in order to get involved in OBS activities and get the benefits of the economies of scale. Moreover, large banks may be the only banks that have a highly qualified risk management and specialized staff. And sophisticated clients who are more likely to engage in OBS activities may not consider small size banks as an option as they believe that large banks are too big to fail. On the other hand, as the bank size gets bigger then probably the bank is more risk-diversified and there will be fewer incentives to engage in OBS activities.

The impact of the loan ratio (the ratio of loans to total assets) on the usage of OBS activities seems to be positive. Angbazo (1997) shows that a higher loan ratio will increase the interest rate risk which will create an incentive for banks to hedge using OBS activities. Another reason for this positive relation is that in the process of approving loans banks get access to their customers' investment information which will facilitate the offer of relevant OBS risk management tools.

A positive relation is expected between profitability and OBS activities. Profitability is considered a measure for the creditworthiness as viewed by customers.

[5] Refer to table (2) for a summary of the variables and their proxies, predicted signs, and the rational of the relation.

Profitability will increase the customer valuation for that bank which in turn will give more incentive to work with profitable banks rather vis-à-vis.

The net charge-off is a proxy for the non-performing loans that banks assign for bad debt loans. The predicted impact of non-performing loans is negative, so as the amount of non-performing loans increases, the bank's creditworthiness decreases, and that will decrease the amount of OBS activities. One may argue that as the charge-offs increase, then the default risk for that bank increases and a risk management instrument might be needed to hedge against this risk. Therefore an increase in the charge-off amount might have a positive impact on OBS activities.

With regard to regulatory factors, following Jacques and Nigro (1997), I will consider the capital adequacy ratio (CAR) to proxy for the capital requirement regulations. CAR is a measure of a bank's capital. It is used to protect depositors and promote the stability and efficiency of financial systems around the world[6]. There are two possible effects of CAR on the diffusion pattern of OBS items. On the one hand, as the bank has a higher CAR its creditworthiness will increase which in turn will increase the incentives of the bank's customers to work with this bank's OBS risk management items. On the other hand, higher CAR reduces a bank's marginal gain from increasing the risk in the asset portfolio (Furlong and Keeley, 1989). As a bank's capital increases, the ability to assume risk increases, but the need for OBS products to hedge risk exposure may decrease.

---

[6] CAR can be expressed as $CAR = \frac{TierICapital + TierIICapital}{RiskWeightedAssets}$. It is also called the capital to risk weighted assets ratio (CRAR).

I also examine the response of the banks to the 8% well-capitalized total risk-based capital (RBC) standards on capital ratios. I classify the banks into two groups CARL, CARH as a signal to the degree of regulatory pressure brought about by the risk-based capital standards on capital ratio, because banks with total CAR above and below the 8 percent regulatory minimum may react differently. Specifically, the low regulatory pressure variable (CARL) equals the difference between the inverse of the bank's actual CAR and the inverse of the regulatory stipulated CAR of 8 percent, i.e., CARL equals (1/CAR-1/8) for all banks with a total risk-based capital ratio less than 8 per cent, and zero otherwise[7]. The high regulatory pressure variable (CARH) equals the difference between the inverse of the regulatory stipulated CAR of 8 percent and bank's actual CAR, i.e., CARH equals (1/8-1/ CAR) for all banks with a total risk-based capital ratio greater than 8 percent, and zero otherwise. High regulatory pressure with respect to capital implies low creditworthiness and can be expected to translate into lower OBS activity. On the other hand, low regulatory pressure, as implied by CRAL, signifies a comfortable capital position and (accompanied with a high credit rating) makes a bank an active supplier of OBS products (Koppenhaver and Stover, 1991). Alternatively, low regulatory pressure reduces the marginal propensity of a bank to increase the risk in its asset portfolio (Furlong and Keeley, 1989). Therefore, banks with high capital ratios (implying low regulatory pressure) can be expected to take less OBS risk and hence, supply a smaller volume of OBS items.

---

[7] Risk – Based Assessment System, Federal Deposit Insurance Corporation, FDIC. They specified three groups in terms of RBC standards, Group 1 - "Well Capitalized." Total Risk-Based Capital Ratio equal to or greater than 10 percent. Group 2 - "Adequately Capitalized." Not Well Capitalized and Total Risk-Based Capital Ratio equal to or greater than 8 percent. Group 3 - "Undercapitalized" Neither Well Capitalized nor Adequately Capitalized.

The macroeconomic vector includes four categories; first, a general economic performance measure (the real Gross Domestic Product (RGDP)), second, price level measures (shares price, consumer price index) the share prices measured by the S&P 500 price index, third, interest rate measures (the difference between the long and the short-term interest rate (INTSPRD)[8], short-term interest rate, mid-term interest rate, and long-term interest rate), and fourth, balance of payment measures (total trade in goods, total trade in services, total trade income, total transfers, and total capital transactions).

Real GDP captures the effects caused by fluctuations in general economic activity. Two arguments can be made about the impact of the real GDP and the usage of OBS activities. First the demand for OBS products reacts positively to the business cycle due to a transactions motive. Second, business risk decreases in economic boom periods, which leads to less demand for risk management techniques (OBS activities). The interest rate spread also encounters two arguments. First, a high and positive interest rate spread signals a high degree of uncertainty about future interest rates and that short-term interest rates are expected to rise in the future. High interest rate risk and future interest rate rises imply a relatively high demand for OBS products. Second, when the spread between short term and long term is high and positive, then bank managers have the incentive to engage in traditional on-balance sheet activities and take advantage of low short-term interest rate funding and high long-term interest rate lending. As a result a bank's manager will be less attracted to engaging in OBS activities. The effect of the interest rate variables (short, mid, and long–term rates) will depend on whether we are considering the customer's point of view or the bank's point of view, and also the investment horizon for

[8] The long-term interest rate is proxied as the interest rate on long term Government bonds. The short-term interest rate is proxied as the interest rate the short term Treasury Bills.

both of them (short term or long term). For example, for a short term investor the word investors can be viewed as a bank or individual, and will increase his lending when the short term rate increases. That will affect OBS activities negatively, while a long term investor will prefer not to lend on the current interest rate and will prefer to go to OBS activities.

With respect to price level variables, the CPI variable may affect OBS activities negatively as it will affect the purchasing power in the economy and then the saving level in the economy and all the banks' activities in general (on and off balance sheet). When the purchasing power of the customer decreases, aggregate demand in the economy decreases which in turn reduces all the trade transactions domestically and internationally, negatively affecting OBS activities. The share price effect may be positive or negative. The positive argument is that when share prices rise, then the domestic corporations' market values will increase leading to expansion of operations, and that will increase OBS transactions. The negative impact is that when the share prices increase, investors will increase their investment in the stock market and will reduce saving and thus banking and OBS activities. All balance of payment variables are expected to increase the usage of OBS activities as more international transactions will increase the need for OBS activities.

2.3. Data Sources:

The data are sourced from the report of income and condition-schedule RC-L reported to the Federal Depository Insurance Corporation for all commercial banks in the U.S. from March 1996 to December 2005. Balanced panel data sets are constructed for

CLCs, SLCs, and Unused Commitments. The number of banks is mainly based on the availability of OBS items data. We have 114, 145, 162 banks included for CLCs, SLCs, Unused Commitments, respectively. An unbalanced data set is formed for participations because of the small number of banks continuously engaged in this activity. This data set is formed as follows: 15 banks have a full data set of 40 quarters, 8 banks with only 32 quarters, 8 banks with only 31 quarters, and one bank with 37 quarters. However the data availability begins in March 1996 for all banks. Banks with discontinuous data were omitted from the data sets which will reduce the noise in the estimate. OBS guarantees are calculated as the logistic transformation of the ratio of the notional amount of each item to total assets. Total assets are defined as the summation of the on-balance sheet total assets and OBS total assets. This is to counter for the scale on which banks introduce OBS items. The on-balance sheet variables are also collected from the call report by the banks with the FDIC. The macroeconomic variables are collected from the IFS database. The interest rate spread represents the difference between the 10-year Treasury bond yield rate and the 3–month Treasury bill yield rate. The short term rate is measured by the short term Treasury bill, the mid-term rate is measured by the mid-term Treasury bill rate and the long term rate is measured by the long term Treasury bill rate. The share prices are the S&P 500 price index. The total trade in goods is the sum of the total exports and imports of goods, the total services is the total exports and imports of services, total trade income is the sum of the total credit and debit income, total transfers is the sum of the total credit and debit transfers, and total capital is also the sum of the credit and debit sides of the capital account.

2.4. Empirical Results:

Tables (3 - 6) present the estimates for four OBS guarantees (CLCS, SLCS, Participations, and Unused Commitments).

Time Diffusion Speed: It is interesting that the time trend coefficients are statistically significant and negative for all OBS guarantees except for SLCs which are insignificant. This suggests that OBS guarantees appeared as banks' activities long enough before our study period which indicates that OBS guarantees are no longer considered financial innovations. It seems that other financial innovations have taken place instead of guarantees, like derivatives activities.

Non-Regulatory Bank Specific Factors: A bank's size, profitability and loan ratio are not always significant which suggest that although OBS guarantees are influenced by bank specific characteristics, they are not a major factor for OBS guarantees usage. More specifically, a bank's size has a significantly negative effect on SLCs, Participations, and the Unused Commitments which can be justified as these items are more related to a bank's risk, which should decrease with the bank's size. Bank size is statistically insignificant for CLCs contracts which suggest the bank's size is not considered when banks make a decision to participate in this type of guarantees.

Banks Loan Ratio has a significantly positive impact on the usage of CLCs and Unused Commitments, which indicates informational economies of scope between loans and OBS activities, and banks will participate more in OBS activities to reduce their risk resulting from loans. However, it is statistically insignificant for SLCs, and significantly negative for participations, indicating that participations are a substitute for a bank's

traditional activities (loans) and not used to decrease the risk arising from loans lending activities.

Banks' profitability significantly and positively affects SLCs and CLCs, and significantly negatively affects OBS participations and unused commitments. This suggests that SLCs and CLCs contracts are derived from profitability consideration, while less profitable banks are more likely to engage in participations and unused commitments contracts. The charge-off ratio has a significantly negative impact on OBS guarantees except for participations and unused commitments since it was insignificant. This implies that banks with larger non-performing loans (proxied by the charge-off ratio) may have been disadvantaged in adopting guarantees (CLCs and SLCs) due to a lack of credibility.

Regulatory Banks Specific Factors: Recent evidence suggests that bank regulatory factors have no major impact on OBS diffusion pattern. This is supported in this study where an insignificant relationship is found between bank capital adequacy ratios (CAR) for both groups of banks (below and above the minimum risk-based capital standards). Though there is a significantly positive effect of high regulatory pressure on unused commitments contracts. This implies that as banks become more capital constrained, they will issue more commitments to avoid this capital regulatory constraint. The relationship is weakly significant (10% level of significance) and negative in some cases of participations. However, as the banks become more capital constrained they issue less participations in order to reduce the risk incurred by OBS participations contracts.

Macroeconomic Factors: It appears that macroeconomic factors have a role to play in determining the usage of OBS guarantees. Real GDP has a significantly positive impact on the usage of guarantees contracts, which suggests that OBS guarantees activities follow the business cycle of the economy and it moves with the size of the economy. OBS guarantees will increase when economic growth is high and decrease when the economy is slowing down. Interest rate variables seem to play a role in the usage of OBS activities. This role comes from the effect of the interest rate spread on the usage of OBS guarantees, but the rates themselves (TB, LLY, and LMY) do not affect the usage of OBS guarantees. They are all insignificant except for participations. The effect of the interest rate spread is significantly negative for all OBS guarantees except for SLCs it is insignificant. This suggests that banks engage more in traditional banking activities instead of OBS activities when the spread is high, i.e., they will benefit from lending at high long term interest rates and borrowing at low short term rates. For decisions concerning SLCs banks do not appear to value uncertainty about future interest rates. Price level variables also have a role in determining OBS guarantees activities. There is a positive relation between share prices and both participations and unused commitments, and a negative relation between the consumer price index and both CLCs and unused commitments. The balance of payments variables have no major role in determining the usage of OBS guarantees; however, the total trade level has a significantly positive impact on participations and the total transfer level has a positive impact on CLCS and a negative one on participations.

2.5. Concluding Remarks:

This study joins the set of recent studies by rejecting the regulatory tax hypothesis and having no major impact on determining banks' OBS guarantees usage. We also conclude that banks OBS guarantees are decreasing over time and that they are no longer considered as a financial innovation in the U.S. banking industry. Banks seem to have replaced guarantees with other OBS activities such as derivatives. While the banks' regulatory factor is not a major determinant in OBS guarantees, bank's non-regulatory factors and macroeconomic factors are at work in determining OBS usage.

The results also suggest that OBS guarantees follow the business cycle and usage decisions might be considered like traditional bank activities. OBS guarantees are profit-driven activities and they increase with banks' profits. Bank size affects OBS guarantees negatively which is inconsistent with the market discipline hypothesis and the usage of guarantees decreases with bank risk. Finally, a lack of credibility is presented as non-performing loans decrease the usage of OBS guarantees in general.

References:

[1] Angbazo, L., "Commercial Bank Net Interest Margins, Default Risk, Interest Rate Risk and Off-Balance Sheet Banking", *Journal of Banking and Finance*, 1997, 21, 55-87.

[2] Avery, Robert, and Elijah Brewer, "Risk-Based Capital and Off-Balance Sheet Activities" Proceeding of a Conference on Bank Structure and Competition, *Federal Reserve Bank of Chicago*, 1988, 261-287.

[3] Avery, R. B. and A. N. Berger. "Loan Commitments and Bank Risk Exposure", *Journal of Banking and Finance*, February 1991, 15, 173-92.

[4] Benveniste, L. M. and A. N. Berger. "An Empirical Analysis of Standby Letters of Credit," Proceedings of the Conference on Bank Structure and Competition. *Chicago: Federal Reserve Bank Of Chicago,*1986, 387-412.

[5] Benveniste, L. M. and A. N. Berger. "Securitization with Recourse: An Instrument that offers Uninsured Bank Depositors Sequential Claims", *Journal of Banking and Finance*, 11, September 1987, 403-424.

[6] Berger, A. N. and G. F. Udell. "Collateral, Loan Quality, and Bank Risk", *Journal of Monetary Economic*, 25, January 1990, 21-42.

[7] Berger, A. N. "Market Discipline in Banking", Proceedings of the Conference on Bank Structure and Competition, *Chicago: Federal Reserve Bank of Chicago*, 1991, 419-427.

[8] Berger, A.N. and G.F.Udell, "Relationship Lending and Lines of Credit in Small Firm Finance" *Journal of Business*, 1995, 68, 351-382

[9] Carter D., Simpson W., and Tandon A., "Managerial ownership and compensation and the use of interest-rate derivatives by U.S. Banks", working paper, *FMA conference 2006*, Slat Lake City.

[10] Davis, S., "*The Diffusion of Financial Innovations"*, *Cambridge: Cambridge University Press*, 1979.

[11] Furlong, F.T., and M.C.Keeley, "Capital Regulation and Bank Risk-Taking", *Journal of Banking and Finance*, 1989, 35, 883-891.

[12] Gorton, Gary, and Anthony M. Santomero, "Market Discipline and the Valuation of Bank Subordinated Debt", *Journal of money, credit and Banking*, February 1990, 22, 118-128.

[13] Hassan, M. K. "The Market Perception of the Riskiness of Large U.S. Bank Commercial Letters Of Credit", *Journal of Financial Services Research*, 6, September 1992, 207-221.

[14] Hassan, Gordon, and Peterson, "Off-Balance Sheet Activities and Bank Default-Risk Premia: A Comparison of Risk Management", Journal of Economic and Finance, 1993, Vol 17, No. 3, 69-83.

[15] Hassan, M. K., G. V. Karels and M. O. Peterson, "Deposit Insurance, Market Discipline and Off- Balance Sheet Banking Risk of Large U.S. Commercial Banks", *Journal Of Banking And Finance*, May 1994, Vol.18, No.3, 575-594.

[16] Hassan, M. Kabir; Sackley, William H., "Determinants of Thrift Institution Off-Balance Sheet Activities : An Empirical Investigation", *Journal of Financial Management & Analysis*, Jan-Jun2006, Vol. 19 Issue 1, p1-13.

[17] Jagtiani, J., "Characteristics Of Banks That Are More Active In The Swaps Market", *Journal Of Financial Services Research*, 1995, Volume 9, No. 4.

[18] Jagtinai,J., A.Saunders And G.Udell, "The Effect of Bank Capital Requirements on Bank Off-Balance Sheet Financial Innovations", *Journal Of Banking And Finance*, 1995, 19, 647-658.

[19] Jacques, K. And P.Nigro, "Risk-Based Standards, Portfolio Risk and Bank Capital: A Simultaneous Equations Approach", *Journal Of Economic And Business*, 1997, 49, 533-547.

[20] Koppenhaver, G. O., "The Effects of Regulation of Bank Participations in the Guarantee Market", *Research In Financial Services,* 1989, 165-80.

[21] Koppenhaver, G. O. and R. D. Stover, "Standby Letters of Credit and Large Bank Capital: An Empirical Analysis", *Journal of Banking and Finance*, 15, 1991, 315-327.

[22] Mansfield, E, "Technical Change and the Rate of Imitation", *Econometrica*, 1961, 29, 741-766.

[23] Pavel, C. and D.Philis, "Why Commercial Banks Sell Loans: An Empirical Analysis" Economic Perspectives*, Federal Reserve Bank of Chicago*, 1987, May/June, 3-14.

[24] Pavel, C., "Loan Sales Have Little Effect on Bank Risk", Economic Perspectives, *Federal Reserve Bank of Chicago*, 1988, May/June, 23-31.

[25] Ronn, Ehud, and A.K. Verma, "Pricing Risk-Adjusted Deposit Insurance: An Option-Based Model", *Jornal of Finance*, September 1986, 41, 871-895.

[26] Zhao F. and Moser J, " Bank Lending and Interest-Rate Derivatives", working paper, *FMA conference 2006*, Slat Lake City.

Table (2-1) Aggregated None Derivatives OBS Items Held By Commercial Banks[9]

	12/31/1992	12/31/1996	12/31/1999	12/31/2002	12/31/2005
Number of Banks Reported	11463.00	9528.00	8580.00	7888.00	7526.00
Financial and performance SLC and foreign office guarantees	**162.52**	**210.97**	**255.70**	**322.17**	**461.21**
(Amount conveyed to others)	**14.87**	**21.81**	**23.43**	**52.98**	**93.87**
Financial SLCs and foreign office guarantees	110.78	170.38	210.67	271.14	394.88
Amount conveyed to others	11.54	18.52	19.17	43.69	81.83
Performance standby letters of credit	51.75	40.60	45.03	51.03	66.33
Amount conveyed to others	3.33	3.29	4.26	9.29	12.04
Commercial and similar letters of credit	**28.16**	**30.92**	**26.54**	**22.61**	**28.24**
Commitments to lend	**1270.90**	**2579.46**	**3949.75**	**5283.76**	**6133.42**
Securities lent	**96.38**	**207.96**	**382.91**	**582.33**	**1368.10**
Participations in acceptances:	**1.04**	**1.46**	**0.82**	**1.13**	**0.72**
Conveyed to others by reporting bank	0.82	1.23	0.53	1.01	0.50
Acquired by reporting bank	0.22	0.23	0.29	0.13	0.22
Total Derivatives	**8764.91**	**20297.44**	**34885.52**	**56404.74**	**101914.00**
All Non - Derivatives OBS	**1447.74**	**2801.00**	**4209.38**	**5576.69**	**6529.72**
All other off-balance sheet	**8.73**	**14.04**	**24.32**	**30.57**	**58.38**
Total Assets (on-Balance Sheet Items)	**3506.17**	**4582.16**	**5735.13**	**7076.77**	**9039.39**

[9] Sources: FDIC, Statistics on Banking, Various Issues. www.fdic.gov

Table (2-2): Empirical Model Variables: This table presents the variables of the empirical model of banks off-balance sheet activities, their proxies and predicted coefficients sign, and the economic rational. The dependent variables are OBS items calculated as $LGTGUAR_{it} = \ln\left[P_{it} / (1 - P_{it}) \right]$, where P_{it} is OBS item calculated as the ratio of that item to the sum of on balance sheet and the off-balance sheet assets.

Variable	Proxy	Predicted coefficient sign	Rational
Size	Total Asset(TA): log(TA)	Positive Negative	Size ↑⇒ Scale economies↑⇒OBS↑ Size ↑⇒ Bank Risk↓⇒OBS↓
Loans	Total Loans (TL): log(TL)	Positive	LOAN↑⇒Scope Economies and Risk↑ ⇒OBS↑
Profitability	Net Income (NI): log(NI)	Positive	PROFIT↑ ⇒Creditworthiness↑⇒OBS↑
Non-Performing Loans	Net charge-off (COFF): COFF /TA	Negative	NNPA↑⇒Creditworthiness↓⇒OBS↓
Low Regulatory Pressure (CARL)	Capital Adequacy Ratio (CAR): $CARL = \begin{Bmatrix} 1/CAR_{actual} - 1/0.08, if CAR_{actual} < 8\% \\ 0, if CAR_{actual} > 8\% \end{Bmatrix}$	Positive Negative	CARL↑⇒ Creditworthiness↑⇒OBS↑ CARL↑⇒Risk-taking capacity↑⇒OBS↓
High Regulatory Pressure (CARH)	Capital Adequacy Ratio (CAR): $CARH = \begin{Bmatrix} 1/0.08 - 1/CAR_{actual}, if CAR_{actual} > 8\% \\ 0, if CAR_{actual} < 8\% \end{Bmatrix}$	Negative	CARH↑⇒ Creditworthiness↓⇒OBS↓
Interest rate Spread	INT: log{ABS(10-Treasury Bond Yield-3-months Treasury Bond Yield)}	Positive Negative	INT↑⇒Uncertainty rates↑⇒OBS↑ INT↑⇒Traditional Banking ↑⇒OBS↓
Real GDP	RGDP: Log(RGDP)	Positive Negative	GDP↑⇒Economic Activity↑⇒OBS↑ GDP↑⇒Business Risk↓⇒OBS↓

Table (2-3): The estimation for ***Commercial Letters of Credit (CLCS***) determinants model, where the explanatory variables appearing in the first column are classified into time, bank specific characteristics, regulatory variables, and macroeconomic variables. The first row represents the coefficient (COEFF.) and standard errors (S.E).

	COEFF.	S.E	COEFF.	S.E	COEFF.	S.E	COEFF.	S.E
CONST	-10.9652^	5.1483	-9.750*	.76791	-4.2869	2.76253	-10.93*	2.16324
TIME	-.029613*	.00894	-.02445*	.002996	-.0181*	.003855	-.0318*	.005465
LTA	-.076402	.10955	-.02017	.109461	-.01031	.109333	.000438	.109345
LLR	.166503¤	.10063	.17041¤	.100495	.16278¤	.100442	.15694¤	.100299
LNI	.038018¤	.02126	.046228^	.02126	.0434258^	.02123	.0335241^	.020058
LCOFF	-.0000001¤	.00000006	-.0000001¤	.00000006	-.0000001¤	.00000006	-.0000001¤	.00000006
CARL	.00020720	.00024	.000273	.000247	.000242	.000247	.000240	.000248
CARH	-.0006341	.00717	.002075	.007229	-.00065	.007256	.000180	.007329
LGDP	3.5110¤	2.04062	---	---	---	---	---	---
LINR	.037676¤	.02144	-.04911¤	.028514	---	---	---	---
LTB	---	---	-.12656	.117217	---	---	---	---
LLY	---	---	.600731	.384723	---	---	---	---
LMY	---	---	-.17570	.269554	---	---	---	---
LSP	---	---	---	---	-.09004	.064497	---	---
LCPI	---	---	---	---	-1.0101¤	.571338	---	---
LTR	---	---	---	---	---	---	-.06053	.479346
LTS	---	---	---	---	---	---	.572075	.368832
LTIN	---	---	---	---	---	---	-.18258	.229536
LTTR	---	---	---	---	---	---	.10493¤	.064854
LTCA	---	---	---	---	---	---	.028370	.035933
NO.Obs.	4560		4560		4560		4560	
R^2	.023173		.023419		.022610		.023053	
L.M	20.8288 [.000]		33.5436 [.000]		32.8485 [.000]		32.2897 [.000]	
D.W	.14595[.000,.000]		.146165[.000,.000]		.146134[.000,.000]		.147070[.000,.000]	

Note: (*), (^), (¤) represent significance level of 1%, 5%, and 10%, respectively

Table (2-4): The estimation for ***Standby Letters of Credit (SLCS)*** determinants model, where the explanatory variables appearing in the first column are classified into time, bank specific characteristics, regulatory variables, and macroeconomic variables. The first row represents the coefficient (COEFF.) and standard errors (S.E).

	COEFF.	S.E	COEFF.	S.E	COEFF.	S.E	COEFF.	S.E
CONST	1.46966	8.44151	14.4089*	1.19039	15.8379*	4.52838	14.4680*	3.55491
TIME	-.013708	.014727	-.015891*	.0048343	-.010428¤	.00634175	-.0088443	.00905632
LTA	-1.35421*	.061000	-1.34576*	.060813	-1.3534*	.061191	-1.3455*	.060797
LLR	-1.35421	.282321	.027744	.283421	.024373	.283080	.045075	.282764
LNI	.0000001*	.00000006	.0000001*	.00000006	.0000001*	.00000006	.0000001*	.00000006
LCOFF	-.0000003*	.00000011	-.0000003*	.00000011	-.0000003*	.00000011	-.0000003*	.00000011
CARL	-.00012764	.00039888	-.00005984	.00039863	-.0001166	.000399031	-.00006791	.00039898
CARH	.00395639	.011930	.00730305	.012035	.00386575	.012000	.00648326	.012135
LGDP	3.16965¤	1.91900	---	---	---	---	---	---
LINR	.030367	.035370	-.00530928	.047222	---	---	---	---
LTB	---	---	.061741	.193867	---	---	---	---
LLY	---	---	.630641	.634304	---	---	---	---
LMY	---	---	-.197972	.445021	---	---	---	---
LSP	---	---	---	---	.129322	.106419	---	---
LCPI	---	---	---	---	-.198357	.947970	---	---
LTR	---	---	---	---	---	---	.351026	.788162
LTS	---	---	---	---	---	---	-.232355	.610457
LTIN	---	---	---	---	---	---	.00486448	.378861
LTTR	---	---	---	---	---	---	-.054302	.107277
LTCA	---	---	---	---	---	---	.019193	.059527
No. Obs.	5800		5800		5800		5800	
R^2	.374323		.374506		.374363		.374344	
L.M	33.1480 [.000]		32.0650 [.000]		33.0290 [.000]		32.4067 [.000]	
D.W	.124504 [.000,.000]		.124531 [.000,.000]		.124451 [.000,.000]		.124505 [.000,.000]	

Note: (*), (^), (¤) represent significance level of 1%, 5%, and 10%, respectively

Table (2-5): The estimation for ***Participations*** determinants model, where the explanatory variables appearing in the first column are classified into time, bank specific characteristics, regulatory variables, and macroeconomic variables. The first row represents the coefficient (COEFF.) and standard errors (S.E).

	COEFF.	S.E	COEFF.	S.E	COEFF.	S.E	COEFF.	S.E
CONST	-55.1503*	11.6827	5.90876*	1.75111	6.44115	6.89863	-3.12856	4.96728
TIME	-.075106*	.020640	-.065058*	.00653913	-.028163*	.00872210	-.016128	.012182
LTA	-.865224*	.087980	-.843428*	.088245	-.873187*	.088271	-.836937*	.088815
LLR	-.415520*	.076254	-.423428*	.076588	-.424720*	.076258	-.425728*	.077064
LNI	-.0000002*	.00000008	-.0000003*	.00000008	-.0000002*	.00000008	-.0000003*	.00000008
LCOFF	.0000003*	.0000001	.0000003*	.00000010	.0000003*	.00000010	.0000003*	.00000010
CARL	-.000171453	.000507964	.00017508	.00051268	.000224487	.000509909	.000109421	.00051487
CARH	-.024723¤	.014710	.00122969	.014659	-.027717¤	.015216	-.00017105	.014973
LGDP	14.9153*	2.63832	---	---	---	---	---	---
LINR	.048515	.049484	-.137403^	.065520	---	---	---	---
LTB	---	---	.660339*	.273561	---	---	---	---
LLY	---	---	3.57693*	.873855	---	---	---	---
LMY	---	---	-1.87945*	.614394	---	---	---	---
LSP	---	---	---	---	.922154*	.139467	---	---
LCPI	---	---	---	---	.164204	1.44888	---	---
LTR	---	---	---	---	---	---	4.01678*	1.07537
LTS	---	---	---	---	---	---	-1.05882	.825223
LTIN	---	---	---	---	---	---	-.809467	.529364
LTTR	---	---	---	---	---	---	-.565290*	.150261
LTCA	---	---	---	---	---	---	-.026580	.083073
No. Obs.	1140		1140		1140		1140	
R^2	.206654		.207438		.206317		.206635	
L.M	28.6266 [.000]		27.4401 [.000]		28.7923 [.000]		25.7091 [.000]	
D.W	.080324 [.000,.000]		.080830 [.000,.000]		.0808300 [.000,.000]		.084353 [.000,.000]	

Note: (*), (^), (¤) represent significance level of 1%, 5%, and 10%, respectively

Table (2-6): The estimation for ***Unused commitments*** determinants model, where the explanatory variables appearing in the first column are classified into time, bank specific characteristics, regulatory variables, and macroeconomic variables. The first row represents the coefficient (COEFF.) and standard errors (S.E).

	COEFF.	S.E	COEFF.	S.E	COEFF.	S.E	COEFF.	S.E
CONST	-10.8389*	2.19846	1.61987*	.349550	3.56684*	1.17541	1.51767¤	.932250
TIME	-.00830963^	.00383685	-.013212*	.00130056	-.014727*	.00166635	-.012180*	.00136240
LTA	-.282124*	.018798	-.270326*	.018777	-.285954*	.018839	-.268170*	.018762
LLR	.872720*	.075663	.887631*	.076178	.881422	.075831	.903064*	.076009
LNI	-.00000006*	.00000001	-.00000006*	.00000001	-.00000005*	.00000001	-.00000006*	.00000001
LCOFF	.00000008*	.00000002	.00000008*	.00000002	.00000008*	.00000002	.00000008*	.00000002
CARL	-.000074228	.00011374	-.000044533	.00011408	-.000097657	.00011381	-.000042218	.00114338
CARH	.010452*	.00306971	.011422*	.00310549	.00908297*	.00308412	.011413*	.00312659
LGDP	2.85644*	.499903	---	---	---	---	---	---
LINR	.00736934	.00914872	-.022137¤	.012167	---	---	---	---
LTB	---	---	-.031654	.049945	---	---	---	---
LLY	---	---	-.087094	.163528	---	---	---	---
LMY	---	---	.104659	.114643	---	---	---	---
LSP	---	---	---	---	.175592*	.027300	---	---
LCPI	---	---	---	---	-.540867^	.242977	---	---
LTR	---	---	---	---	---	---	-.00541571	.203462
LTS	---	---	---	---	---	---	-.097433	.157294
LTIN	---	---	---	---	---	---	.131202	.097977
LTTR	---	---	---	---	---	---	-.033014	.027639
LTCA	---	---	---	---	---	---	.016593	.015338
No. Obs.	6480		6480		6480		6480	
R^2	.011271		.012711		.011322		.013456	
L.M	17.5446 [.000]		17.5141 [.000]		18.7598 [.000]		17.9813 [.000]	
D.W	.022758 [.000,.000]		.023102 [.000,.000]		.022662 [.000,.000]		.023120 [.000,.000]	

Note: (*), (^), (¤) represent significance level of 1%, 5%, and 10%, respectively

Figure (1) Derivative Contracts and Other OBS Items Held by Commercial Banks, by products

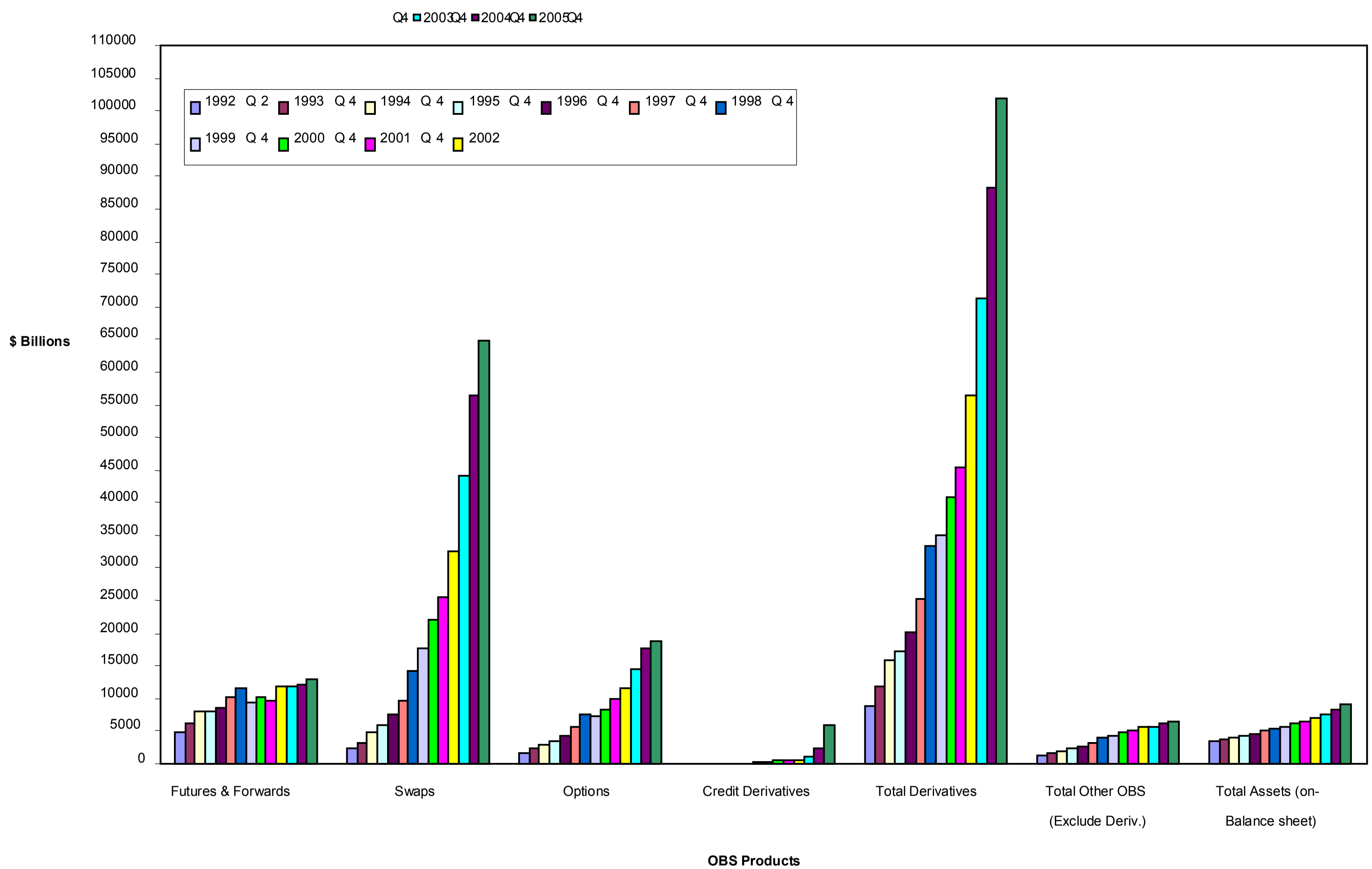

Table (2-7): OBS Items' Definitions[10]: This table represents OBS guarantees activities by products and their brief definitions. It includes four guarantees products (Unused Commitments, CLCs, SLCs, and Participations).

I. Unused Commitments: Includes the following
1- *Unused Commitments - Revolving, Open-End Lines Secured By 1-4 Family Residential Properties*: Includes the unused portions of commitments to extend credit under revolving, open-end lines of credit secured by 1 to 4 family residential properties. These lines, commonly known as home equity lines, are typically secured by a junior lien and are usually accessible by check or credit card.
2 -*Unused Commitments - Credit Card Lines*: Includes the unused portions of all commitments to extend credit both to individuals for household, family, and other personal expenditures and to commercial or industrial enterprises through credit cards. Excludes home equity lines accessible through credit cards. Banks or bank holding companies may report unused credit card lines as of the end of their customers' last monthly billing cycle prior to the report date or as of the report date.
3- *Commercial Real Estate, Construction, And Land Development*: Commitments To Fund Loans Secured By Real Estate: Includes the unused portions of commitments to extend credit for the specific purpose of financing commercial and multifamily residential properties (e.g., business and industrial properties, hotels, motels, churches, hospitals, and apartment buildings), provided that such commitments, when funded, are reported as either "Loans Secured by Multifamily Residential Properties", or "Loans Secured by Non-farm Nonresidential Properties". Also includes the unused portions of commitments to extend credit for the specific purpose of financing land development (i.e., the process of improving land - laying sewers, water pipes, etc.) preparatory to erecting new structures or the on-site construction of industrial, commercial, residential, or farm buildings, provided that such commitments, when funded, would be reported as loans secured by real estate in "Construction and Land Development". For this item, "construction" includes not only construction of new structures, but also additions or alterations to existing structures and the demolition of existing structures to make way for new structures. Also includes loan proceeds the bank or bank holding company is obligated to advance as construction progress payments.
4- *Unused Commitments - Securities Underwriting*: Includes the unsold portion of the reporting bank's or the reporting bank holding company's own take down in securities underwriting transactions on a consolidated basis. Also includes note issuance facilities (NIFs) and revolving underwriting facilities (RUFs).

[10] These definitions are taken from the FDIC.

5- *Unused Commitments-Other*: Includes commitments to extend credit through overdraft facilities or commercial lines of credit and retail check credit and related plans. Also includes commitments to purchase securities or other assets.

II. Standby Letters of credit: Includes the following

1- *Financial Standby Letters Of Credit And Foreign Office Guarantees:* A financial standby letter of credit irrevocably obligates the bank to pay a third-party beneficiary when a customer (account party) fails to repay an outstanding loan or debt instrument.

Minus;

Amount Of Financial Standby Letters Of Credit Conveyed To Others: Includes that portion of the bank's total contingent liability for financial standby letters of credit. Also includes that portion of the reporting bank's financial standby letters of credit that are backed by other banks' financial standby letters of credit, as well as the portion that participating banks have re-participated to others. Participations and backings may be for any part or all of a given obligation.

2- *Performance Standby Letters Of Credit:* A performance standby letter of credit irrevocably obligates the bank to pay a third-party beneficiary when a customer (account party) fails to perform some contractual non-financial obligation.

Minus;

Amount Of Performance Standby Letters Of Credit Conveyed To Others: Includes that portion of the bank's total contingent liability for performance standby letters of credit that the bank has conveyed to others. Also includes that portion of the reporting bank's performance standby letters of credit that are backed by other banks' financial standby letters of credit, as well as the portion that participating banks have re-participated to others. Participations and backings may be for any part or all of a given obligation.

III. Commercial Letters of Credit: Includes the following

Commercial And Similar Letters Of Credit: Includes the amount outstanding and unused as of the report date of issued or confirmed commercial letters of credit, travelers' letters of credit not issued for money or its equivalent, and all similar letters of credit, but excluding standby letters of credit. Legally binding commitments to issue commercial letters of credit are reported in this item.

IV. Participations: Includes the following

Participations In Acceptances Acquired By The Reporting (Nonaccepting) Bank, Branch Or Agency Or Bank Holding Company: Includes the amount of all participations acquired by the reporting (nonaccepting)

bank or bank holding company or its consolidated subsidiaries in the acceptances of other (accepting) banks or unaffiliated banks that are outstanding, whether acquired from the accepting bank or from others, regardless of the nature of participations agreement and regardless of the system of debits and credits used to reflect the agreement on the reporting (nonaccepting) bank's or bank holding company's books. Thus, participations in acceptances acquired by the reporting (nonaccepting) bank or bank holding company or its consolidated subsidiaries includes both those that provide for participations in the risk of loss in the event of default by the account party at the time of maturity and those that provide for participations in putting the holder of the acceptance in funds at the maturity of the acceptance.

Chapter Three

The determinants of OBS Derivatives activities in U.S. Commercial Banks

Abstract

This paper aims to test the tax regulatory hypothesis and market discipline hypothesis in determining OBS derivatives activities of U.S. commercial banks during the period 1996-2005. We employ Mansfield's (1961) logistic diffusion model and we consider OBS derivatives activities as real financial innovations following a time trend diffusion curve. The model is modified to include regulatory and non-regulatory bank-specific factors in addition to macroeconomic factors. The results reveal that OBS derivatives activities are real financial innovations that are increasing over time. Another major finding is that the regulatory tax hypothesis is not a factor in determining OBS derivatives activities by U.S. commercial banks. The results also suggest that OBS derivatives do not follow the business cycle notion and the usage decision does not depend on economic conditions. OBS derivatives follow the economies of scale notion since they require higher qualifications and these are more likely available in large size banks. The substitution effect is dominant in the case of OBS derivatives and the loan ratio factor. Lack of credibility will reduce OBS derivatives activities. While OBS derivatives are more likely to be an innovation, they are determined by some other factors like technology and learning.

The Determinants of OBS Derivatives Activities in U.S. Commercial Banks

3.1. Introduction:

The last two decades have witnessed an extraordinary increase in the usage of OBS activities by financial institutions in general, and in the banking industry more noticeably. In 2005, the notional value of on-balance-sheet items was $9.0 trillion compared to $108.5 trillion in OBS items for the U.S. banking system. Further, OBS activities grew from $10.2 trillion in 1992 to $108.5 trillion in 2005, a rate of change of 341.2%[11]. Banks engage in OBS activities hoping to earn additional fee income to compensate for declining margins or spreads on their traditional lending business. Secondly, they seek to avoid regulatory costs or taxes since reserve requirements and deposit insurance premiums are not levied on OBS activities.

OBS activities have both risk reducing as well as risk increasing attributes and the net impact on risk will depend on the ability to manage the risk resulting from engaging in these activities. The use of derivatives contracts accelerated during the 1992-2005 period and accounted for much of the growth in OBS activities. (See figure 1 & 2 and refer to table 2 for more data evidence). Observe that the notional amount of derivatives increased from $8764.91 billion in 1992 to $101914.0 billion in 2005[12]. The significant growth in derivative securities activities by commercial banks has been a direct response to the increased interest rate risk, credit risk, and foreign exchange risk exposures they have faced, both domestically and internationally. These contracts offer

[11] Refer to table 1 for more detailed data evidence
[12] Same Source.

banks a way to hedge these risks without having to make extensive changes on the on-balance sheet items.

3.2. The Determinants of OBS Derivatives Activities:

Following Jagtiani et al. (1995), I employ the logistic model. Mansfield (1961) has shown that the adoption pattern of real innovations often follow a logistic time curve. OBS derivatives activities (swaps, options, futures, and forwards) will be considered as an innovation following the time diffusion pattern.

This study differs from Jagtinai et al (1955) in several ways. First, they consider the important changes in capital requirements during the period of their study by imposing dummy variables representing the occurrence of each of the capital requirement changes. I will measure the capital requirement factor in line with the analysis of Jacques and Nigro (1997) by introducing the concept of regulatory pressure in regard to banks' capital adequacy ratios (CARs). (A detailed discussion of this factor will follow). Second, the period of their analysis was limited to 1984 and 1991. I study a more recent time span of 1996 to 2005, which includes the most recent regulatory pressure effects. Third, in addition to the capital requirement factor and bank specific features, I will add macroeconomic conditions as a determinant of OBS derivatives activities. Moreover, bank-level panel data is constructed and panel estimation techniques are used. One of the main benefits of panel data is that it enables us to identify and measure effects that are simply not determined in pure cross-section or pure time-series data.

3.3. The Model:

3.3.1. The Logistic Diffusion Model:

Mansfield (1961) introduced a deterministic model to answer two questions: Why firms were so slow to install some innovations and so quick to install others? What factors seem to govern the rate of imitation? His model assumes that the number of firms adopting an innovation between time t and time t+1 depends on several factors. First, the number of firms that have previously adopted the innovation. The increases in the proportion of firms already using an innovation would increase $\lambda_{ij}(t)$. As more information and experience accumulate, it becomes less risky to begin using it. Moreover, competitive pressures mount and "bandwagon" effects occur. Second, the profitability of installing the innovation would also be expected to have an important influence on $\lambda_{ij}(t)$. the more profitable this investment is relative to others that are available, the greater is the chance that a firm's estimate of the profitability will be high enough to compensate for whatever risks are involved and that it will seem worthwhile to install the new technique rather than to wait. Third, for equally profitable innovations, $\lambda_{ij}(t)$ should tend to be smaller for those requiring relatively large investments. One would expect this on the grounds that firms tend to be more cautious before committing themselves to such projects and that they often have more difficulty in financing them. Finally, for equally profitable innovations requiring the same investment, $\lambda_{ij}(t)$ is likely to vary among industries (depending on the risk aversion attitude in each industry). Below is the formal derivation of Mansfield (1961) model.

Let n_{ij} be the total number of firms which adopted the j^{th} innovation in the i^{th} industry, $m_{ij}(t)$ be the number of these firms having introduced the innovation at time t, π_{ij} be the profitability of installing this innovation relative to that of alternative investments, and S_{ij} be the investment required to install this innovation as a per cent of the average total assets of these firms. $\lambda_{ij}(t)$ is the proportion of "hold-outs" (firms not using this innovation) at time t that introduced it by time t+1, i.e.,

$$\lambda_{ij}(t) = \frac{m_{ij}(t+1) - m_{ij}(t)}{n_{ij}(t) - m_{ij}(t)} \text{..................................(1)} \quad \text{and,}$$

$$\lambda_{ij}(t) = f\left(\frac{m_{ij}(t)}{n_{ij}}, \pi_{ij}, S_{ij}, ...\right) \text{.............................(2)}$$ From the discussion above.

Assume that the number of firms having introduced an innovation can vary continuously rather than only one integer value, and assume that $\lambda_{ij}(t)$ can be approximated adequately within the relevant range by Taylor's expansion that drops third and higher order terms. Assuming that the coefficient of $\left(\frac{m_{ij}(t)}{n_{ij}}\right)$ in this expansion is zero, we have

$$\lambda_{ij}(t) = a_{i1} + a_{i2}\frac{m_{ij}(t)}{n_{ij}} + a_{i3}\pi_{ij} + a_{i4}S_{ij} + a_{i5}\pi_{ij}\frac{m_{ij}(t)}{n_{ij}} + a_{i6}S_{ij}\frac{m_{ij}(t)}{n_{ij}} + a_{i7}\pi_{ij}S_{ij} + a_{i8}\pi_{ij}^2 + a_{i9}S_{ij}^2 + \ldots\ldots\ldots, \quad \text{...............(3)}$$

Thus,

$$m_{ij}(t+1) - m_{ij}(t) = \left(n_{ij} - m_{ij}(t)\right)\left(a_{i1} + a_{i2}\frac{m_{ij}(t)}{n_{ij}} + \cdots + a_{i9}S_{ij}^2 + \ldots\right) \text{.........(4)}$$

Assuming that time is measured in fairly small units, we can use as an approximation the corresponding differential equation

$$\frac{dm_{ij}(t)}{dt} = \left(n_{ij} - m_{ij}(t)\right)\left(\theta_{ij} + \beta_{ij}\frac{m_{ij}(t)}{n_{ij}}\right) \text{.............................(5)}$$

The solution of which,

$$m_{ij}(t) = \frac{n_{ij}\left[e^{\alpha_{ij}+(\theta_{ij}+\beta_{ij})t} - \left(\theta_{ij}/\beta_{ij}\right)\right]}{1 + e^{\alpha_{ij}+(\theta_{ij}+\beta_{ij})t}} \text{...................(6)}$$

Where α_{ij} is a constant of integration, θ_{ij} is the sum of all terms in (3) not containing $\frac{m_{ij}(t)}{n_{ij}}$, and β_{ij} is the coefficient of $\frac{m_{ij}(t)}{n_{ij}}$

$$\beta_{ij} = a_{i2} + a_{i5}\pi_{ij} + a_{i6}S_{ij} + \cdots \text{ , ………………….. (7)}$$

Add another assumption, as we go backward in time, the number of firms having introduced the innovation must tend to zero, i.e.,

$$\lim_{t \to -\infty} m_{ij}(t) = 0 \text{..........................(8)}$$

It follows, $P_t = m_{tj}(t)/n_{ij} = \left[1 + e^{(-\alpha_{ij} - \beta_{ij}t)}\right]^{-1}$ ....(9)

Thus, the growth over time in the number of firms having introduced an innovation should conform to a logistic function. The logistic time curve, equation (9), predicts that the proportion of the population which has already adopted the innovation will increase at an accelerating rate until 50 percent adoption achieved, this is attained at t = -(α/β). Thereafter, the adoption will increase at a decelerating rate and 100 percent adoption is approached asymptotically.

If equation 9 is correct, it can be shown that the rate of imitation is governed by only one parameter β_{ij}. Assuming that the unspecified terms in (7) is uncorrelated with π_{ij} and S_{ij} and that it can be treated as a random error term, then it follows from 9

$$\ln\left[P_{it} / (1 - P_{it}) \right] = \alpha + \beta t \text{.......... ....}(10)$$

where P_{it} is the ratio of OBS items (in nominal terms) to the nominal value of total assets (defined as on-balance sheet assets + OBS items) of bank i at time t. this definition follows Jagtiani et al. (1995) which enables us to counter for the scale on which bank introduce OBS items.

3.3.2. The Empirical Model:

Starting from equation (10), I will add two factor vectors; the first to control for bank-specific characteristics and the other to capture the macroeconomic conditions. The choice of these factors is based on both theoretical literature and from policy discussions. Accordingly, equation (11) is the modified econometric model from equation (10).

$$LGTDERV_{it} = \ln\left[P_{it} \Big/ (1 - P_{it}) \right] = \alpha_i + \beta t + \gamma X_{it} + \delta Y_t + \varepsilon_{it} \text{.......... ....}(11)$$

where i = 1,2,3,….,N denotes the number of banks and t = 1,2,3,…T denotes the number of time periods. The dependent variable, $LGTDERV_{it}$ is the logistic transformation of P_{it}, where P_{it} is the ratio of OBS derivatives items (in nominal terms) to the nominal value of total assets (defined as on-balance sheet assets + OBS items) of bank i at time t. This definition follows Jagtiani et al (1995) which enables us to control for the scale on which banks introduce OBS items. The explanatory variables are shown below. (Refer to table 3 for a summary of the variables and their proxies, predicted signs, and the rational of the relation).

i-The time trend (t) accounts for the autonomous diffusion.

ii-X_{it} is a vector of bank-specific characteristics.

iii-Y_{it} is a vector of general macroeconomic conditions.

iv-The intercept α is a bank-specific constant.

The bank-specific characteristics are classified into regulatory and non-regulatory variables. The non-regulatory factors are bank size, loan ratio, profitability, and net charge-off. The anticipated effect of bank size has a two-sided effect and the net effect of these two determines the net impact of firm size on OBS derivatives activities. On the one hand, a bank has to be of a certain size in order to get involved in OBS derivatives activities and get the benefit of the economies of scale. Moreover, large banks may be the only banks that have the high qualified risk management and specialized staff.

Also, sophisticated clients who are more likely to engage in OBS derivatives activities may not consider the small-sized banks as an option as they believe that large banks are too big to fail. On the other hand, as bank size gets bigger the bank is likely more risk-diversified and there will be fewer incentives to engage in OBS derivatives activities.

The impact of the loan ratio (the ratio of loans to total assets) on the usage of OBS derivatives activities is expected to be positive and significant. Angbazo (1997) shows that a higher loan ratio will increase the interest rate risk which will create an incentive for banks to hedge using OBS derivatives activities. Another reason for this positive relation is in the process of approving loans; banks get access to their customers' investment information which will facilitate the offer of relevant OBS derivatives risk management tools.

A positive relation is expected between profitability and OBS derivatives activities. Profitability is considered as a measure of the creditworthiness viewed by customers. Profitability will increase the customer valuation for a bank which in turns will give more incentives to work with profitable banks rather than a non-profitable (less-profitable) one.

The net charge-off is a proxy for non-performing loans that banks assign for bad debt loans. The predicted impact of non-performing loans is negative, so as the amount of non-performing loans increases the bank's creditworthiness decreases, and that will decrease the amount of OBS derivatives activities. One may argue that as the charge-off amount increases that means the default risk for that bank is high and then a risk management instrument might be needed to hedge against this risk and generate another

income source to compensate for the bad loans loss. Therefore an increase in the charge off amount might have a positive impact on OBS derivatives activities.

With respect to regulatory factors, following Jacques and Nigro (1997), I consider the capital adequacy ratio (CAR) as a proxy for capital requirements regulations. CAR is a measure of a bank's capital, used to protect depositors and promote the stability and efficiency of financial systems around the world[13]. There are two possible effects of the CAR on the diffusion pattern of OBS derivatives items. On the one hand, a higher CAR increases a bank's creditworthiness, which in turn will increase the incentives of bank's customers to work with this bank's OBS derivatives risk managements items. On the other hand, a higher CAR reduces a bank's marginal gain from increasing the risk in the asset portfolio (Furlong and Keeley, 1989). As bank capital increases, the ability to assume risks increases, but the need for OBS derivatives products to hedge risk exposure may decrease. I also examine the response of banks to the 8% well capitalized total risk-based capital (RBC) standards on the capital ratio. I classify the banks into two groups CARL, CARH as a signal to the degree of regulatory pressure brought about by the risk-based capital standards on capital ratio, because banks with total CAR above and below the 8 percent regulatory minimum may react differently. Specifically, the low regulatory pressure variable (CARL) equals the difference between the inverse of the bank's actual CAR and the inverse of the regulatory stipulated CAR of 8 percent, i.e., CARL equals (1/CAR-1/8) for all banks with a total risk-based capital ratio less than 8 per cent, and

[13] CAR can be expressed as $CAR = \frac{TierICapital + TierIICapital}{RiskWeightedAssets}$. It is also called the capital to risk weighted assets ratio (CRAR).

zero otherwise[14]. The high regulatory pressure variable (CARH) equals the difference between the inverse of the regulatory stipulated CAR of 8 percent and bank's actual CAR, i.e., CARH equals (1/8-1/CAR) for all banks with a total risk-based capital ratio greater than 8 per cent, and zero otherwise. High regulatory pressure with respect to capital implies low creditworthiness and can be expected to translate into lower OBS activity. On the other hand, low regulatory pressure, as implied by CRAL, signifies a comfortable capital position and (accompanied with a high credit rating) makes a bank an active supplier of OBS products (Koppenhaver and Stover, 1991). Alternatively, low regulatory pressure reduces the marginal propensity of a bank to increase the risk in its asset portfolio (Furlong and Keeley, 1989). Therefore, banks with high capital ratios (implying low regulatory pressure) can be expected to take less OBS risk and hence, supply a smaller volume of OBS items.

The macroeconomic vector includes four categories; first, general economic performance measure (the real Gross Domestic Product (RGDP)), second, price level measures (shares price, consumer price index), the shares price having measured by the S&P price index, third, interest rates measures (the difference between the long and the short-term interest rate (INTSPRD)[15], short-term interest rate, mid-term interest rate, and long-term interest rate), and fourth, balance of payment measures (total trade in goods, total trade in services, total trade income, total transfers, and total capital transactions).

---

[14] Risk – Based Assessment System, Federal Deposit Insurance Corporation, FDIC. They specified three groups in terms of RBC standards, Group 1 - "Well Capitalized." Total Risk-Based Capital Ratio equal to or greater than 10 percent. Group 2 - "Adequately Capitalized." Not Well Capitalized and Total Risk-Based Capital Ratio equal to or greater than 8 percent. Group 3 - "Undercapitalized" Neither Well Capitalized nor Adequately Capitalized.

[15] The long-term interest rate is proxied as the interest rate on long term Government bonds. The short-term interest rate is proxied as the interest rate the short term Treasury Bills.

Real GDP captures the effects caused by fluctuations in general economic activity. Two arguments can be made about the impact of the real GDP and the usage of OBS activities. First, the demand for OBS products reacts positively to the business cycle due to a transactions motive. Second, business risk decreases in economic boom periods which lead to less demand for risk management techniques (OBS activities). The interest rate spread also encounters two arguments. First, a high and positive interest rate spread signals a high degree of uncertainty about future interest rates and that short-term interest rates are expected to rise in the future. High interest rate risk and future interest rate increase imply a relatively high demand for OBS products. Second, when the spread between short term and long term is high and positive, then bank's managers have incentives to engage in traditional on-balance sheet activities and take the advantage of low short-term interest rate funding and high long - term interest rate lending. As a result a bank's manager will be less attracted to engaging OBS activities. The effect of the interest rate variables (short, mid, and long–term rates) will depend on the side we are considering, whether it is the customer's point of view or the bank's point of view, and also on the investment horizon for both of them (short term or long term). For example, short term investors-the word investors can be viewed as a bank or individual-will increase their lending when the short term rate increases and that will affect OBS activities negatively, while long term investors will prefer not to lend on the current interest rate and will prefer to go to OBS activities.

The CPI variable may affect OBS activities negatively as it will affect the purchasing power of the economy and then the saving level in the economy and all the banks activities in general (on and off balance sheet). And also when the purchasing

power of customers decrease, aggregate demand in the economy decreases which in turn reduces all trade transactions domestically and internationally, which will affect OBS activities negatively. The shares price effect may include two arguments. One is positive, and the other one is negative. The positive one is that when share prices increase then the corporation in the country market value will increase and then it will expand its operation and that will increase OBS transactions. The negative impact is that when the shares price increases the investors will increase their investment in the stock market and will reduce saving, banks activities including OBS activities. All balance of payments variables are expected to increase the usage of OBS activities as more international transactions will increase the need for OBS activities.

3.4. Data Sources:

The data set is drawn from the report of income and condition reported to the Federal Depository Insurance Corporation (FDIC) for all commercial banks in the United States of America during the period of March 1996 to December 2005, i.e. there will be a 40 quarters data set. Balanced data sets are constructed in a panel data format; banks with discontinuous data were omitted from the data sets which will reduce the noise in the estimate. The number of banks is mainly based on the availability of OBS derivatives items data, we have 67, 62, 20, 19 banks included in the data sets for Swaps, Options, Forwards, and Futures, respectively.

Off-Balance Sheet Derivatives Variables include four items chosen from the report of income and condition-schedule RC-L. The four items are Swaps, Options,

Forwards, and Futures[16]. OBS Derivatives items are calculated as the ratio of the notional amount of each OBS item to the total assets then taking the logistic transformation as indicated in the model specification previously. Total assets are defined as the summation of the on-balance sheet total assets and OBS total asset. This is to counter for the scale on which banks introduce OBS items.

The On-Balance Sheet Variables are also collected from the call reports by the banks with the FDIC. The macroeconomic variables are collected from the IFS data base. The interest rate spread represents the difference between the 10-year Treasury bond yield rate and the 3–month Treasury bill yield rate. The short term rate is measured by the short term Treasury bill, mid-term rate is measured by the mid-term, 3-year treasury bond rate, and the long term rate is measured by the long term Treasury bill rate. The share prices are the S&P price index. The total trade in goods is the sum of the total exports and imports of goods, the total services is the total exports and imports of services, total trade income is the sum of the total credit and debit income, and total transfers is the sum of the total credit and debit transfers, and the total capital is also the sum of the credit and debit sides of the capital account.

3.5. Empirical Results:

In this section we present the results of our estimates of the logistic diffusion model for OBS Derivatives. Tables (4 - 7) present the estimates for the logistic diffusion model for four OBS derivatives contracts (Swaps, Options, Forwards, Futures)[17]. It is

[16] Please refer to table (3-8) for detailed components and definition for each one of these items.

[17] Please refer to table (3-8) for detailed components and definition for each one of these items.

interesting that none of the included factors are significant in determining futures usage by U.S. commercial banks. This may be because a relatively small number of banks participated in futures activity.

Time Diffusion Speed: There are significantly positive coefficients for the swaps, options, and forwards activities; this implies that these two activities follow the financial innovation diffusion model over time. And OBS derivatives have taken place over OBS guarantees.

Non-Regulatory Bank Specific Factors: There is a higher significance of these factors on derivatives activities more than guarantees activities. Specifically, a bank's size has a significantly positive impact on swaps and options contracts. This implies that there is an economy of scale impact on the use of swaps and options that can be justified as they are more complicated contracts and need more qualified staff to manage these contracts which are more likely available in large-size banks. There is a negative impact on forward contracts which seems to be more related to a bank's risk that should decrease with size level.

Banks' Loan Ratios have a significantly positive impact on the usage of the swaps, which indicates an informational economy of scope between loans and OBS derivatives activities, and banks will participate more in OBS activities to reduce their risk resulting from loans. However, it is statistically insignificant for futures. But it is significantly negative for options and forwards which indicate they are substitutes for banks' traditional activities (loans) and not used to decrease the risk arising from lending activities.

Banks' Profitability is statistically insignificant for all OBS derivatives contracts. The charge–off ratio has a significantly negative impact on all OBS derivatives activities except for forwards. The negative charge-off coefficients imply that banks with more non-performing loans (proxied by the charge-off ratio) may have been disadvantaged in adopting derivatives due to a lack of credibility.

Regulatory Banks' Specific Factors: the CAR has no significant effect in determining the usage of OBS derivatives. This implies, consistent with some recent trend, that capital regulations are not considered as a major factor in OBS derivatives usage decision-making. However, we have significantly positive coefficients for forwards and options contracts for the low regulatory pressure banks. This can be explained as the bank's capital position is more comfortable, they have a high credit rating which implies that banks will increase the issuance of forwards. We also have a significantly negative coefficient for swaps and futures contracts for the high regulatory pressure banks which can be explained as high regulatory pressure with respect to capital implies low creditworthiness and can be expected to translate into lower derivatives activities. In other words, as banks are capital constrained and have higher regulatory pressure then they are required to either increase their risk weighted capital or decrease their capital. Swaps and forwards seems to be used to achieve this purpose.

Macroeconomic Factors have no significant impact on OBS derivatives activities. This suggests that OBS derivatives do not follow economic growth and the business cycle and that there are other factors affecting the usage of derivatives. More specifically, Real GDP coefficients are statistically insignificant for all OBS derivatives activities except for options contracts where it is significantly negative. This indicates

less need for the risk management instruments when an economy is in a high growth phase and vice-versa. Interest rate variables play no important role in the usage of OBS derivatives activities. The interest rate spread has a statistically insignificant impact on OBS derivatives activities except for the forward contracts. This suggests that banks do not value the uncertainty about future interest rates when they consider OBS contracts decisions. The significantly negative impact of the interest rate spread on forward contracts can be explained by the substitution effect between traditional banks activities and OBS activities. Short–term treasury bills and mid-term treasury bills are insignificant for derivatives while long-term treasury bill rates are significantly negative for options and forwards. This can be explained by the fact that banks prefer to deal with the long-term lending activities when the interest rates are high. Price level variables also have a role in determining OBS derivatives activities. There is a negative relation between share prices and both options and futures, and a negative relation between the CPI and both swaps and forwards. The balance of payments variables unexpectedly have no significant role in determining the usage of OBS derivatives. However there is a significantly negative impact of the total trade level on options and the total transfers level has a negative impact on forward OBS contracts.

3.6. Concluding Remarks:

The results indicate that OBS derivatives usage is increasing over time and follows the financial innovation trend in the banking industry. I conclude that regulatory factors are not a major factor in determining the usage of OBS derivatives activities, while bank's non-regulatory factors and macroeconomic factors are at work in determining OBS derivatives usage.

Banks specific factors affect OBS derivatives but in different directions. The relationship between a bank’s size and OBS derivatives is positive which is consistent with the economies of scale notion since derivatives require higher qualifications than other OBS activities and that they are more likely available in large size banks. The substitution effect is dominant in the case of OBS derivatives and the loan-ratio factor. Non-performing loans will decrease the usage of OBS derivatives activities in general due to a lack of credibility. The results also suggest that OBS derivatives do not follow the business cycle and the usage decision does not depend on economic conditions. OBS derivatives are more likely to be an innovation and are determined by some other factors like technology and learning.

References:

[1] Angbazo, L., "Commercial Bank Net Interest Margins, Default Risk, Interest Rate Risk and Off-Balance Sheet Banking", *Journal of Banking and Finance*, 1997, 21, 55-87.

[2] Avery, Robert, and Elijah Brewer, "Risk-Based Capital and Off-Balance Sheet Activities" Proceeding of a Conference on Bank Structure and Competition, *Federal Reserve Bank of Chicago*, 1988, 261-287.

[3] Avery, R. B. and A. N. Berger. "Loan Commitments and Bank Risk Exposure", *Journal of Banking and Finance*, February 1991, 15, 173-92.

[4] Benveniste, L. M. and A. N. Berger. "An Empirical Analysis of Standby Letters of Credit," Proceedings of the Conference on Bank Structure and Competition. *Chicago: Federal Reserve Bank Of Chicago,*1986, 387-412.

[5] Benveniste, L. M. and A. N. Berger. "Securitization with Recourse: An Instrument that offers Uninsured Bank Depositors Sequential Claims", *Journal of Banking and Finance*, 11, September 1987, 403-424.

[6] Berger, A. N. and G. F. Udell. "Collateral, Loan Quality, and Bank Risk", *Journal of Monetary Economic*, 25, January 1990, 21-42.

[7] Berger, A. N. "Market Discipline in Banking", Proceedings of the Conference on Bank Structure and Competition, *Chicago: Federal Reserve Bank of Chicago*, 1991, 419-427.

[8] Berger, A.N. and G.F.Udell, "Relationship Lending and Lines of Credit in Small Firm Finance" *Journal of Business*, 1995, 68, 351-382

[9] Carter D., Simpson W., and Tandon A., "Managerial ownership and compensation and the use of interest-rate derivatives by U.S. Banks", working paper, *FMA conference 2006*, Slat Lake City.

[10] Davis, S., "*The Diffusion of Financial Innovations"*, *Cambridge: Cambridge University Press*, 1979.

[11] Furlong, F.T., and M.C.Keeley, "Capital Regulation and Bank Risk-Taking", *Journal of Banking and Finance*, 1989, 35, 883-891.

[12] Gorton, Gary, and Anthony M. Santomero, "Market Discipline and the Valuation of Bank Subordinated Debt", *Journal of money, credit and Banking*, February 1990, 22, 118-128.

[13] Hassan, M. K. "The Market Perception of the Riskiness of Large U.S. Bank Commercial Letters Of Credit", *Journal of Financial Services Research*, 6, September 1992, 207-221.

[14] Hassan, Gordon, and Peterson, "Off-Balance Sheet Activities and Bank Default-Risk Premia: A Comparison of Risk Management", Journal of Economic and Finance, 1993, Vol 17, No. 3, 69-83.

[15] Hassan, M. K., G. V. Karels and M. O. Peterson, "Deposit Insurance, Market Discipline and Off- Balance Sheet Banking Risk of Large U.S. Commercial Banks", *Journal Of Banking And Finance*, May 1994, Vol.18, No.3, 575-594.

[16] Jagtiani, J., "Characteristics Of Banks That Are More Active In The Swaps Market", *Journal Of Financial Services Research*, 1995, Volume 9, No. 4.

[17] Jagtinai,J., A.Saunders And G.Udell, "The Effect of Bank Capital Requirements on Bank Off-Balance Sheet Financial Innovations", *Journal Of Banking And Finance*, 1995, 19, 647-658.

[18] Jacques, K. And P.Nigro, "Risk-Based Standards, Portfolio Risk and Bank Capital: A Simultaneous Equations Approach", *Journal Of Economic And Business*, 1997, 49, 533-547.

[19] Koppenhaver, G. O., "The Effects of Regulation of Bank Participations in the Guarantee Market", *Research In Financial Services,* 1989, 165-80.

[20] Koppenhaver, G. O. and R. D. Stover, "Standby Letters of Credit and Large Bank Capital: An Empirical Analysis", *Journal of Banking and Finance*, 15, 1991, 315-327.

[21] Mansfield, E, "Technical Change and the Rate of Imitation", *Econometrica*, 1961, 29, 741-766.

[22] Pavel, C. and D.Philis, "Why Commercial Banks Sell Loans: An Empirical Analysis" Economic Perspectives*, Federal Reserve Bank of Chicago*, 1987, May/June, 3-14.

[23] Pavel, C., "Loan Sales Have Little Effect on Bank Risk", Economic Perspectives, *Federal Reserve Bank of Chicago*, 1988, May/June, 23-31.

[24] Ronn, Ehud, and A.K. Verma, "Pricing Risk-Adjusted Deposit Insurance: An Option-Based Model", *Jornal of Finance*, September 1986, 41, 871-895.

[25] Zhao F. and Moser J, " Bank Lending and Interest-Rate Derivatives", working paper, *FMA conference 2006*, Slat Lake City.

Table (3-1) Aggregated None Derivatives OBS Items Held By Commercial Banks[18]

	12/31/1992	12/31/1996	12/31/1999	12/31/2002	12/31/2005
Number of Banks Reported	11463.00	9528.00	8580.00	7888.00	7526.00
Financial and performance SLC and foreign office guarantees	**162.52**	**210.97**	**255.70**	**322.17**	**461.21**
(Amount conveyed to others)	**14.87**	**21.81**	**23.43**	**52.98**	**93.87**
Financial SLCs and foreign office guarantees	110.78	170.38	210.67	271.14	394.88
Amount conveyed to others	11.54	18.52	19.17	43.69	81.83
Performance standby letters of credit	51.75	40.60	45.03	51.03	66.33
Amount conveyed to others	3.33	3.29	4.26	9.29	12.04
Commercial and similar letters of credit	**28.16**	**30.92**	**26.54**	**22.61**	**28.24**
Commitments to lend	**1270.90**	**2579.46**	**3949.75**	**5283.76**	**6133.42**
Securities lent	**96.38**	**207.96**	**382.91**	**582.33**	**1368.10**
Participations in acceptances:	**1.04**	**1.46**	**0.82**	**1.13**	**0.72**
Conveyed to others by reporting bank	0.82	1.23	0.53	1.01	0.50
Acquired by reporting bank	0.22	0.23	0.29	0.13	0.22
Total Derivatives	**8764.91**	**20297.44**	**34885.52**	**56404.74**	**101914.00**
All Non - Derivatives OBS	**1447.74**	**2801.00**	**4209.38**	**5576.69**	**6529.72**
All other off-balance sheet	**8.73**	**14.04**	**24.32**	**30.57**	**58.38**
Total Assets (on-Balance Sheet Items)	**3506.17**	**4582.16**	**5735.13**	**7076.77**	**9039.39**

[18] Sources: FDIC, Statistics on Banking, Various Issues. www.fdic.gov

Table (3-3): Empirical Model Variables: This table presents the variables of the empirical model of banks off-balance sheet activities, their proxies and predicted coefficients sign, and the economic rational. The dependent variables are OBS items calculated as $LGTDERV_{it} = \ln\left[P_{it} / (1 - P_{it}) \right]$, where P_{it} is OBS item calculated as the ratio of that item to the sum of on balance sheet and the off-balance sheet assets.

Variable	Proxy	Predicted coefficient sign	Rational
Size	Total Asset(TA): log(TA)	Positive Negative	Size ↑⇒ Scale economies↑⇒OBS↑ Size ↑⇒ Bank Risk↓⇒OBS↓
Loans	Total Loans (TL): log(TL)	Positive	LOAN↑⇒Scope Economies and Risk↑ ⇒OBS↑
Profitability	Net Income (NI): log(NI)	Positive	PROFIT↑ ⇒Creditworthiness↑⇒OBS↑
Non-Performing Loans	Net charge-off (COFF): COFF /TA	Negative	NNPA↑⇒Creditworthiness↓⇒OBS↓
Low Regulatory Pressure (CARL)	Capital Adequacy Ratio (CAR): $CARL = \begin{cases} 1/CAR_{actual} - 1/0.08, if CAR_{actual} < 8\% \\ 0, if CAR_{actual} > 8\% \end{cases}$	Positive Negative	CARL↑⇒ Creditworthiness↑⇒OBS↑ CARL↑⇒Risk-taking capacity↑⇒OBS↓
High Regulatory Pressure (CARH)	Capital Adequacy Ratio (CAR): $CARH = \begin{cases} 1/0.08 - 1/CAR_{actual}, if CAR_{actual} > 8\% \\ 0, if CAR_{actual} < 8\% \end{cases}$	Negative	CARH↑⇒ Creditworthiness↓⇒OBS↓
Interest rate Spread	INT: log{ABS(10-Treasury Bond Yield-3-months Treasury Bond Yield)}	Positive Negative	INT↑⇒Uncertainty rates↑⇒OBS↑ INT↑⇒Traditional Banking ↑⇒OBS↓
Real GDP	RGDP: Log(RGDP)	Positive Negative	GDP↑⇒Economic Activity↑⇒OBS↑ GDP↑⇒Business Risk↓⇒OBS↓

Table (3-4): The estimation for ***Swaps*** determinants model, where the explanatory variables appearing in the first column are classified into time, bank specific characteristics, regulatory variables, and macroeconomic variables. The first row represents the coefficient (COEFF.) and standard errors (S.E).

	COEFF.	S.E	COEFF.	S.E	COEFF.	S.E	COEFF.	S.E
CONST	-11.1703*	4.60854	-6.11826*	.640545	-2.18807	2.46779	-6.20611*	1.95574
TIME	.0682592*	.00807569	.0898452*	.00261932	.0071982^	.00343954	.0342363*	.00489942
LTA	.166791*	.031950	.168993*	.031849	.162161*	.032144	.170587*	.031828
LLR	.464278*	.160520	.489893*	.161053	.468348*	.160800	.472907*	.160216
LNI	.00000001	.00000002	.000000012	.00000002	.000000015	.00000002	.000000010	.00000002
LCOFF	-.0000001*	.00000004	-.00000013*	.00000004	-.0000001*	.00000004	-.0000001*	.00000004
CARL	-.00095678	.00161509	-.000871188	.00162585	-.00116980	.00162550	-.00097686	.00163059
CARH	-.00835656	.00575033	-.00748306	.00587816	-.976292¤	.591465	-.00862595	.00601570
LGDP	1.14637	1.05136	---	---	---	---	---	---
LINR	.024902	.019057	-.011979	.025180	---	---	---	---
LTB	---	---	-.137064	.103942	---	---	---	---
LLY	---	---	-.090777	.347879	---	---	---	---
LMY	---	---	.198558	.241777	---	---	---	---
LSP	---	---	---	---	.00746136	.057693	---	---
LCPI	---	---	---	---	-.860799¤	.514832	---	---
LTR	---	---	---	---	---	---	-.278971	.438876
LTS	---	---	---	---	---	---	.411992	.326292
LTIN	---	---	---	---	---	---	-.054735	.208811
LTTR	---	---	---	---	---	---	.021274	.057007
LTCA	---	---	---	---	---	---	.013610	.031672
No. Obs.	2680		2680		2680		2680	
R^2	.117852		.118039		.116466		.118100	
L.M	.608039 [.436]		.452755 [.501]		.922985 [.356]		.501295 [.479]	
D.W	.123585 [.000,.000]		.123095 [.000,.000]		.123301 [.000,.000]		.123818 [.000,.000]	

Note: (*), (^), (¤) represent significance levels of 1%, 5%, and 10%, respectively

Table (3-5): The estimation for ***Options*** determinants model, where the explanatory variables appearing in the first column are classified into time, bank specific characteristics, regulatory variables, and macroeconomic variables. The first row represents the coefficient (COEFF.) and standard errors (S.E).

	COEFF.	S.E	COEFF.	S.E	COEFF.	S.E	COEFF.	S.E
CONST	40.8767*	9.71390	-5.52269*	1.42935	-5.14757	5.22204	2.70133	4.14554
TIME	.065978*	.016941	-.031489*	.00557205	-.010062	.00726292	.00788569	.010363
LTA	.358127*	.071206	.308091*	.070755	.360975*	.071874	.284628*	.070713
LLR	-.995284*	.254729	-1.00139*	.256100	-.989828*	.254962	-1.03694*	.256218
LNI	-.00000002	.00000004	-.000000012	.00000004	-.00000002	.00000004	-.00000002	.00000004
LCOFF	-.0000001¤	.00000008	-.00000015¤	.00000008	-.0000001¤	.00000008	-.0000001¤	.00000008
CARL	.00447682¤	.00271763	.00251365	.0027383	.00505021¤	.00273811	.00246250	.00275168
CARH	.00241594	.011783	-.013960	.011956	.00705593	.012052	-.013520	.012255
LGDP	-11.2358*	2.22168	---	---	---	---	---	---
LINR	-.00515621	.040191	.158561*	.053450	---	---	---	---
LTB	---	---	-.031832	.219481	---	---	---	---
LLY	---	---	-1.64686^	.728236	---	---	---	---
LMY	---	---	.421933	.507932	---	---	---	---
LSP	---	---	---	---	-.765775*	.121236	---	---
LCPI	---	---	---	---	-.136138	1.07978	---	---
LTR	---	---	---	---	---	---	-2.10569^	.921257
LTS	---	---	---	---	---	---	.085650	.6931100
LTIN	---	---	---	---	---	---	.270175	.439930
LTTR	---	---	---	---	---	---	.151494	.121145
LTCA	---	---	---	---	---	---	-.012122	.067299
No. Obs.	2480		2480		2480		2480	
R^2	.110484		.103014		.110388		.101919	
L.M	21.6187 [.000]		13.6084 [.000]		21.0843 [.000]		8.36481 [.000]	
D.W	.112869 [.000,.000]		.112381 [.000,.000]		.112816 [.000,.000]		.111241 [.000,.000]	

Note: (*), (^), (¤) represent significance levels of 1%, 5%, and 10%, respectively

Table (3-6): The estimation for ***Forwards*** determinants model, where the explanatory variables appearing in the first column are classified into time, bank specific characteristics, regulatory variables, and macroeconomic variables. The first row represents the coefficient (COEFF.) and standard errors (S.E).

	COEFF.	S.E	COEFF.	S.E	COEFF.	S.E	COEFF.	S.E
CONST	3.46283*	.696573	7.53414*	1.66284	38.5244*	10.1471	23.8968*	7.87760
TIME	.0449490*	.00523209	-.026450*	.010036	.050619*	.013836	.062776*	.020524
LTA	-.0044949*	.035018	-.478177*	.035029	-.663893*	.031636	-.661730*	.031576
LLR	-.0085547*	.00121634	-.00863993*	.00121286	-.012000*	.0012377	-.012162*	.00123451
LNI	-.00000010	.00000031	-.000000084	.000000315	-.00000044	.00000033	-.00000039	.00000034
LCOFF	.000000001	.000000004	.0000000011	.000000004	.000000005	.000000004	.000000004	.000000004
CARL	.141680^	.071948	.114077	.072653	.065828	.078229	.066761	.077803
CARH	-.027685*	.00951055	-.025589*	.00948567	-.022738^	.010066	-.024085*	.010063
LGDP	.027032	.059934	---	---	---	---	---	---
LINR	-.644139*	.062283	-.634076*	.062500	---	---	---	---
LTB	---	---	-.475896	.383340	---	---	---	---
LLY	---	---	-3.17684*	1.34249	---	---	---	---
LMY	---	---	1.51399	.977159	---	---	---	---
LSP	---	---	---	---	-.279761	.249016	---	---
LCPI	---	---	---	---	-6.92576*	2.19439	---	---
LTR	---	---	---	---	---	---	-2.50211	1.84735
LTS	---	---	---	---	---	---	-.803190	1.40437
LTIN	---	---	---	---	---	---	.341231	.912903
LTTR	---	---	---	---	---	---	-.420133*	.246697
LTCA	---	---	---	---	---	---	-.181648	.136797
No. Obs.	800		800		800		800	
R^2	.242825		.242230		.166709		.166644	
L.M	15.9999 [.000]		16.9176 [.000]		2.47371 [.116]		2.60037 [.000]	
D.W	.114805 [.000,.000]		.114883 [.000,.000]		.120018 [.000,.000]		.121171 [.000,.000]	

Note: (*), (^), (¤) represent significance levels of 1%, 5%, and 10%, respectively

Table (3-7): The estimation for ***Futures*** determinants model, where the explanatory variables appearing in the first column are classified into time, bank specific characteristics, regulatory variables, and macroeconomic variables. The first row represents the coefficient (COEFF.) and standard errors (S.E).

	COEFF.	S.E	COEFF.	S.E	COEFF.	S.E	COEFF.	S.E
CONST	5.01199	13.2301	-3.90915^	1.78720	7.44210	7.19740	1.52700	5.48932
TIME	.017279	.023218	.0058992	.00767113	.019417¤	.010319	.021697	.013759
LTA	-.015418	.090409	-.053310	.089589	-.034235	.091838	-.054542	.089376
LLR	.216681	.425315	.330942	.427344	.259726	.426809	.285020	.428557
LNI	.000000006	.00000003	.00000002	.000000037	.000000013	.000000037	.00000002	.000000037
LCOFF	-.0000001^	.00000006	-.0000001^	.000000067	-.0000001^	.000000068	-.0000001^	.000000068
CARL	.013273	.033871	.016217	.033833	.011495	.033990	.014084	.033985
CARH	-.0013688	.015141	.00263787	.015045	-.00293674	.015849	-.00090429	.015531
LGDP	-1.89702	3.04164	---	---	---	---	---	---
LINR	.052784	.053622	-.036434	.070257	---	---	---	---
LTB	---	---	.000328966	.288923	---	---	---	---
LLY	---	---	1.34064	.966779	---	---	---	---
LMY	---	---	-.772076	.673495	---	---	---	---
LSP	---	---	---	---	-.283995¤	.167515	---	---
LCPI	---	---	---	---	-2.08417	1.48667	---	---
LTR	---	---	---	---	---	---	.343624	1.23237
LTS	---	---	---	---	---	---	-.935693	.912038
LTIN	---	---	---	---	---	---	-.404106	.593044
LTTR	---	---	---	---	---	---	-.063350	.159067
LTCA	---	---	---	---	---	---	-.010221	.088214
No. Obs.	760		760		760		760	
R^2	.00358380		.011790		.010354		.0016288	
L.M	4.46847 [.035]		3.93199 [.047]		4.09445 [.024]		4.90374 [.027]	
D.W	.314503 [.000,.000]		.307556 [.000,.000]		.311392 [.000,.000]		.307626 [.000,.000]	

Note: (*), (^), (¤) represent significance levels of 1%, 5%, and 10%, respectively.

Figure (3): Derivative Contracts and Other OBS Items Held by Commercial Banks, by products

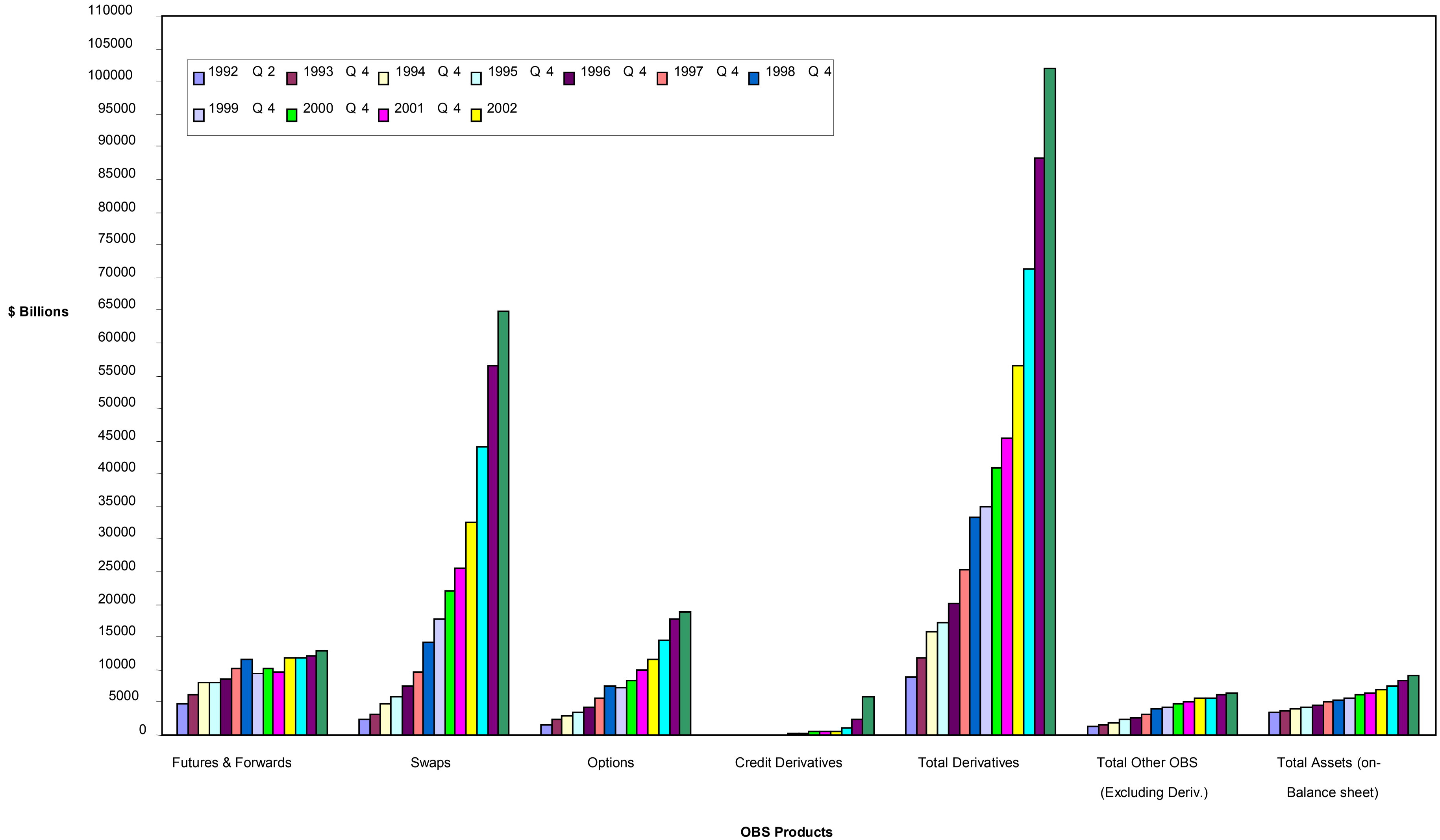

Figure (3-2) Derivative Contracts Held by Commercial Banks, by products

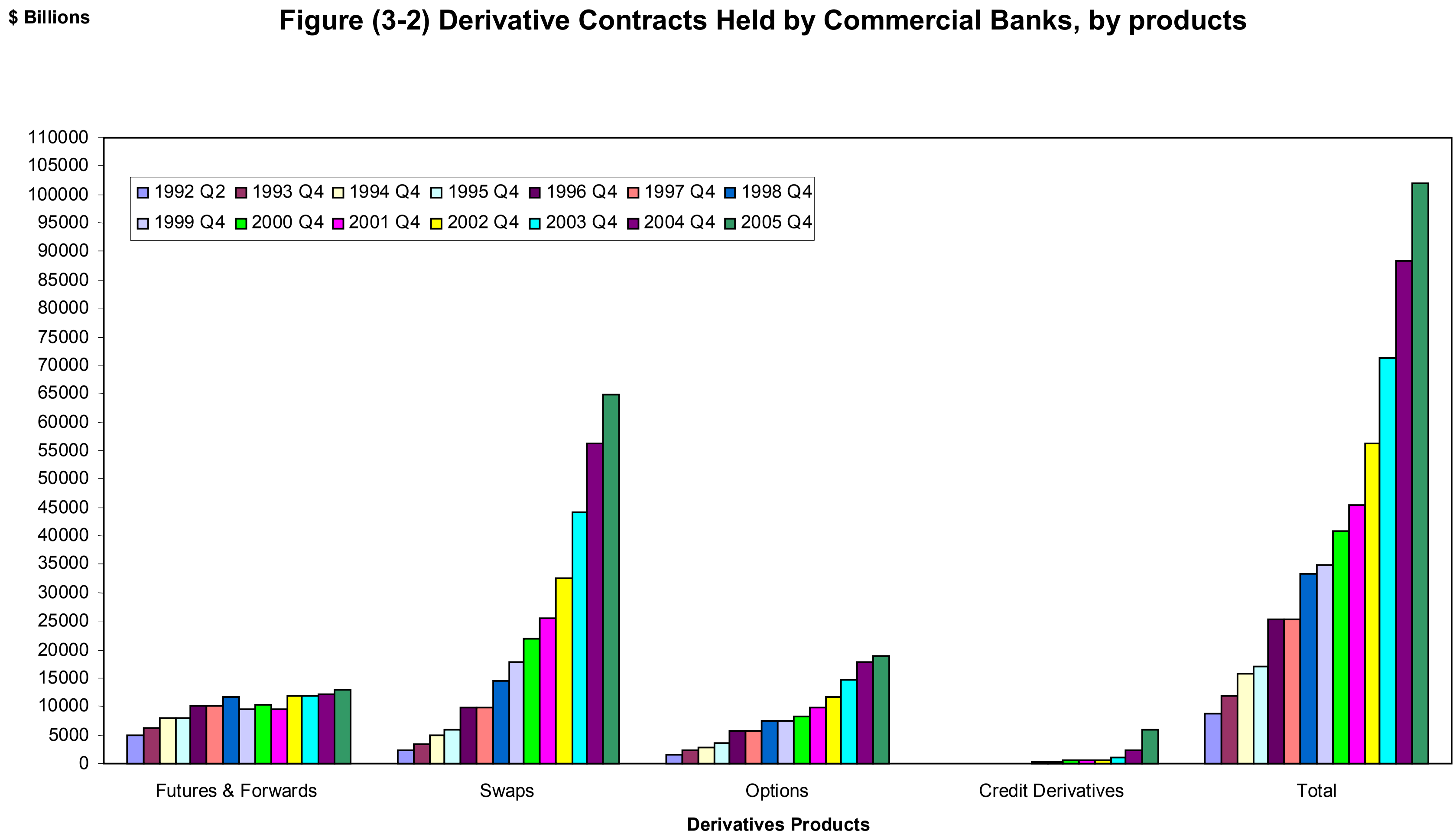

Table (3-8): OBS Items' Definitions [19]**:** This table represents OBS derivatives activities by products and brief definitions. It includes four derivatives products (Swaps, Option, Forwards, and Futures).

V. Swaps Contracts: Includes the following
1-*Interest Rate Swaps*: Is a transaction in which two parties agree to exchange payment streams based on a specified notional amount for a specified period. Forward starting swap contracts are reported as swaps. The notional amount of a swap is the underlying principal amount upon which the exchange of interest, foreign exchange or other income or expense is based. The notional amount to be reported for a swap contract with a multiplier component is the contract's effective notional amount. In those cases where the reporting entity is acting as an intermediary, both sides of the transaction are reported.
2-*Foreign Exchange Swaps*: Is a transaction in which two parties agree to exchange principal amounts of different currencies, usually at the prevailing spot rate, at the inception of an agreement which lasts for a certain number of years. At defined intervals over the life of the swap, the counter parties exchange payments in the different currencies based on specified rates of interest. When the agreement matures, the principal amount is re-exchanged at the same spot rate. The notional amount of a cross-currency interest rate swap is generally the underlying principal amount upon which the exchange is based.
3-*Equity Exchange Swaps*: Includes the notional amount of all outstanding equity or equity index swaps, whether the swap is undertaken by the reporting entity to hedge its own equity-based risk, in an intermediary capacity, or to hold in inventory.
4- *Commodity Exchange Swaps:* Includes the notional principal value of all other swap agreements that are not reportable as either interest rate or foreign exchange rate contracts.
VI. Futures Contracts: Includes the following
1- *Interest rate Futures:* Futures contracts represents agreements for delayed delivery of financial instruments or commodities in which the buyer agrees to purchase and the seller agrees to deliver, at a specified future date, a specified instrument at a specified price or yield. Futures contracts are standardized and are traded on organized exchanges that act as the counterparty to each contract.
2- *Foreign Exchange Future Contracts*: A currency futures contract is a standardized agreement for delayed delivery of a foreign currency or U.S. dollar exchange in which the buyer agrees to purchase and

[19] These definitions are taken from the FDIC.

the seller agrees to deliver, at a specified future date, a specified amount at a specified exchange rate.
3- *Equity Exchange Futures Contracts*: Includes futures contracts committing the reporting entity to purchase or sell equity securities or instruments based on equity indexes such as the Standard and Poor's 500 or the Nikkei.
4- *Commodity Exchange futures contracts:* Includes the contract amount for all futures contracts committing the reporting entity to purchase or sell commodities such as agricultural products (e.g., wheat, coffee), precious metals (e.g., gold, platinum), and non-ferrous metals (e.g., copper, zinc). Also included is any other futures contract that is not reportable as an interest rate, foreign exchange, or equity derivative contracts.
VII. Forwards: Includes the following
1- *Interest rate Forwards contracts*: represents agreements for delayed delivery of financial instruments or commodities in which the buyer agrees to purchase and the seller agrees to deliver, at a specified future date, a specified instrument or commodity at a specified price or yield. Forward contracts are not traded on organized exchanges and their contractual terms are not standardized.
2- *Foreign Exchange Forwards Contracts*: is an agreement for delayed delivery of a foreign (non-U.S.) currency or U.S. dollar exchange in which the buyer agrees to purchase and the seller agrees to deliver, at a specified future date, a specified amount at a specified exchange rate.
3- *Equity Exchange Contracts:* Includes forward contracts committing the reporting entity to purchase or sell equity instruments.
4- *Commodity Exchange Contracts:* Includes the contract amount for all forward contracts committing the reporting entity to purchase or sell commodities such as agricultural products (e.g., wheat, coffee), precious metals (e.g., gold, platinum), and non-ferrous metals (e.g., copper, zinc). Also included is any other forward contract that is not reportable as an interest rate, foreign exchange, or equity derivative contract.
VIII. Options: Includes the following
1- *Written Exchange-Traded Interest Rate Option Contracts*: Option contracts convey either the right or the obligation, depending upon whether the reporting entity is the purchaser or the writer, respectively, to buy or sell a financial instrument or commodity at a specified price by a specified future date. Some options are traded on organized exchanges. The buyer of an option contract has, for compensation (such as a fee or premium), acquired the right (or option) to sell to, or purchase from, another party some financial instrument or commodity at a stated price on a specified future date. The seller of the contract has, for such

compensation, become obligated to purchase or sell the financial instrument or commodity at the option of the buyer of the contract. A put option contract obligates the seller of the contract to purchase some financial instrument or commodity at the option of the buyer of the contract. A call option contract obligates the seller of the contract to sell some financial instrument or commodity at the option of the buyer of the contract.
2- *Written Exchange-Traded Foreign Exchange Option Contracts*: Includes the gross amount (stated in U.S. dollars) of foreign (non-U.S.) currency and U.S. dollar exchange that the reporting entity has, for compensation, obligated itself to either purchase or sell under exchange-traded option contracts whose predominant risk characteristic is foreign exchange risk. In the case of option contracts obligating the reporting entity to either purchase or sell a foreign exchange futures contract, the gross amount (stated in U.S. dollars) of the foreign (non-U.S.) currency underlying the futures contract is reported. Exchange-traded options on major currencies such as the Japanese Yen, British Pound Sterling and French Franc and options on futures contracts of major currencies are examples of such contracts.
3- *Written Exchange-Traded Equity Derivative Option Contracts:* Includes the contract amount for those exchange-traded option contracts where the reporting entity has obligated itself, for compensation, to purchase or sell an equity instrument or equity index.
4- *Written Exchange-Traded Commodity And Other Exchange-Traded Option Contracts*: Includes the contract amount for those exchange-traded option contracts where the reporting entity has obligated itself, for compensation, to purchase or sell a commodity or product. Also included is any other written, exchange-traded option that is not reportable as an interest rate, foreign exchange, or equity derivative contract.
5- *Purchased Exchange-Traded Interest Rate Option Contracts:* For exchange-traded option contracts giving the reporting entity the right to either purchase or sell an interest rate futures contract and whose predominant risk characteristic is interest rate risk, the par value of the financial instrument underlying the futures contract is reported. An example of such a contract is a Chicago Board Options Exchange option on the 13-week Treasury bill rate.
6- *Purchased Exchange-Traded Foreign Exchange Option Contracts*: Includes the gross amount (stated in U.S. dollars) of foreign (non-U.S.) currency and U.S. dollar exchange that the reporting entity has, for a fee, purchased the right to either purchase or sell under exchange-traded option contracts whose predominant risk characteristic is foreign exchange risk. In the case of option contracts giving the reporting entity the right to either purchase or sell a currency futures contract, the gross amount (stated in U.S. dollars) of the foreign (non-U.S.) currency underlying the futures contract is reported. Exchange-traded options on major currencies such as the Japanese Yen, British Pound Sterling and French Franc and options

on futures contracts of major currencies are examples of such contracts.
7- *Purchased Exchange-Traded Equity Derivative Option Contracts*: Includes the contract amount for those exchange-traded option contracts where the reporting entity has, for a fee, purchased the right to purchase or sell an equity instrument or equity index.
8- *Purchased Exchange-Traded Commodity And Other Exchange-Traded Option Contracts:* Includes the contract amount for those exchange-traded option contracts where the reporting entity has, for a fee, purchased the right to purchase or sell a commodity or product. Also included is any other purchased, exchange-traded option that is not reportable as an interest rate, foreign exchange, or equity derivative contract.
9- *Written OTC Interest Rate Option Contracts*: Option contracts conveys either the right or the obligation, depending upon whether the reporting bank is the purchaser or the writer, respectively, to buy or sell a financial instrument or commodity at a specified price by a specified future date. Options can be written to meet the specialized needs of the counterparties to the transaction. These customized option contracts are known as over-the-counter (OTC) options. Thus, over-the-counter option contracts include all option contracts not traded on an organized exchange. The buyer of an option contract has, for compensation (such as a fee or premium), acquired the right (or option) to sell to, or purchase from, another party some financial instrument or commodity at a stated price on a specified future date. The seller of the contract has, for such compensation, become obligated to purchase or sell the financial instrument or commodity at the option of the buyer of the contract. A put option contract obligates the seller of the contract to purchase some financial instrument or commodity at the option of the buyer of the contract. A call option contract obligates the seller of the contract to sell some financial instrument or commodity at the option of the buyer of the contract.
10- *Written OTC Foreign Exchange Option Contracts:* A written currency option contract conveys the obligation to exchange two different currencies at a specified exchange rate. Includes the gross amount (stated in U.S. dollars) of foreign (non-U.S.) currency and U.S. dollar exchange that the reporting entity has, for compensation, obligated itself to either purchase or sell under OTC option contracts whose predominant risk characteristic is foreign exchange risk.
11- *Written OTC Equity Derivative Option Contracts*: Includes the contract amount for those OTC option contracts where the reporting entity has obligated itself, for compensation, to purchase or sell an equity instrument or equity index.
12- *Written OTC Commodity And Other OTC Option Contracts*: Includes the contract amount for those

OTC option contracts where the reporting entity has obligated itself, for compensation, to purchase or sell a commodity or product. Included are any other written OTC option that is not reportable as an interest rate, foreign exchange, or equity derivative contract.
13- *Purchased OTC Interest Rate Option Contracts*: Interest rate options includes options to purchase and sell interest-bearing financial instruments and whose predominant risk characteristic is interest rate risk as well as contracts known as caps, floors, collars, corridors, and swaptions. Included is the notional principal amount for interest rate caps and floors that the reporting entity purchases.
14- *Purchased OTC Foreign Exchange Option Contracts:* Includes the gross amount (stated in U.S. dollars) of foreign (non-U.S.) currency and U.S. dollar exchange that the reporting entity has, for a fee, purchased the right to either purchase or sell under OTC option contracts whose predominant risk characteristic is foreign exchange risk.
15- *Purchased OTC Equity Derivative Option Contracts*: Includes the contract amount of those OTC option contracts where the reporting entity has, for a fee, purchased the right to purchase or sell an equity instrument or equity index.
16- *Purchased OTC Commodity And Other OTC Option Contracts*: Includes the contract amount for those OTC option contracts where the reporting entity has, for a fee, purchased the right to purchase or sell a commodity or product. Included are any other purchased OTC option that is not reportable as an interest rate, foreign exchange, or equity derivative contract.

Chapter Four

The Determinants of World Commercial Banks' Off-Balance Sheet Activities: World Regions Comparison

Abstract

This study tries to fill the gap in the literature by examining the determinants of OBS activities in major world regions. Based on a logistic diffusion model we have formed two models; one includes only quantitative variables (QVM) and the other one (QLVM) includes qualitative variables in addition to the quantitative ones. The model considers OBS activities as a financial innovation following a time diffusion curve. The results suggest that OBS activities are no longer a financial innovation in the developed regions; however, they are in less developed regions. Second, bank non-regulatory variables are major factors in determining the usage of OBS activities in almost all regions. Bank size, bank loans, and non-performing loans are significant in six regions and insignificant in three regions. OBS activities are not profit driven hence the profitability factor was insignificant for six regions. The macroeconomic variable is at work with other variables in determining OBS existence in the banking systems' activities. Consistent with recent research, our results reject the regulatory tax hypothesis except for Africa, the Far East and Central Asia. More interestingly, Financial Systems, Economy Endowments and Political Environments are all factors to explain the extensive usage of OBS activities in the world and should not be neglected.

The Determinants of Commercial Banks' Off-Balance Sheet Activities: World Regions Comparison

4.1. Introduction:

Financial systems around the globe always try to move in the same trend, especially when we consider the revolution of globalization. As an important part of globalization, financial systems for each party must, directly or indirectly, follow the innovative trend in the system, otherwise they will not be able to get at least the minimum globalization benefits. One of these innovations that we have seen in the last two decades is off-balance sheet (OBS) activities which have been adopted by almost all financial systems in the world. Financial institutions around the world have made extensive use of OBS activities, though below the level of those in the U.S. The reasons that foreign banks are engaging in OBS activities are the same as those for U.S. commercial banks. Banks engage in OBS activities hoping to earn additional fee income to compensate for declining margins or spreads on their traditional lending business or/and to avoid regulatory costs or taxes since reserve requirements and deposit insurance premiums are not levied on OBS activities.

Given the fact that OBS activities are being used extensively in almost all banking systems in the world, and given that each region in the world has its own political, technological, economic characteristics, we believe that the determinants of a bank's OBS activities will be different from one region to another based on the distinguishing characteristics for each region. For example, we should not expect that the

banking system in Africa is designed in the same way as the banking system in Europe and that the same factors will affect the decisions of OBS bank's activities in both regions.

Table (2) shows some statistical evidence about OBS usage in the banking systems of different regions. The ratio of the aggregated OBS activities to aggregated total assets for each region is significantly different. For example, the aggregated amount of OBS activities in Eastern Europe, South and Central America, Africa and The Far East and Central Asia equals 15%, 12%, 18%, 12% of the total assets in 2005, respectively, compared to 60%, 63%, 41% for North America, NAFTA, and G7 countries, respectively. Also, the low OBS/Total Assets ratio is associated with a relatively higher total assets value when compared to the regions with higher OBS/Total Assets ratio. That indicates that low OBS/Total Assets ratio regions prefer to rely on traditional banking activities instead of OBS activities and this difference might be a result of a region's specific characteristics.

Figure (1) reports OBS/TA ratios. As seen in the diagram there is wide variation in the ratio from one region to another. More specifically, the OBS/TA ratio is higher for those regions that include developed countries than those with less developed countries. The highest OBS/TA ratio exists in the G7 region with an average of 121.2% during the period between 1992 and 2005; the G7 region also exhibits extremely high year-to-year variation in this ratio. For example, in 1992 the ratio was 267%, it then dropped to 87% in 1995, jumping up a little higher at 92% in 1998. It increased to 119% in 2001 followed by a period of decline to 41% in 2005. The European Union has a relatively moderate ratio level; however, the year 2001 has an extreme high ratio of

around 350% while the average during the period of consideration was around 27% (excluding 2001). The ratio for North America and NAFTA was stable over this time period and was around an average of 59%, which is the second highest ratio. The OBS/TA ratio is relatively small and relatively stable for the remaining regions: Eastern Europe, South and Central America, Africa, The Far East and Central Asia, and The Middle East. The average ratio for these regions was moving in the range of 6.8% - 44.4% in the time period under study. The lowest ratio is seen in The Far East and Central Asia and interestingly, the highest ratio among these regions was The Middle East. This is probably caused by the oil exports agreements in these countries. Also it is worth mentioning that this ratio varies widely from year to year which can possibly be due to oil supply and demand shocks.

Our research will try to determine the motivation behind the usage of OBS activities in banking system in different regions of the world. To our knowledge no one has attempted to study this wide range of investigation. There will be two levels to this study, first we check the determinants of OBS activities in each region, and second we examine the impact of other qualitative variables such as political environments and technological endowments for each region in deciding to use OBS banking activities. The research is designed as follows. In the next section, we present our empirical model and the following section will discuss our empirical results. The last section will be the conclusion.

4.2. The Logistic Diffusion Model:

Mansfield (1961) introduced a deterministic model to answer two questions: Why firms were so slow to install some innovations and so quick to install others? What factors seem to govern the rate of imitation? His model assumes that the number of firms adopting an innovation between time t and time t+1 depends on several factors. First, the number of firms that have previously adopted the innovation. The increases in the proportion of firms already using an innovation would increase $\lambda_{ij}(t)$. As more information and experience accumulate, it becomes less risky to begin using it. Moreover, competitive pressures mount and "bandwagon" effects occur. Second, the profitability of installing the innovation would also be expected to have an important influence on $\lambda_{ij}(t)$. the more profitable this investment is relative to others that are available, the greater is the chance that a firm's estimate of the profitability will be high enough to compensate for whatever risks are involved and that it will seem worthwhile to install the new technique rather than to wait. Third, for equally profitable innovations, $\lambda_{ij}(t)$ should tend to be smaller for those requiring relatively large investments. One would expect this on the grounds that firms tend to be more cautious before committing themselves to such projects and that they often have more difficulty in financing them. Finally, for equally profitable innovations requiring the same investment, $\lambda_{ij}(t)$ is likely to vary among industries (depending on the risk aversion attitude in each industry). Below is the formal derivation of Mansfield (1961) model.

Let n_{ij} be the total number of firms which adopted the j^{th} innovation in the i^{th} industry, $m_{ij}(t)$ be the number of these firms having introduced the innovation at time t, π_{ij} be the profitability of installing this innovation relative to that of alternative investments,

and S_{ij} be the investment required to install this innovation as a per cent of the average total assets of these firms. $\lambda_{ij}(t)$ is the proportion of "hold-outs" (firms not using this innovation) at time t that introduced it by time t+1, i.e.,

$$\lambda_{ij}(t) = \frac{m_{ij}(t+1) - m_{ij}(t)}{n_{ij}(t) - m_{ij}(t)} \text{..................................(1)} \quad \text{and,}$$

$$\lambda_{ij}(t) = f(\frac{m_{ij}(t)}{n_{ij}}, \pi_{ij}, S_{ij}, ...) \text{.............................(2)}$$ From the discussion above.

Assume that the number of firms having introduced an innovation can vary continuously rather than only one integer value, and assume that $\lambda_{ij}(t)$ can be approximated adequately within the relevant range by Taylor's expansion that drops third and higher order terms. Assuming that the coefficient of $(\frac{m_{ij}(t)}{n_{ij}})$ in this expansion is zero, we have

$$\lambda_{ij}(t) = a_{i1} + a_{i2}\frac{m_{ij}(t)}{n_{ij}} + a_{i3}\pi_{ij} + a_{i4}S_{ij} + a_{i5}\pi_{ij}\frac{m_{ij}(t)}{n_{ij}} + a_{i6}S_{ij}\frac{m_{ij}(t)}{n_{ij}}$$
$$+ a_{i7}\pi_{ij}S_{ij} + a_{i8}\pi_{ij}^2 + a_{i9}S_{ij}^2 + \ldots\ldots\ldots, \quad \text{...............(3)}$$

Thus,

$$m_{ij}(t+1) - m_{ij}(t) = \left(n_{ij} - m_{ij}(t)\right)\left(a_{i1} + a_{i2}\frac{m_{ij}(t)}{n_{ij}} + \cdots + a_{i9}S_{ij}^2 + \ldots\right) \text{.........(4)}$$

Assuming that time is measured in fairly small units, we can use as an approximation the corresponding differential equation

$$\frac{dm_{ij}(t)}{dt} = \left(n_{ij} - m_{ij}(t)\right)\left(\theta_{ij} + \beta_{ij}\frac{m_{ij}(t)}{n_{ij}}\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

The solution of which,

$$m_{ij}(t) = \frac{n_{ij}\left[e^{\alpha_{ij}+(\theta_{ij}+\beta_{ij})t} - \left(\theta_{ij}/\beta_{ij}\right)\right]}{1+e^{\alpha_{ij}+(\theta_{ij}+\beta_{ij})t}} \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Where α_{ij} is a constant of integration, θ_{ij} is the sum of all terms in (3) not containing $\frac{m_{ij}(t)}{n_{ij}}$, and β_{ij} is the coefficient of $\frac{m_{ij}(t)}{n_{ij}}$

$$\beta_{ij} = a_{i2} + a_{i5}\pi_{ij} + a_{i6}S_{ij} + \cdots \text{ , } \ldots\ldots\ldots\ldots\ldots\ldots\ldots (7)$$

Add another assumption, as we go backward in time, the number of firms having introduced the innovation must tend to zero, i.e.,

$$\lim_{t\to-\infty} m_{ij}(t) = 0 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (8)$$

It follows, $P_t = m_{ij}(t)/n_{ij} = \left[1+e^{(-\alpha_{ij}-\beta_{ij}t)}\right]^{-1} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9)$

Thus, the growth over time in the number of firms having introduced an innovation should conform to a logistic function. The logistic time curve, equation (9), predicts that the proportion of the population which has already adopted the innovation will increase at an accelerating rate until 50 percent adoption achieved, this is attained at t

= -(α/β). Thereafter, the adoption will increase at a decelerating rate and 100 percent adoption is approached asymptotically.

If equation 9 is correct, it can be shown that the rate of imitation is governed by only one parameter β_{ij}. Assuming that the unspecified terms in (7) is uncorrelated with π_{ij} and S_{ij} and that it can be treated as a random error term, then it follows from 9

$$\ln\left[P_{it} / (1 - P_{it}) \right] = \alpha + \beta t \text{.......... ....}(10)$$

where P_{it} is the ratio of OBS items (in nominal terms) to the nominal value of total assets (defined as on-balance sheet assets + OBS items) of bank i at time t. this definition follows Jagtiani et al. (1995) which enables us to counter for the scale on which bank introduce OBS items.

4.3. The Empirical Models:

Equation (10) is modified in two fashions; the first includes a set of quantitative variables in both the bank specific characteristics and macroeconomic variables. Let us call this model the quantitative variables model (QVM). The second includes qualitative variables in addition to the same quantitative variables. Let us call this model the qualitative variables model (QLVM). The first model will be applied to nine separate world regions, while the second model will be applied on a world wide data set.

4.3.1. The Quantitative Variables Model (QVM) [World Regions Analysis]:

4.3.1.1. The Model:

The choice of the included explanatory factors is based on both theoretical literature and on policy discussions. A bank-specific characteristics vector will include both regulatory and non-regulatory variables. Accordingly, equation (11) represents banks' OBS activities diffusion model for each region.

$$LGTOBS_{it} = \ln\left[P_{it} \big/ (1 - P_{it}) \right] = \alpha_i + \beta t + \gamma X_{it} + \delta Y_t + \varepsilon_{it} \text{.......... ....}(11)$$

where i = 1,2,3,….,n denotes the number of banks and t = 1,2,3,…T denotes the number of time periods. The dependent variable, $LGTOBS_{it}$ is the logistic transformation of P_{it}, where P_{it} is the ratio of OBS items (in nominal terms) to the nominal value of total assets (defined as on-balance sheet assets + OBS items) of bank i at time t. This definition follows Jagtiani et al (1995) which enables us to control for the scale on which banks introduce OBS items. The explanatory variables are as follows:

v-The time trend (t) accounts for the autonomous diffusion.

vi-X_{it} is a vector of bank-specific characteristics.

vii-Y_{it} is a vector of general macroeconomic conditions.

viii-The intercept α is a bank-specific constant.

The bank-specific characteristics are classified into regulatory and non-regulatory variables. The non-regulatory factors are bank size, loan ratio, profitability, and net charge-off. The anticipated effect of bank size has a two-sided effect and the net effect of these two determines the net impact of firm size on OBS derivatives activities. On the one hand, a bank has to be of a certain size in order to get involved in OBS

derivatives activities and get the benefit of the economies of scale. Moreover, large banks may be the only banks that have the high qualified risk management and specialized staff. Also, sophisticated clients who are more likely to engage in OBS derivatives activities may not consider the small-sized banks as an option as they believe that large banks are too big to fail. On the other hand, as bank size gets bigger the bank is likely more risk-diversified and there will be fewer incentives to engage in OBS derivatives activities.

The impact of the loan ratio (the ratio of loans to total assets) on the usage of OBS activities is expected to be positive. Angbazo (1997) shows that a higher loan ratio will increase the interest rate risk, which will create an incentive for banks to hedge using OBS activities. Another reason for this positive relation lies in the process of approving loans; banks get access to their customers' investment information which will facilitate the offer of relevant OBS risk management tools.

A positive relation is expected between profitability and OBS activities. Profitability is considered a measure of the creditworthiness viewed by customers. Profitability will increase the customer valuation for a bank, which in turn will give more incentives to work with profitable banks rather than non-profitable (less-profitable) ones.

The net charge-off is a proxy for the non-performing loans that banks assign for the bad debt loans. The predicted impact of the non-performing loans is negative, so as the amount of the non-performing loans increase the bank's creditworthiness decreases and that will decrease the amount of OBS activities. One may argue that as the charge-off amount increases that means the default risk for that bank is high and then a risk management instrument might be needed to hedge against this risk and generate another

income source to compensate for the bad loans loss. Therefore an increase in the charge off amount might have a positive impact on OBS activities.

With respect to regulatory factors, following Jacques and Nigro (1997), I consider the capital adequacy ratio (CAR) as a proxy for capital requirements regulations. CAR is a measure of a bank's capital, used to protect depositors and promote the stability and efficiency of financial systems around the world[20]. There are two possible effects of the CAR on the diffusion pattern of OBS derivatives items. On the one hand, a higher CAR increases a bank's creditworthiness, which in turn will increase the incentives of bank's customers to work with this bank's OBS derivatives risk managements items. On the other hand, a higher CAR reduces a bank's marginal gain from increasing the risk in the asset portfolio (Furlong and Keeley, 1989). As bank capital increases, the ability to assume risks increases, but the need for OBS derivatives products to hedge risk exposure may decrease. I also examine the response of banks to the 8% well capitalized total risk-based capital (RBC) standards on the capital ratio. I classify the banks into two groups CARL, CARH as a signal to the degree of regulatory pressure brought about by the risk-based capital standards on capital ratio, because banks with total CAR above and below the 8 percent regulatory minimum may react differently. Specifically, the low regulatory pressure variable (CARL) equals the difference between the inverse of the bank's actual CAR and the inverse of the regulatory stipulated CAR of 8 percent, i.e., CARL equals (1/CAR-1/8) for all banks with a total risk-based capital ratio less than 8 per cent, and

[20] CAR can be expressed as $CAR = \frac{TierICapital + TierIICapital}{RiskWeightedAssets}$. It is also called the capital to risk weighted assets ratio (CRAR).

zero otherwise[21]. The high regulatory pressure variable (CARH) equals the difference between the inverse of the regulatory stipulated CAR of 8 percent and bank's actual CAR, i.e., CARH equals (1/8-1/CAR) for all banks with a total risk-based capital ratio greater than 8 per cent, and zero otherwise. High regulatory pressure with respect to capital implies low creditworthiness and can be expected to translate into lower OBS activity. On the other hand, low regulatory pressure, as implied by CRAL, signifies a comfortable capital position and (accompanied with a high credit rating) makes a bank an active supplier of OBS products (Koppenhaver and Stover, 1991). Alternatively, low regulatory pressure reduces the marginal propensity of a bank to increase the risk in its asset portfolio (Furlong and Keeley, 1989). Therefore, banks with high capital ratios (implying low regulatory pressure) can be expected to take less OBS risk and hence, supply a smaller volume of OBS items.

We include the interest rate spread as a proxy for macroeconomic conditions. The interest rate spread seems to be the most important macroeconomic factor for OBS activities, since it will reflect directly on the status of monetary policy and indirectly the status of the fiscal policy. Following prior research, we use the net interest margin (NIMR) on a bank level basis to proxy for the interest rate spread. The interest rate spread also encounters two arguments. First, a high and positive interest rate spread signals a high degree of uncertainty about future interest rates and that short-term interest

---

[21] Risk – Based Assessment System, Federal Deposit Insurance Corporation, FDIC. They specified three groups in terms of RBC standards, Group 1 - "Well Capitalized." Total Risk-Based Capital Ratio equal to or greater than 10 percent. Group 2 - "Adequately Capitalized." Not Well Capitalized and Total Risk-Based Capital Ratio equal to or greater than 8 percent. Group 3 - "Undercapitalized" Neither Well Capitalized nor Adequately Capitalized.

rates are expected to rise in the future. High interest rate risk and future interest rate increases imply a relatively high demand for OBS products. Second, when the spread between short-term and long-term rates is high and positive, then bank managers have an incentive to engage in traditional on-balance sheet activities and take advantage of low short-term interest rate funding and high long-term interest rate lending. As a result a bank's manager will be less inclined to engage in OBS activities.

4.3.1.2. Data Source and Analysis:

The data used in this study is bank-level data for world-wide commercial banks. The countries included in this study are classified into nine regions, namely, North America, The European Union, Europe excluding Eastern Europe, Eastern Europe, The Middle East, Africa, The Far East and Central Asia, NAFTA, and G7 countries[22]. The data were collected from the Bank Scope database during the period of 1995 - 2005. The datasets include all commercial banks that engaged in OBS activities during the period studied, i.e., commercial banks with zero OBS activities were omitted from the sample. As a result of this process the resulting number of banks in each set is as follows, North America: 391 banks, The European Union: 200 banks, Europe excluding Eastern Europe: 216 banks, Eastern Europe: 100 banks, The Middle East: 54 banks, Africa: 38 banks, The Far East and Central Asia: 223 banks, NAFTA: 539 banks, and G7: 665 banks. Tables (3.a, 3.b, 3.c, 3.d, and 3.e) represent descriptive statistics for each data set. The highest OBS activities appear in the European countries with average OBS activities of \$18,310,795 thousand, followed by Europe excluding Eastern Europe at \$16,426,951 thousand. The second group ranked according to OBS activities includes North America,

[22]Please refer to table one for the countries included in each region.

NAFTA, and G7 where OBS activities ranged between $12,121,100 thousand and $9,272,137 thousand. The third group with the lowest OBS activities formed out of four world regions, the Middle East, Africa, Eastern Europe, and the Far East and Central Asia, where OBS activities ranged between $3,056,339 thousand and $195,181 thousand. World regions can also be classified according to banks' total assets into the same three groups. As classified, the regions are in almost the same groups with the exception of the Far East and Central Asia region which is a member of lowest OBS group but a member of the highest total assets group. Banks form the same three groups according to loans average.

It is interesting that the group of seven (G7) has the highest average capital and highest average charge-off between all other regions and the lowest average risk-weighted assets between the groups. The other groups can be classified according to the risk-weighted assets into a high average group, including The Far East and Central Asia and Europe excluding Eastern Europe, a middle average group, including North America and NAFTA, and a low average group including Africa, the Middle East, The European Union, and Eastern Europe. According to the average net income, all groups follow OBS grouping except for the Far East and Central Asia.

4.3.1.3. Empirical Results for QVM model:

This section presents the empirical results of the regression model. We apply the OBS determinants model, equation (11), to the nine selected regions separately to determine what factors are relevant to decisions regarding OBS activities usage. Tables 4-A, 4-B and 4-C report the estimate for each region separately. The time diffusion speed

is statistically significant for North America, Africa, the Middle East, as well as the Far East and Central Asia. The positive sign for North America and Africa suggests that OBS activities represent a financial innovation in the banking system for these two regions, while the negative sign for the Middle East and the Far East and Central Asia suggests that OBS activities are not a financial innovation and the traditional banking activities represents the major activities for these regions. However, the group of seven (G7), NAFTA, The European Union, Western Europe and Eastern Europe all have an insignificant relation between the time diffusion speed and OBS activities suggesting that OBS usage in the most developed regions are determined by some other factors other than the time diffusion and OBS is no longer a financial innovation.

The impact of bank non-regulatory factors is different from one region to another. Generally speaking these factors seem to be the major factors that influence OBS activities in most of the regions. Bank size is statistically significant for six regions (Africa, the Middle East, NAFTA, the Far East and Central Asia, North America, and The European Union) and statistically insignificant for three regions (G7, Western Europe, and Eastern Europe). The negative sign for bank size suggests that as bank size increases then the total bank's risk will decrease, which implies that the need for OBS instruments will decrease.

Loan ratio has a significant effect on OBS activities usage for the same six regions as bank size and is insignificant for the same three regions. While the negative sign holds for the case of Africa there is a positive impact of loan ratio for the other five regions. The negative sign of the African bank loans indicates that banks do not take advantage of the economies of scope since African banks are relatively small. On the

other hand, the positive impact of loans on the usage of OBS activities in other regions indicates that these regions take advantage of economies of scope, and higher levels of loans will increase their ability to handle these relatively complicated activities. Also with a higher level of loans, banks will face a higher level of risk and then OBS activities will be used as a risk management instrument. However, loan ratios do not play a role in OBS activities decision-making for the European regions (East and West) and the group of seven (G7).

OBS activities do not seem to derive from profitability consideration in six regions (Africa, NAFTA, the Far East and Central Asia, North America, The European Union, and Western Europe) since we find the net income variable to be statistically insignificant. On the other hand, the Middle East, the Eastern Europe, and G7 have a positive and significant impact on OBS activities. The positive relation implies that as banks' profits increase, the creditworthiness of the banks, from the investors' point of view, will increase and the demand for OBS activities will increase in creditworthy banks.

Charge-offs have an insignificant impact on OBS bank's activities in four regions (Africa, The Middle East, North America, and The European Union) which imply that bank's charge-offs play no role in decisions regarding OBS activities. In the other five regions there is a significantly positive relation between charge-offs and bank's OBS activities. The positive impact can be interpreted as being due to the higher credibility in the view of investors and thus banks are less risky by taking account unpredictable non-performing loans.

On the macroeconomic side we include the net interest margin as a proxy for the net interest rate spread. Empirical results suggest that macroeconomic factors are at work in determining a bank's OBS activities. Net interest margin is statistically significant in six regions (Africa, G7, NAFTA, North America, The European Union, and Eastern Europe) and statistically insignificant in The Middle East, The Far East and Central Asia, and Western Europe. There is a negative impact of net interest margin on banks' OBS activities in both The European Union, and Eastern Europe, suggesting that banks engage in more traditional banking activities instead of OBS activities when margins are high, i.e., they will benefit from lending at the high long-term interest rates and borrowing at the low short-term rates. On the other hand, in the other four significant regions net interest margin is positive, which suggests that as the uncertainty about future interest rates increases, the future interest rate risk will increase, pushing these banks to engage in more OBS activities as risk management instruments.

In order to control for bank regulation, we include three variables: the capital adequacy ratio (CAR), low regulatory pressure ratio (CARL), and high regulatory pressure ratio (CARH). Interestingly, bank regulations have no effect on OBS activities in all of the major regions (Europe's three regions, North America, NAFA, G7, and The Middle East) which is consistent with recent literature regarding U.S. commercial banks[23]. Regulatory factors have a statistically significant effect on African banks' OBS activities; positive for low regulatory pressure banks and negative for the high regulatory pressure banks. The positive sign can be explained that the bank's capital position is more comfortable; it then has a high credit rating, implying that banks will increase their

[23] Jagtinai,J., A.Saunders And G.Udell, "The Effect of Bank Capital Requirements on Bank Off-Balance Sheet Financial Innovations", *Journal Of Banking And Finance*, 1995, 19, 647-658.

issuance of OBS instruments. On the other hand, the negative sign can be explained that as high regulatory pressure with respect to capital implies low creditworthiness, this can be expected to translate into lower levels of OBS activities. In other words, as banks are capital constrained and have higher regulatory pressure, then they are required to either increase their risk-weighted capital or decrease their capital, and OBS activities seem be used to achieve this purpose.

4.3.2. The Qualitative Variables Model (QLVM) [World Wide Analysis]:

4.3.2.1. The Model:

The previous analysis has given us the determinants of OBS activities in the world banking system divided into nine regions. In this section we try to analyze OBS phenomenon in the world as one banking system. Moreover, we want to shed light on the qualitative factors that are not included in our original model. As reported in figure (1), the volume of OBS usage varies significantly from one region to another. We have answered part of the question as to why this would occur in the previous section by analyzing the quantitative variables that may affect this phenomenon. We conclude that the differences in bank level regulatory and non-regulatory factors and macroeconomic conditions from region to region justify this variation in OBS usage. However, we still believe that there are other qualitative variables, which are not included in our previous model like political environment, technological endowments and freedom of the financial system, which cause this variation from region to region.

In order to account for these non-quantitative variables, we need to modify our model by including a third vector of dummy variables. The dummy variables vector

represents the regional location of each bank included in the data set; therefore, we include ten indicator variables: the USA, NAFTA, the Middle East, Africa, The Far East and Central Asia, G7, The European Union, Eastern Europe, Europe excluding Eastern Europe and South and Central America. These variables are used to estimate the impact of the political environment, technological endowments and freedom of the financial system. We expect that highly developed financial and technological systems should have a different level of OBS activities than poor financial and technological systems; also, political stability should have some influence on variation in OBS usage. Accordingly, our model is modified into equation (12):

$$LGTOBS_{ijt} = \ln\left[P_{ijt} \big/ (1 - P_{ijt}) \right] = \alpha_i + \beta t + \gamma X_{ijt} + \delta Y_{jt} + \theta DUM_j + \varepsilon_{ijt} \quad \text{.......... ....}(12)$$

where j (j=1,2,…..10) stands for the world specific regions, and i (i = 1,2,3,……,N) is the number of banks in each specific region, and t (t = 1,2,3,….,T) is the number of time periods. The dependent variable, $LGTOBS_{ijt}$ is the logistic transformation of OBS activities for bank i located in region j. P_{ijt} is the ratio of OBS items (in nominal terms) to the nominal value of total assets (defined as on-balance sheet assets + OBS items) of bank i in region j at time t. The explanatory variables vectors include the autonomous diffusion (t), where β is the speed of adoption and depends on the characteristics of the innovation and firms in the industry. The second explanatory vector X_{ijt} controls for bank-specific characteristics and it will also include the same regulatory and non-regulatory variables. The expected sign for each variable will hold the same as discussed in the previous section. As an attempt to control for macroeconomic conditions,

we use the net interest margin to proxy for the interest rate spread in the economy, and the same theoretical arguments can be made about the expected impact of this variable on OBS banking activities. The intercept α_j is a bank specific constant of integration for region j.

The third vector included in this model are the dummy variables (DUMj), including ten dummies for each selected region. These important differences between regions should impact the banking systems of these regions and thus will have a role in determining the diffusion model of any innovation in the financial system. For example, we don't expect Africa's banking system to have the same diffusion model as Europe's banking system because of differences in political environment and technological endowments, which will directly affect customer motivation and bank productivity. In summary, in this section we intend to test a new hypothesis which is the political, technological, social, and freedom hypothesis.

4.3.2.2. Data Source:

We formed an unbalanced, bank-level dataset from the Bank Scope database during the period 1995 - 2005. The dataset includes 1,080 world-wide commercial banks from all regions. We include banks in the top size quartile and OBS issuers. Because of bank inconsistency from region to region in terms of total assets and OBS values we normalized the data variables by dividing each variable data by total assets in each bank.

4.3.2.3. Empirical Results for the (QLVM) model:

In this part of our empirical work, we form a set of 1080 commercial banks that operate in different regions of the world. Having established the determinants of OBS activities in each region of the world in the previous part, our concern here is to check the effects of other qualitative variables that are not included in our prior model, such as the level of technology, political environment, and level of economic development. We proxy for these factors by adding twelve dummy variables representing each of the twelve regions where the banks are located.

Tables 5-A, 5-B and 5-C report the results as follows. The time diffusion speed has no significant impact on OBS activities in the world's commercial banks. Bank size has a weak negative impact on OBS activities, while loan ratios and charge-offs have a positive effect on commercial bank OBS activities. Net income has an insignificant relationship with OBS. Net interest margin has a positive effect on OBS activities, so as the interest rate spread grows higher banks will engage in more OBS activities. Regulatory factors have a significant role in determining OBS activities in high regulatory pressure commercial banks and no impact on the low regulatory pressure commercial banks.

Level of technology, political environment, and level of economic development are positive factors in determining OBS usage in six regions, U.S.A., NAFTA, G7, the European Union, Western Europe, and Eastern Europe. These regions are the most economically and technologically developed countries. The financial system in these regions is an open system and more globalized than any other region in the

world. These regions also have a stable political environment which provides an opportunity to improve the financial system and foster financial innovation such as OBS activities. Technological and political environments have affected OBS activities negatively in The Far East and Central Asia and South and Central America. These two regions are generally less developed than the first set of regions and the financial system does not encourage OBS activities as a financial innovation. The Middle East and Africa are the regions with ongoing political problems, particularly The Middle East. They also are less developed countries, and their financial systems do not support new financial innovations. In other words, being a Middle Eastern or African bank does not affect a bank's OBS usage.

4.4. Conclusions:

Our results suggest the OBS activities are no longer considered a financial innovation in the majority of the developed regions of the world. However, OBS activities are financial innovations in less developed regions. Second, bank non-regulatory variables are the main factors in determining the usage of OBS activities in almost all regions. Bank size and bank loans are significant in six regions and insignificant in the remaining three. OBS activities are not profit driven. Increased bank profits do not affect the decisions regarding OBS usage. Non-performing loans is a major factor in OBS decision-making for most of the regions in our study. Third, the macroeconomic variables are at work with other variables in determining OBS existence in the banking systems' activities.

Fourth, consistent with recent research, our results reject the regulatory tax hypothesis and suggest that bank regulations have no major role in OBS activities in the banking system for all the regions except for Africa and The Far East and Central Asia. This suggests that alternate hypotheses may better explain the OBS phenomenon, such as the technology hypothesis or market discipline hypothesis. Finally, financial system development, economic size, economic openness, and political environment are all factors explaining extensive usage of OBS activities in the world.

References:

[1] Angbazo, L., "Commercial Bank Net Interest Margins, Default Risk, Interest Rate Risk and Off-Balance Sheet Banking", *Journal of Banking and Finance*, 1997, 21, 55-87.

[2] Angelidis, D., and Lyroudi, K., "The Magnitude of Off Balance Sheet Activities for The Evaluation Of Banking Productivity", working paper, *International Conference on Finance*, Copenhagen-Denmark, September 2-4, 2005.

[3] Avery, Robert, and Elijah Brewer, "Risk-Based Capital and Off-Balance Sheet Activities" Proceeding of a Conference on Bank Structure and Competition, *Federal Reserve Bank of Chicago*, 1988, 261-287.

[4] Avery, R. B. and A. N. Berger. "Loan Commitments and Bank Risk Exposure", *Journal of Banking and Finance*, February 1991, 15, 173-92.

[5] Benveniste, L. M. and A. N. Berger. "An Empirical Analysis of Standby Letters of Credit," Proceedings of the Conference on Bank Structure and Competition. *Chicago: Federal Reserve Bank of Chicago,* 1986, 387-412.

[6] Benveniste, L. M. and A. N. Berger. "Securitization with Recourse: An Instrument that offers Uninsured Bank Depositors Sequential Claims", *Journal of Banking and Finance*, 11, September 1987, 403-424.

[7] Berger, A. N. and G. F. Udell. "Collateral, Loan Quality, and Bank Risk", *Journal of Monetary Economic*, 25, January 1990, 21-42.

[8] Berger, A. N. "Market Discipline in Banking", Proceedings of the Conference on Bank Structure and Competition, *Chicago: Federal Reserve Bank of Chicago*, 1991, 419-427.

[9] Berger, A.N. and G.F.Udell, "Relationship Lending and Lines of Credit in Small Firm Finance" *Journal of Business*, 1995, 68, 351-382

[10] Carter D., Simpson W., and Tandon A., "Managerial ownership and compensation and the use of interest-rate derivatives by U.S. Banks", Working paper, *FMA conference 2006*, Slat Lake City.

[11] Davis, S., "*The Diffusion of Financial Innovations"*, *Cambridge: Cambridge University Press*, 1979.

[12] Furlong, F.T., and M.C.Keeley, "Capital Regulation and Bank Risk-Taking", *Journal of Banking and Finance*, 1989, 35, 883-891.

[13] Gorton, Gary, and Anthony M. Santomero, "Market Discipline and the Valuation of Bank Subordinated Debt", *Journal of money, credit and Banking*, February 1990, 22, 118-128.

[14] Hassan, M. K. "The Market Perception of the Riskiness of Large U.S. Bank Commercial Letters Of Credit", *Journal of Financial Services Research*, 6, September 1992, 207-221.

[15] Hassan, Gordon, and Peterson, "Off-Balance Sheet Activities and Bank Default-Risk Premia: A Comparison of Risk Management", *Journal of Economic and Finance*, 1993, Vol 17, No. 3, 69-83.

[16] Hassan, M. K., G. V. Karels and M. O. Peterson, "Deposit Insurance, Market Discipline and Off- Balance Sheet Banking Risk of Large U.S. Commercial Banks", *Journal Of Banking And Finance*, May 1994, Vol.18, No.3, 575-594.

[17] Hassan, M. K., Lai, V. S., and Yu, M. T., "Market Discipline of the Canadian Bank's Letters of Credit Activities: An Empirical Examination", *The Service Industries Journal,* Volume 22, No. 4, October 2002, 187-208.

[18] Hassan, M. Kabir; Sackley, William H., "Determinants of Thrift Institution Off-Balance Sheet Activities : An Empirical Investigation", *Journal of Financial Management & Analysis*, Jan-Jun2006, Vol. 19 Issue 1, p1-13.

[19] Jagtiani, J., "Characteristics Of Banks That Are More Active In The Swaps Market", *Journal Of Financial Services Research*, 1995, Volume 9, No. 4.

[20] Jagtinai,J., A.Saunders And G.Udell, "The Effect of Bank Capital Requirements on Bank Off-Balance Sheet Financial Innovations", *Journal Of Banking And Finance*, 1995, 19, 647-658.

[21] Jacques, K. And P.Nigro, "Risk-Based Standards, Portfolio Risk and Bank Capital: A Simultaneous Equations Approach", *Journal Of Economic And Business*, 1997, 49, 533-547.

[22] Khambata, D., and Bagdi, R., "Off-balance-sheet credit risk of the top 20 Japanese banks" *Journal of International Banking Regulation*, Vol. 5, No. 1, 2003, 57-71.

[23] Khambata, D., and Bagdi, R., "Off-balance-sheet credit risk of the top 20 European banks" *Journal of International Banking Regulation*, Vol. 4, No. 2, 2002, 107-122.

[24] Koppenhaver, G. O., "The Effects of Regulation of Bank Participations in the Guarantee Market", *Research In Financial Services,* 1989, 165-80.

[25] Koppenhaver, G. O. and R. D. Stover, "Standby Letters of Credit and Large Bank Capital: An Empirical Analysis", *Journal of Banking and Finance*, 15, 1991, 315-327.

[26] Lieu, P., Yeh, T., and Chiu, Y., "Off-Balance Sheet Activities and Cost Inefficiency in Taiwan's Banks", *The Service Industries Journal*, Vol.25, No.7, October 2005, pp.925–944.

[27] Mansfield, E, "Technical Change and the Rate of Imitation", *Econometrica*, 1961, 29, 741-766.

[28] Pavel, C. and D.Philis, "Why Commercial Banks Sell Loans: An Empirical Analysis" Economic Perspectives*, Federal Reserve Bank of Chicago*, 1987, May/June, 3-14.

[29] Pavel, C., "Loan Sales Have Little Effect on Bank Risk", Economic Perspectives, *Federal Reserve Bank of Chicago*, 1988, May/June, 23-31.

[30] Ronn, Ehud, and A.K. Verma, "Pricing Risk-Adjusted Deposit Insurance: An Option-Based Model", *Jornal of Finance*, September 1986, 41, 871-895.

[31] Sinha, Ram Pratap, "Off Balance Sheet Exposure of Indian Commercial Banks - Some Emperical Results", *Indian Institute of Capital Markets 9th Capital Markets Conference* Paper Available at SSRN: http://ssrn.com/abstract=877813.

[32] Zhao F. and Moser J, "Bank Lending and Interest-Rate Derivatives", working paper, *FMA conference 2006*, Slat Lake City.

Table (4-1): Countries Included in each region, as reported by Bank Scope Data bas

Africa		The Far East and Central Asia	The European Union	Eastern Europe	The Middle East
Algeria	Sao Tome &Principe	Afghanistan	Austria	Yugoslavia	Afghanistan
Angola	Senegal	Armenia	Belgium	CROATIA	Bahrain
Benin	Seychelles	Azerbaijan	Denmark	Slovenia	Iran
Botswana	Sierra Leone	Bangladesh	Finland	Macedonia Rep. Of	Iraq
Burkina Faso	Somalia	Bhutan	France	Bosnia-Herzegovina	Israel
Burundi	South Africa	Brunei Darussalam	Germany	Albania	Jordan
Cameroon	Sudan	Cambodia	Greece	Bulgaria	Kuwait
Cape Verde	Swaziland	China-People's Rep.	Ireland	Czech Republic	Lebanon
Central African Rep.	Tanzania	Georgia Rep. Of	Italy	Slovakia	Oman
Chad	Togo	Hong Kong	Luxembourg	Hungary	Qatar
Comers	Tunisia	India	Netherlands	Poland	Saudi Arabia
Congo Rep. Of	Uganda	Indonesia	Portugal	Romania	Syria
Congo	Zambia	Japan	Spain	Russian Federation	United Arab Emirates
Cote D'ivoire	Zimbabwe	Kazakhstan	Sweden	Armenia	Yemen
Djibouti		Korea Rep. Of	United Kingdom	Azerbaijan	
Egypt		Korea, Dpr.	**Europe Exc. Eastern Europe**	Belarus	**G7**
Equatorial Guinea		Kyrgyzstan	Andorra	Estonia	Canada
Ethiopia		Laos	Austria	Georgia Rep. Of	France
Gabon		Macau	Belgium	Kazakhstan	Germany
Gambia		Malaysia	Cyprus	Kyrgyzstan	Italy
Ghana		Maldives	Denmark	Latvia	Japan
Guinea		Mongolia	Finland	Lithuania	United Kingdom
Guinea-Bissau		Myanmar (Union Of)	France	Moldova Rep. Of	USA
Kenya		Nepal	Germany	Tajikistan	
Lesotho		Pakistan	Gibraltar	Turkmenistan	**North America**
Liberia		Philippines	Greece	Ukraine	USA
Libya		Singapore	Iceland	Uzbekistan	Canada
Madagascar		Sri Lanka	Ireland		
Malawi		Taiwan	Italy		**NAFTA**
Mali		Tajikistan	Liechtenstein		USA
Mauritania		Thailand	Luxembourg		Canada
Mauritius		Turkmenistan	Malta		Mexico
Morocco		Uzbekistan	Monaco		
Mozambique		Vietnam	Netherlands		
Namibia			Norway		
Niger			Portugal		
Nigeria			Spain		
Reunion			Sweden		
Rwanda			Switzerland		
			Turkey		

Table (4-2) Aggregated OBS Accounts for the World Regions[24]

World Region	2005 (Billions US Dollars)			2001 (Billions US Dollars)			1998 (Billions US Dollars)		
	Total Assets	OBS	Ratio	Total Assets	OBS	Ratio	Total Assets	OBS	Ratio
Euro Area	3959.67	1169.90	0.30	2773.13	9734.85	3.51	9808.35	2710.74	0.28
Eastern Europe	421320.75	61555.75	0.15	215191.50	60009.56	0.28	222155.07	40744.67	0.18
G7	15254.77	6203.21	0.41	10605.14	12623.90	1.19	192834.32	177138.32	0.92
NAFTA	8614.53	5388.36	0.63	5182.14	3030.77	0.58	5770.07	3639.29	0.63
North America	8634.42	5160.51	0.60	5205.14	2929.46	0.56	5651.12	3633.95	0.64
South and Central America	659280.07	76322.96	0.12	616.31	118.98	0.19	829430.02	110496.84	0.13
Africa	244225.79	44494.37	0.18	149542.87	37376.13	0.25	247480.89	61223.18	0.25
The Far East and Central Asia	6357.74	766.21	0.12	5142.80	334.75	0.07	15565.01	364.91	0.02
The Middle East	776504.47	202846.03	0.26	634334.42	180808.01	0.29	437171.47	141007.90	0.32

[24] Bureau Van Dijik – Bank Scope, 2006. www.BankScope.com.

Table (4-2 - Continued) Aggregated OBS Accounts for the World Regions

World Region	1995 (Billions US Dollars)			1992 (Billions US Dollars)		
	Total Assets	OBS	Ratio	Total Assets	OBS	Ratio
Euro Area	1033.26	255.88	0.25	228.43	59.89	0.26
Eastern Europe	41078.77	5783.94	0.14	4773.60	149.84	0.03
G7	111348.14	97026.92	0.87	30268.85	80670.35	2.67
NAFTA	1457.01	822.72	0.56	571.56	312.15	0.55
North America	1451.06	822.70	0.57	568.55	312.04	0.55
South and Central America	146718.02	20502.58	0.14	22380.89	2512.32	0.11
Africa	40721.47	10242.31	0.25	1056.12	90.64	0.09
The Far East and Central Asia	3324.42	190.17	0.06	381.18	27.14	0.07
The Middle East	11578.39	9195.74	0.79	4480.97	2501.87	0.56

Figure (4-1): world regions' Aggregated Off- Balance Sheet/Aggregated Total assets Ratio

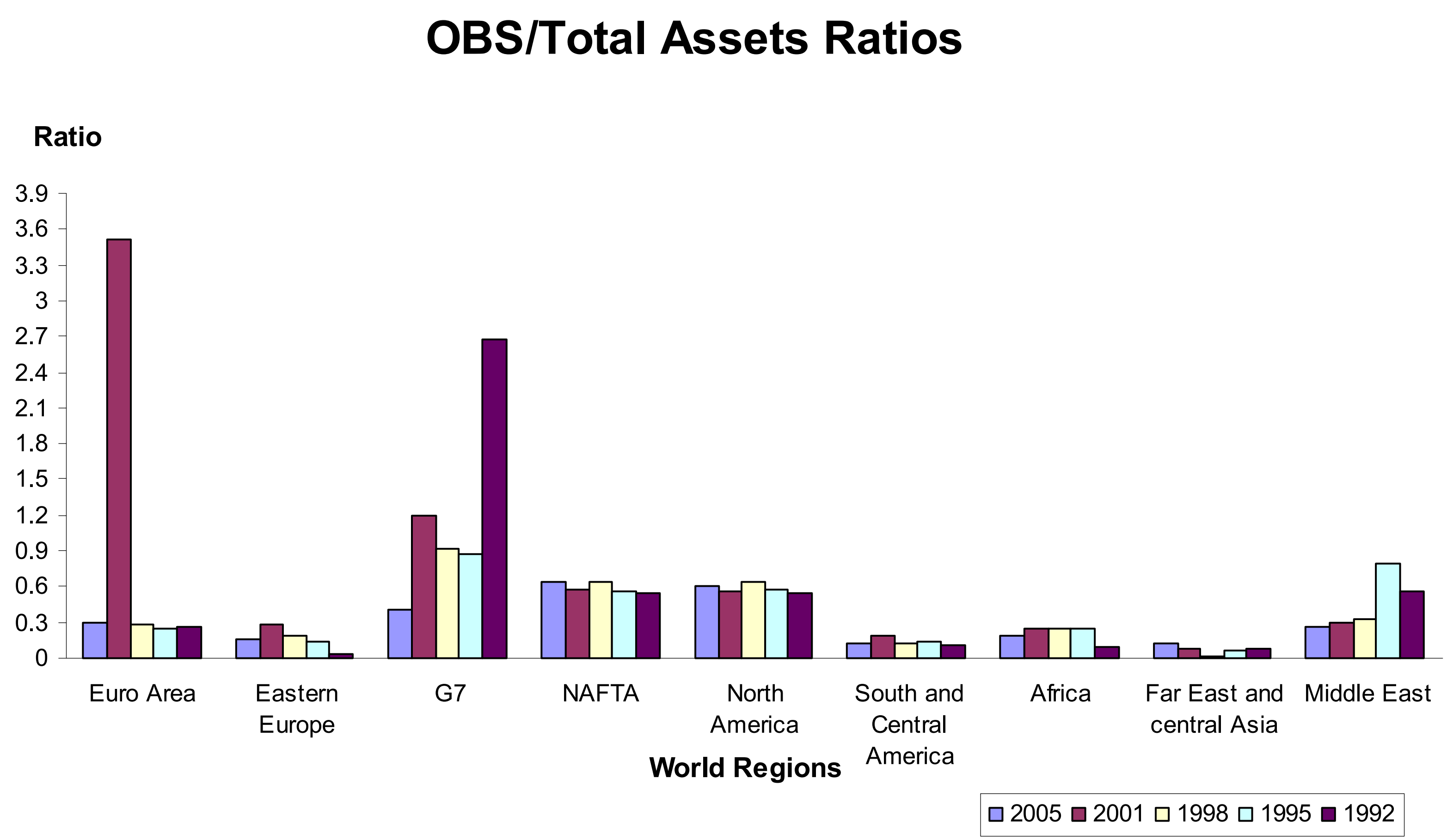

Table 4-3 (A): Data Statistics

	Africa (Thousands $)			The Middle East (Thousands $)		
	Mean	**Median**	**St. Dev.**	**Mean**	**Median**	**St. Dev.**
Tot. asset	1721419	208528	5719525	7632454	2553277	13528479
Int. Margin	9.4296	17735	2938023	3.0835	2.9700	1.0092
Loans	1145050	103059	4426393	4724316	1376937	9265672
OBS	195181	8.25	7.9935	1940667	491755	3253629
Net Income	22367	6505	66537	63673	18109	107312
Capital	453081	24350	553680	643355	231468	1056695
Charge off	6971	501	28328	22344	3408	55165
Risk Assets	1321256	110241	4943555	5476908	1727379	10388903

Table 4-3 (B): Data Statistics

	The Far East and Central Asia (Thousands $)			North America (Thousands $)		
	Mean	**Median**	**St. Dev.**	**Mean**	**Median**	**St. Dev.**
Tot. asset	61213654	16395102	141224793	17520866	3737800	55949567
Int. Margin	1.9374	1.9300	1.0135	4.3651	4.2100	1.7620
Loans	37717263	10731725	86132397	9861705	2153950	28805874
OBS	3056339	425753	7874606	12121100	744850	45392702
Net Income	-84843	13216	929601	197583	42800	592310
Capital	4058437	904039	9845781	1563634	337100	4832837
Charge off	492414	137684	863235	81784	7200	316193
Risk Assets	51801515	14363533	117887898	14084954	3263450	41101273

Table 4-3 (C): Data Statistics

	The European Union (Thousands $)			Eastern Europe (Thousands $)		
	Mean	**Median**	**St. Dev.**	**Mean**	**Median**	**St. Dev.**
Tot. asset	105374259	24047785	195336630	2693015	1231050	3678329
Int. Margin	2.4303	2.4900	1.2136	5.3188	4.4100	3.8373
Loans	50460274	14285236	85211780	1232657	622187	1585693
OBS	18310795	2760927	39338267	2674487	190900	8583791
Net Income	435201	95315	1149273	53130	6489	490151
Capital	6464314	1568785	12018198	209811	117265	267998
Charge off	309268	34419	644570	119344	6525	237222
Risk Assets	587799	141983	1224488	1505858	691814	2003495

Table 4-3 (D): Data Statistics

	Europe Excluding Eastern Europe (Thousands $)			NAFTA (Thousands $)		
	Mean	Median	St. Dev.	Mean	Median	St. Dev.
Tot. asset	66143190	8449220	152852325	13463461	2253900	48853767
Int. Margin	2.6306	2.5700	1.3224	4.5987	4.2200	10.4378
Loans	31018297	4669956	60569208	7577689	1349000	25203252
OBS	16426951	1163378	40685361	9272137	401600	39496383
Net Income	306442	40219	850040	151283	24600	518343
Capital	3890981	621674	8638925	1201371	203500	4220554
Charge off	821593	76767	2295632	97066	5700	312771
Risk Assets	45123595	6129036	94631505	10806502	2009900	35959774

Table 4-3 (E): Data Statistics

	G7 (Thousands $)		
	Mean	Median	St. Dev.
Tot. asset	34955532	5773700	102280718
Int. Margin	3.6321	3.7000	1.8852
Loans	19822964	3601800	55619115
OBS	11024921	614100	40174472
Net Income	135096	31500	737353
Capital	2505295	463100	7099989
Charge off	11024921	614100	40174472
Risk Assets	317949	13700	1193933

Table (4-4 (A)): Random Effect Estimation for the Quantitative variables model (QVM)

$$LGTOBS_{it} = \ln\left[P_{it}/(1-P_{it})\right] = \alpha_i + \beta t + \gamma X_{it} + \delta Y_t + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots(4)$$

	Africa		The Middle East		Far East & Central Asia		North America	
Variables	Coefficient	S.D	Coefficient	S.D	Coefficient	S.D	Coefficient	S.D
Constant	4.67920*	.49233	-2.75290*	.93241	-1.74987**	.71907	-3.60758*	.31644
Time	.026915*	.01022	-.045847*	.01465	-.047564*	.00795	.013214*	.00476
LTA	-1.06013*	.09698	-.417187**	.17605	-.621191*	.13400	-.117822**	.04984
LLR	-.355220*	.10612	.470234*	.15880	.540287*	.12643	.222989*	.04194
LNI	.088481	.05923	.167284**	.08583	-.019190	.03017	-.030578	.04248
LCOFF	.00342977	.02458	-.015571	.05417	.062368*	.01602	.024108	.02164
LNIMR	.210448*	.07718	.161886	.17026	.072005	.05187	.318241*	.04815
CAR	-.017380*	.00389	-.00001365	.61435	-.753497	.70423	-.208932**	.09102
CARL	.00060792*	.00015	-.00001365	.00006	-.0010257	.00107	-.00770639	.01605
CARH	-.057521*	.01974	.026269	.02884	.097767*	.02098	.075487*	.00783
R^2	.938083		.168183		.147619		.311145	
L.M	9.59212 [.002]		2.86866 [.082]		20.5702 [.000]		60.2950 [.000]	
D.W	.074854 [.000,.000]		.236963 [.000,.000]		.088611 [.000,.000]		.096691 [.000,.000]	

Note: 1)*, **, ^ represent 1%, 5% and 10% level of significance, respectively.
2) Refer to table 6 for list of explanatory variables.

Table (4-4 (B)): Random Effect Estimation for the Quantitative variables model (QVM)

$$LGTOBS_{it} = \ln\left[P_{it}/(1-P_{it})\right] = \alpha_i + \beta t + \gamma X_{it} + \delta Y_t + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots(4)$$

	The European Union		Eastern Europe		Western Europe		G7	
Variables	Coefficient	S.D	Coefficient	S.D	Coefficient	S.D	Coefficient	S.D
Constant	-2.65545*	.80224	-5.05438*	1.0469	-4.12262*	.62006	-4.89402*	.26827
Time	.00990924	.01076	.041316	.02779	.010584	.00994	-.00691248	.00561
LTA	-.616993*	.15180	.184390	.22833	.073649	.10150	-.056816	.04953
LLR	.661399*	.14254	-.038016	.20367	.00792512	.09783	.020748	.04380
LNI	.00972595	.07210	.154461^	.08450	.00839075	.05924	.357448*	.03776
LCOFF	.038791	.02851	.188645*	.07215	.107373**	.04336	.097952*	.02081
LNIMR	-.239781**	.12184	-.306666**	.13062	.042677	.07682	.826237*	.04242
CAR	-.00984703	.00500	-.618941	.53357	-.00311753	.00343	-.00476^	.00258
CARL	-.00145564	.01765	-.00001744	.00002	-.00410640	.00292	-.0083462*	.00198
CARH	.017580	.01765	.035468	.03507	.047616*	.01510	.169843*	.00837
R^2	.094015		.319359		.060338		.454299	
L.M	071973 [.788]		.199473 [.655]		12.6949 [.000]		8.92569 [.003]	
D.W	.075871 [.000,.000]		.232429 [.000,.000]		.151401 [.000,.000]		.359346 [.000,.000]	

Note: 1) *, **, ^ represent 1%, 5% and 10% level of significance, respectively.
2) Refer to table 6 for list of explanatory variables.

Table (4-4 (C)): Random Effect Estimation for the Quantitative variables model (QVM)

$$LGTOBS_{it} = \ln\left[P_{it} \Big/ (1 - P_{it}) \right] = \alpha_i + \beta t + \gamma X_{it} + \delta Y_t + \varepsilon_{it} ....(4)$$

	NAFTA	
Variables	**Coefficient**	**S.D**
Constant	-4.92411*	.26388
Time	-.00111819	.00432
LTA	-.245969*	.04796
LLR	.423858*	.04108
LNI	.034863	.03570
LCOFF	.022369^	.01384
LNIMR	.317120*	.03771
CAR	-.11981^	.07005
CARL	-.021280	.01366
CARH	.065226*	.00723
R^2	.249994	
L.M	20.4929 [.000]	
D.W	.140638 [.000,.000]	

Note: 1) *, **, ^ represent 1%, 5% and 10% level of significance, respectively.
2) Refer to table 6 for list of explanatory variables.

Table (4-5 (A)): Random Effect Estimation for the Qualitative variables model (QLVM)

$$LGTOBS_{ijt} = \ln\left[\frac{P_{ijt}}{(1 - P_{ijt})}\right] = \alpha_i + \beta t + \gamma X_{ijt} + \delta Y_{jt} + \theta DUM_j + \varepsilon_{ijt} \quad .....(5)$$

Variables	Coefficient	S.D	Coefficient	S.D	Coefficient	S.D	Coefficient	S.D	Coefficient	S.D	Coefficient	S.D
Constant	-2.95202*	.346834	-3.89766*	.41514	-3.61970*	.34022	-3.51979*	.34159	-2.96666*	.347830	-2.93359*	.347216
Time	.00526937	.004729	-.0034336	.00462	.00348449	.00467	.00413164	.00468	.00519445	.004732	.00540018	.00473198
LTA	-.087904^	.052223	-.062354	.05046	-.077046	.05151	-.079515	.05164	-.087892^	.052232	-.088217^	.052220
LLR	.094443**	.046276	.151622*	.04509	.104973**	.04572	.101393**	.04582	.095082**	.046298	.093563**	.046282
LNI	.044308	.029267	.017786	.02904	.033960	.02920	.034357	.02922	.044146	.029274	.045035	.029275
LCOFF	.037561**	.016918	.056039*	.01683	.056497*	.01692	.053688*	.01692	.037579**	.016921	.037466**	.016920
LNIMR	.207201*	.039754	.096377**	.04016	.138915*	.03995	.145244*	.04000	.207761*	.039773	.208317*	.039762
CAR	-.016514*	.005588	-.016170*	.00549	-.016768*	.00555	-.016693*	.00556	-.016465*	.005589	-.016554*	.00558869
CARL	-.0000008	.000019	-.0000061	.00001	.00000530	.00001	.000005109	.00001	-.00000107	.000019	-.0000005	.00001947
CARH	.064448*	.007734	.063002*	.00763	.070991*	.00765	.069999*	.00767	.064123*	.007756	.064682*	.0077362
DUSA	---	---	1.06801*	.27298	1.01986*	.09551	---	---	---	---	---	---
DNAFTA	---	---	1.25932*	.30286	---	---	.936773*	.09509	---	---	---	---
DMIDEST	---	---	.299419	.31554	---	---	---	---	.130791	.228848	---	---
DAFRI	---	---	-.262637	.44430	---	---	---	---	---	---	-.468055	.436357
DFCASIA	---	---	-.13753**	.09154	---	---	---	---	---	---	---	---
DG7	---	---	.621066*	.13191	---	---	---	---	---	---	---	---
DEURO	----	---	.606096^	.34570	---	---	---	---	---	---	----	---
DESTRN	---	---	.741305**	.30741	---	---	---	---	---	---	---	---
DEUEXC	---	---	.913621**	.38972	---	---	---	---	---	---	---	---
DSCAMERI	---	---	-.802155*	.30548	---	---	---	---	---	---	---	---
R^2	.236951		.421094		.282636		.270322		.232023		.236640	
L.M	38.566[.000]		19.6583 [.000]		8.75288[.000]		5.70859 [.000]		33.7088 [.000]		41.0894 [.000]	
D.W	.081540[.000,.000]		.122569[.000,.000]		.097238[.000,.000]		..095134 [.000,.000]		..081507 [.000,.000]		.081644 [.000,.000]	

Note: 1) *, **, ^ represent 1%, 5% and 10% level of significance, respectively.
2) Refer to table 6 for list of explanatory variables.

Table (4- 5(B)): Random Effect Estimation for the Qualitative variables model (QLVM)

$$LGTOBS_{ijt} = \ln\left[\frac{P_{ijt}}{(1-P_{ijt})}\right] = \alpha_i + \beta t + \gamma X_{ijt} + \delta Y_{jt} + \theta DUM_j + \varepsilon_{ijt} .....(5)$$

Variables	Coefficient	S.D	Coefficient	S.D	Coefficient	S.D	Coefficient	S.D	Coefficient	S.D	Coefficient	S.D
Constant	-3.05496*	.338289	-2.95226*	.345553	-2.97052*	.346830	-3.01842*	.348982	-2.98264*	.346777	-2.98947*	.343330
Time	.00238310	.0046913	.00516022	.004714	.00547734	.004732	.00468250	.004742	.00547064	.004730	.00496889	.004713
LTA	-.091404^	.051656	-.087668^	.051859	-.090537^	.052248	-.085059^	.052257	-.090372^	.052223	-.073042	.052104
LLR	.131293*	.045936	.094705**	.045972	.095397**	.046277	.095545**	.046288	.095209**	.046265	.080485^	.046227
LNI	.030355	.029233	.044562	.029078	.045815	.029283	.044314	.029272	.046090	.029279	.048549^	.029236
LCOFF	.044340*	.016866	.037581**	.016803	.035744**	.016965	.036513**	.016932	.035153**	.016961	.038931**	.016897
LNIMR	.140559*	.039890	.207552*	.039471	.212214*	.039886	.204230*	.039798	.213907*	.039903	.229419*	.039869
CAR	-.016671*	.0055653	-.016514*	.005551	-.016675*	.005589	-.016340*	.005590	-.016708*	.005588	-.016755*	.005579
CARL	-.00000437	.0000190	-.0000009	.000019	-.0000003	.000019	-.0000047	.000019	-.0000001	.000019	-.0000008	.000019
CARH	.062661*	.0076780	.064488*	.007712	.064362*	.007735	.063444*	.007758	.064426*	.007733	.066025*	.007709
DUSA	---	---	---	---	---	---	---	---	…	---	---	---
DNAFTA	---	---	---	---	---	---	---	---	…	---	---	---
DMIDEST	---	---	---	---	---	---	---	---	…	---	---	---
DAFRI	---	---	---	---	---	---	---	---	…	---	---	---
DFCASIA	-1.36241*	.116549	---	---	---	---	---	---	…	---	---	---
DG7	---	---	.012976*	.005354	---	---	---	---	…	---	---	---
DEURO	---	---	---	---	.167513^	.112835	---	---	…	…	---	---
DESTRN	---	---	---	---	---	---	.391210^	.226733	…	…	…	…
DEUEXC	---	---	---	---	---	---	---	---	.198064^	.111271	…	…
DSCAMERI	---	---	---	---	---	---	---	---	…	…	-1.09227*	.257950
R^2	.291412		.215892		.227634		.212378		.226645		.258541	
L.M	6.45434 [.004]		37.0262 [.021]		23.3364 [.000]		37.8650 [.000]		19.5039 [.000]		6.53443 [.003]	
D.W	.98337 [.000,.000]		.080974 [.000,.000]		.081508.000]		.081541 [.000,.000]		.081601 [.000,.000]		.083952 [.000,.000]	

Note: 1) *, **, ^ represent 1%, 5% and 10% level of significance, respectively.
2) Refer to table 6 for list of explanatory variables.

Table (4-6): List of Explanatory variables used in both the QVM and QLVM models

Variables	Explanations
CONSTANT	Constant
TIME	Time
LTA	Natural Logarithm of bank's Total Assets
LLR	Natural Logarithm of bank's Net Loans
LNI	Natural Logarithm of bank's Net Income
LCOFF	Natural Logarithm of bank's Net Charge-off
LNIMR	Natural Logarithm of bank's Net Interest Margin
CAR	Capital Adequacy Ratio
CARL	Low Regulatory pressure
CARH	High Regulatory pressure
DUSA	Dummy for USA
DNAFTA	Dummy for NAFTA
DMIDEST	Dummy for The Middle East
DAFRI	Dummy for Africa
DFCASIA	Dummy for The Far East and Central Asia
DG7	Dummy For the Group of Seven (G7)
DEURO	Dummy for The European Union
DESTRN	Dummy for Eastern Europe
DEUEXC	Dummy for Europe Exclude Eastern Europe
DSCAMERI	Dummy for South & Central America

Chapter Five

Guarantees Bank Holding Companies' Systematic and Unsystematic Risks: Contingent and Non-Contingent Claim Models

Abstract

This study employs both contingent and non-contingent claim models to test for evidence of the market discipline hypothesis for OBS guarantees contracts in the banking industry. In addition to the CAPM systematic risk measure and the standard deviation of bank's equity return we apply the Ronn-Verma options pricing model to see whether market participants account for guarantees positions when they value banks' market risk. The benefit of using the contingent claim model is that the traditional linear models seem to be inadequate to estimate the non-linear relation between OBS guarantees and bank's risks. We conclude that (1) OBS guarantees are generally considered in market risk valuations, and they are being viewed as risk reducers according to the three risk measures (Beta, equity return risk, and implied asset volatilities); (2) except CLCs contracts, all OBS guarantees are risk reducers for larger bank holding companies (BHCs); (3) market participants generally view OBS guarantees as more potential risk diversification tools, (4) big BHCs have different marginal propensity to risk (MPR) than both medium and small BHCs. (5) more capital requirements and regulations on bank's guarantees activities may distort the large banks market positions.

Guarantees Bank Holding Companies' Systematic and Unsystematic Risks: Contingent and Non-Contingent Claim Models

5.1. Introduction:

This chapter deals with the risk exposure of OBS guarantees by large bank holding companies (BHCs) in the United States of America. OBS guarantees are contingent contracts which obligate banks to fulfill some contractual terms in a certain date in future at given circumstances. Examples of OBS guarantees could be commitments, standby letters of credits (SLCs), commercial letters of credits (CLCs), and participations (PARTI). Prior literature suggests many hypotheses to justify why banks engage in these activities. No matter the reason behind these activities, it is a fact now that almost all banking firms engage in these activities very extensively. However, we believe that as a result of this extensive usage of OBS guarantees, a bank's market risk exposure may affected directly or indirectly by these activities as a risk reducer or as a risk enhancer.

Extant theory about how a bank's risk is affected by OBS activities suggests that OBS activities may be related to bank risk in three ways. First, OBS activities are an obligation against a bank and the bank's customers to make a payment in the future under certain circumstances in which the banks and their customers would prefer not to make the payment. Thus OBS activities will increase the bank's risk. Second, OBS activities will reduce a bank's customer risk, in sense that there will be more professional management. Third, Avery and Berger (1988) claim that OBS activities may reduce banks risk if they are used to hedge rather than to speculate.

In this study a two-stage analysis has been developed, in stage one we have estimated our dependent variables, which include three market risk measures (1) the systematic market risk (from CAPM, β), (2) the standard deviation of bank's equity return (σ_E), and (3) the implied asset volatility from the Ronn-Verma option model (σ_V). In the second stage we regress these dependent variables on the on and off balance sheet risk variables using a panel econometric technique for the bank holding companies (BHCs) sector. The study is organized as follows; a discussion of the methodology is next; in section three we describe the data and we present the empirical results in section four; conclusions and policy implications are presented in section five.

5.2. Methodology:

In this section we intend to test a bank's risk level that might be affected by on and off-balance-sheet bank activities. Our analysis is compromised of two stages, the first stage is to estimate BHCs market risk from the perspective of the equity holders. Three different risk measures are used to estimate BHCs market risk; the first one is market systematic risk (beta), derived from CAPM, second is the standard deviation of bank's equity return (σ_{it}^{E}), daily return data is used to estimate the yearly BHCs risk, and thirdly we use a contingent option pricing model to estimate the BHCs implied asset volatility (σ_{it}^{V}) as a measure of BHCs risk. (More detailed discussion will follow). The second stage is to regress these three estimated risk measures (beta, standard deviation of equity return (σ_{it}^{E}), and implied asset volatility (σ_{it}^{V})) as the dependent variables on off- and on-balance-sheet risk measures. Following is a discussion of each of these risks.

5.2.1 Market Risk Measures:

1)*Beta or Systematic Risk* β_{it} *:* in the CAPM framework, risk is measured by the variance of possible returns. However, variance is not a universal measure of riskiness. Our first risk measure is derived from the CAPM return generating process according to the following equation:

$$R_{it} = \alpha_i + \beta_{it} R_{Mt} + \varepsilon_{it} \text{ ....(1)}$$

where $R_{it} = r_{it}-R_{ft}$ is the holding period return (r_{it}) for the i^{th} over the period t in excess of the risk-free rate of interest (R_{ft}). $R_{mt} = r_{mt}-R_{ft}$ is the holding period return (r_{mt}) for the market portfolio over period t in excess of the risk-free rate of interest (r_{ft}). α_i is the intercept, and ε_{it} is the i^{th} bank-specific factor which is independent of R_{mt}. c represents the systematic risk which measures the security's sensitivity to market-wide events which cannot be diversified away. It reflects differing investor expectations about the relationship between each bank's return and the market return.

2)*Standard Deviation of Equity Return* σ_{it}^{E}: We are using the standard deviation of bank's equity return as a measure for the market risk which will include both the market risk and bank-specific risk. The standard deviation of bank's equity return will be estimated using the following formula:

$$\sigma_{RE} = \sqrt{\sum_{t=1}^{n}(\overline{K}_t - \overline{K}_{Avg})^2} \text{ ....(2)}$$

$\overline{K}_t$ is the Ex-post equity return in period t, $\overline{K}_{Avg}$ is the average annual return during the year.

3)<u>*Contingent Claim Models*</u>: The standard linear approaches to estimate the bank's market risk might be inadequate because not all the risk measures are neither linear nor monotonic functions of a bank's risk. The contingent claim models correct for this nonlinearity of a bank's risk. Ronn and Verma (1986) introduced a contingent claim model nested from Black and Sholes (1973) option pricing model; following is an explanation of this model.

Ronn and Verma introduce the risk-based deposit insurance measure that can be estimated from the market value of a bank's equity and the instantaneous equity's standard deviation. They state that the empirical estimation of risk and deposit insurance premium is measurable when time series data on the market value of a bank's equity and the book value of its debt are available. The equity of a bank can be written as:

$$E = VN(X) - \rho BN(X - \sigma_v \sqrt{T}) \quad \text{...(3)}$$

Where:

$$X = \frac{\left(\ln \frac{V}{\rho b} + \frac{\sigma_v^2 T}{2} \right)}{\sigma_v \sqrt{T}} \quad \text{..(4)}$$

$$\sigma_v = \sigma_E \frac{E}{VN(X)} \quad \text{..(5)}$$

where, E is the market value of equity, σ_E is the instantaneous standard deviation of equity return, V is the unobserved post-insurance value of bank assets, B is the book value of debt liabilities, σ_v is the instantaneous standard deviation of asset return, N(~) is the univariate cumulative normal distribution function, and T represents the time until the next audit of bank assets. Equations (4 and 5) can be solved simultaneously for two unknowns, V and σ_v, for each observed E and σ_E. An exogenously determined closure rule is required to solve these simultaneous equations. Banks are audited each year, and at audit time banks are closed if V_T is less than ρB where V_T is the terminal value of assets at time T, and $\rho \leq 1$ is a policy parameter; therefore, the maturity of debt is assumed to be 1.

5.2.2. On-Balance-Sheet Accounting Risk Factors:

1)*Leverage Risk (LEV):* Beaver, Kettler, and Scholes (1970) indicate that as additional debt is added the equity holder's estimate of return volatility is increased. Hamada (1972) reports that approximately one quarter of systematic risk is explained by the degree of financial leverage. On the other hand, Mandelker and Rhee (1984) find that both operating and financial leverage jointly determine systematic risk. Therefore, if these leverage ratios increase, it may lead to higher variability of bank's equity returns and therefore its market risk. Financial leverage is constructed by taking a ratio of total liabilities and total assets.

2)*Diversification Risk (DIV):* a heavy investment in one category of assets will generate a diversification risk. In other words, as banks concentrate their loan operations on one type of clients then the bank will be considered less diversified and the diversification

risk will increase and it will directly and indirectly affect the market risk. The Herfindahl Index (HI) can be used to measure the degree of loan portfolio diversification, an increased levels of loan concentration associated with large HI values (i.e. less loan diversification) will increase a bank's risk. Hence, greater diversification is expected to cause less variability in earnings. Thus, the HI measure of loan concentration should be positively related to systematic and unsystematic market risk measures. In this study we will use the inverse of the HI to translate it from a concentration index to a diversification index.

$$HI = \frac{1}{\sum_{i=1}^{n} L_i^2} \quad \text{...(6)}$$ Where n = number of loans types.

3)*<u>Credit Risk (LOSS):</u>* this type of risk is the risk associated with the quality of a bank's earning assets, namely its loans. Low quality bank assets (loans) cause high probability of future defaults that may be expected to reduce earnings and dividends; in other words it will increase the bank's risk. Since banks are highly leveraged, Brewer and Lee (1986) conclude that large nonperforming loans or large security losses can bring about insolvency. Furthermore, major fluctuations in interest rates can greatly influence the market value of long-term fixed rate assets. Similarly, a decline in asset quality can lead to write-offs and reduced earnings from the loan portfolio. Thus, *LOSS* is expected to affect the market measures of risk positively. The credit measure used in this study is calculated by dividing loan loss provision by total assets.

4)*<u>The Interest Rate Risk (GAP):</u>* This type of risk arises because the maturity composition of assets and liabilities may be different, and therefore banks may be affected negatively,

as changing market interest rates may have a differentiated impact on the value of assets and liabilities. French, Ruback, and Schwert (1983) introduce the nominal contracting hypothesis to explain the sensitivity of commercial bank stock returns. Nominal contracts are those assets which have cash flows that are fixed in nominal terms. On the other hand, cash flows generated by real assets fluctuate with the price level. Overall, most of the assets and liabilities of depository financial institutions can be postulated to be nominal contracts. Thus, according to the nominal contracting hypothesis, a firm's holding of nominal assets is important in order to achieve the objective of maximizing stockholder's wealth. Studies by Fama (1975, 1976), and Fama and Gibbons (1982), establish that unexpected changes in interest rates are directly related to inflationary expectations. Hence, the nominal contracting hypothesis supports the notion that unanticipated changes in the interest rate would affect a bank's equity value depending on the duration of nominal assets and liabilities held by the firm. The greater the amount of net nominal assets and the longer the duration of these assets, the higher would be the interest rate sensitivity of a bank's common stock. In other words, the greater the absolute value of GAP, the more the bank is exposed to unexpected changes in interest rates. Therefore, GAP is expected to be positively related to market-related risk measures.

5)*Operating Risk (Bank's Size Risk) (SIZE):* According to Saunders, Strock, and Travlos (1990), the larger the size of a bank holding company the greater its ability to diversify away its asset risk. Furthermore, the "too big to fail" doctrine enables large banking firms to maximize the value of implicit failure guarantees associated with deposit insurance and bank closure policy. The larger the bank is, the more analysis will be conducted about the bank's equity and debt, thus low risk. Investors may also believe that larger banking

firms may be protected by some regulatory rules than the small banking firms. All these reasons together suggest a negative relation between bank size and market risk measures for BHCs.

6)*Dividend Payout Variability Risk (POR):* According to Brewer and Lee (1986), bank equities are affected by the earning power of bank assets. Therefore, a bank's stock price is negatively related to the variability of its rate of return. BHCs will always want to keep a stable dividend policy after it is established, and it will be reluctant to cut down the dividend payout ratio. Furthermore, a higher dividend payout ratio may be considered as a sign of higher earning levels. Also stability in the dividend payout ratio suggests stability in the bank’s earning levels, implying a lower level of market risk. Thus, a high dividend payout ratio is associated with low risk and *POR* is expected to affect market risk measures negatively.

5.2.3. Off-Balance Sheet Guarantees Risk Factors:

Off-balance sheet (OBS) items are contingent assets and liabilities that may affect the future status of a financial institution’s balance sheet. Although OBS activities are now an important source of fee income for almost all BHCs, they have the potential to produce positive as well as negative future cash flows. Some OBS activities may involve risks that add to the banking firm’s overall risk exposure; others may hedge or reduce their interest rate, credit, and foreign exchange risks. Following is a discussion of the impact of OBS activities on banking firm’s risk.

1)*Commitments Risk:* A loan commitment agreement is a contractual commitment by a bank to loan a customer a certain maximum amount at given interest rate terms. The

commitment contract also defines the period over which the customer will be able to utilize his contracted loan. It is true that the bank will generate fee income by making these commitments to the borrowers, but it will also generate more credit and liquidity risks. Bennett (1986) claims that off-balance-sheet activities lead to credit risk since these activities provide an opportunity to increase leverage significantly without additional regulatory requirements. Cates and Davis (1989) suggest that credit risk due to off-balance sheet activities may be transferred to other bank assets. As an example, if a bank buys an option, interest rate risk may be reduced but credit risk can increase. Of the activities that are likely to contribute significantly to credit risk, loan commitments may be the largest contributor. Bennett (1986) identifies liquidity risk as another element that may contribute to the riskiness of the banking firm when exposed to off-balance-sheet activities. Nevertheless, the bank is exposed to liquidity risk due to these loan commitments. Liquidity risk arises because of the possibility that many customers may decide to borrow from the bank at the same time. This will be especially true in the event that alternative sources of funds may be unavailable. In order to satisfy this unexpected need of funds, banks may have to compete for funds aggressively. All the points discussed so far about the loan commitments were increasing risk factors but not decreasing risk factors. Loan commitments can be viewed as risk management tools that reduce a bank's risk when these contracts are added to the diversified bank's activities portfolio. This is especially true when there is extensive competition with the other non-banking financial firms, and more importantly, when we consider the competition internationally. In other words, instead of having only the traditional banking activities, there will be a more diversified portfolio to invest a bank's assets.

Letters of Credit (LC): banks deal with two types of LC, Commercial Letters of Credit (CLCs) and the Standby Letters of Credit (SLCs). LCs are essentially guarantees to underwrite performance that a depository institution sells to the buyers of guarantees for fees while at the same time adding to its contingent future liabilities. Although both CLCs and SLCs have the same type of risk exposure, default risk, they are different in the severity of the risk exposure. In the case of CLCs, the bank's role is to provide a formal guarantee that payment for goods shipped or sold internationally or domestically will be forthcoming regardless of whether the buyer of the good defaults on payment. With SLCs, the bank's role is to provide a formal guarantee of payment to cover contingencies that are potentially more severe and less predictable, like bond performance. SLCs mean a higher level of default risk exposure. At the same time, LCs may have a risk-reducing impact through the diversification effect.

5.3. Data and Empirical Analysis

Data comes from three different sources: CRSP, COMPUSTAT, and FDIC. Our sample includes 54 bank holding companies (BHCs) during the period 2000 - 2005. We are limited to this number of BHCs and the time span because we have restricted our study to those BHCs that are available in the CRSP database. There is a trade-off between including more time-series points but less cross-section points, or less time-series points with more cross-section points. Given this trade-off we chose to have more cross-section points since our primary interest is in the impact of the off-and on-balance-sheet measures on BHCS's market risks between the largest number of BHCs. However, a six year period should be reasonable relative to recent research in this area.

First, we collected the following data from CRSP; daily return for our sample BHCs, equally weighted return to proxy for the market portfolio's return, and daily rate of return for one month treasury bills to proxy for the risk free rate. Then we estimated the yearly value of the systematic risk measure (β), equation (1), using the ordinary least square (OLS) method for each BHC. Second, using the daily rate of return for each BHC, we calculated the standard deviation of equity return (σ_{RE}), equation (2), to get our second measure of market risk. Yearly average rate of return is computed from the daily rate of return for each BHCS.

Third, we have collected data about market value of equity (E) and book value of debt (B) from COMPUSTAT, used along with the data collected from CRSP to solve equation (4) and (5) simultaneously to get the value of the unobserved implied asset volatility (σ_{it}^{V}) and the unobserved post-insurance value of bank assets (V). We used a numerical routine to get the simultaneous solution of our two unknowns. Following Ronn and Verma (1986), the initial estimate that we used for the value of V was the sum of market value of equity and the face value of the debt, while that for σ_V was σ_E scaled down by the leverage ratio. The values of the cumulative normal probability distribution N(--) were obtained using the polynomial approximation as follows

$$N(z) = 1 - \frac{1}{\sqrt{2\pi}}[\exp(-z^2/2)][a_1 k + a_2 k^2 + a_3 k^3 + a_4 k^4 + a_5 k^5]........(7)\text{, for } z > 0$$

and obtaining N(z) for z<0 by symmetry, N(0) equal exactly to ½. Where; $k = \frac{1}{1+pz}$,

P = 0.2316419; a_1 = 0.31938153; a_2 = -0.356563782;

a_3 = 1.781477937; a_4 = -1.821255978; a_5 = 1.330274429.

From the first stage we estimated our dependent variables, the three market risk measures β, σ_E, and σ_V. The second stage of our study was to regress these dependent variables on the on and off balance sheet variables as they appear in the following equations.

$$\beta_{it} = \alpha_0 + \alpha_1 GURN_{it}^{K} + \alpha_2 LEV_{it} + \alpha_3 DIV_{it} + \alpha_4 LOSS_{it} + \alpha_5 GAP_{it} + \alpha_6 SIZE_{it} + \alpha_7 POR_{it} + \upsilon_{it} \text{....(8)}$$

$$\sigma_{it}^{E} = \alpha_0 + \alpha_1 GURN_{it}^{K} + \alpha_2 LEV_{it} + \alpha_3 DIV_{it} + \alpha_4 LOSS_{it} + \alpha_5 GAP_{it} + \alpha_6 SIZE_{it} + \alpha_7 POR_{it} + \upsilon_{it} \text{.....(9)}$$

$$\sigma_{it}^{V} = \alpha_0 + \alpha_1 GURN_{it}^{K} + \alpha_2 LEV_{it} + \alpha_3 DIV_{it} + \alpha_4 LOSS_{it} + \alpha_5 GAP_{it} + \alpha_6 SIZE_{it} + \alpha_7 POR_{it} + \upsilon_{it} \text{.....(10)}$$

where the dependent variables are:

β_{it} : Is the systematic risk measure for bank i at time t.

σ_{it}^{E} : Is the standard deviation of equity returns for BHCS i at time t.

σ_{it}^{V} : Is the implied asset volatility from estimated from the Ronn-Verma model for bank i at time t.

We collected the data required to compute the independent variables, both on-and off-balance sheet, from the Federal Depository Insurance Corporation (FDIC) for the same 54 BHCs during the same period of time. On-balance sheet variables are used primarily as control variables as we are interested in examining the relation between OBS

guarantees contracts and bank's market risk from the equityholder point of view. Following is brief definition of the variables in equation 8-9.

$GURN_{it}^{K}$: represent the notional value of OBS guarantees contracts for bank i at time t, K represent the type of OBS guarantees contracts, unused commitments, SLCs, CLCS, and participations. Each one of these types includes the notional value of the interest rate contracts, exchange rate contracts, commodity exchange contract, and equity exchange contracts.

LEV_{it}: Leverage variable is computed as the ratio of total liabilities to total assets.

DIV_{it}: Diversification variable is computed using seven different types of loans, as reported in schedule HC-C of the report of income for BHCs, employing the inverse of Herfindahl Index (HI) reported in equation (6).

$LOSS_{it}$: Credit risk variable is calculated as the ratio of loan loss provision to total assets.

GAP_{it}: Interest rate risk variable is calculated as the difference between the total market rate assets and the total market rate liabilities divided by the total assets.

$SIZE_{it}$: Operational risk variable is computed by taking the natural logarithm of banks assets to avoid the linearity problem.

POR_{it}: The earning variability risk is calculated by dividing the cash dividend by the total assets.

Equations 8-9 have been regressed on the independent variables using panel data collected for the BHCs in the U.S. banking industry. We employ the random-effects

methodology, as it appears to be better estimate than the fixed-effects model from Husman test (χ^2 values are reported in the table results).

A dummy variable technique has been employed to test OBS guarantees strength on a bank's market risk given a bank's size group. To achieve this we estimate the regression equations (11-13) using panel data methodology employing all of the BHCs in our sample (54 BHCs) during the study period 2000-2005. We imposed dummy variables to represent bank's size, in other words, OBS guarantees contracts are inserted in the regression as three variables one is [(SIZE_DUM=1 if big, and 0 otherwise) * GURN], second [(SIZE_DUM=1 if medium, and 0 otherwise) * GURN], and third [(SIZE_DUM=1 if small, and 0 otherwise) * GURN].

$$\beta_{it} = \alpha_1 SIZEDUM_{(BIG/MID/SMALL)} * GURN_{it}^K + \alpha_2 LEV_{it} + \alpha_3 DIV_{it} + \alpha_4 LOSS_{it} + \alpha_5 GAP_{it} + \alpha_7 POR_{it} + \upsilon_{it} \quad ..(11)$$

$$\sigma_{it}^E = \alpha_1 SIZEDUM_{(BIG/MID/SMALL)} * GURN_{it}^K + \alpha_2 LEV_{it} + \alpha_3 DIV_{it} + \alpha_4 LOSS_{it} + \alpha_5 GAP_{it} + \alpha_7 POR_{it} + \upsilon_{it} \quad ..(12)$$

$$\sigma_{it}^V = \alpha_1 SIZEDUM_{(BIG/MID/SMALL)} * GURN_{it}^K + \alpha_2 LEV_{it} + \alpha_3 DIV_{it} + \alpha_4 LOSS_{it} + \alpha_5 GAP_{it} + \alpha_7 POR_{it} + \upsilon_{it} \quad ..(13)$$

This will estimate, not only the directional impact of OBS guarantees on market risk in a given size group, but also the strength impact of these activities given the size group. Therefore, the size group may enhance the effect of OBS guarantees contracts on a bank's risk, or discourage the effect of OBS guarantees contracts on a bank's risk.

5.4. Result Analysis

5.4.1. Size separation analysis:

Here we report the empirical results of the random effect estimations. Our analysis is designed in a way to capture the differences in the marginal propensity to risk (MPR) which might be affected by the operational size differences between BHCs. We believe that the operation size of each BHCs should be an important factor in determining the marginal propensity to risk factors (on- and off-balance-sheet), in other words, large BHCs should react differently than small BHCs or medium size BHCs. In order to test this hypothesis, we divide our BHCS sample into three groups, big, medium, and small. This size classification should not interfere with the SIZE factor included in the regression model. The independent variable SIZE is included as a control variable in order to measure the impact of OBS guarantees contracts on the market overall risk, while the three size classifications are to see the differences in the MPR between the three size groups. It may also be viewed as a statistical smoothing process in order to eliminate some of the outliers from of our sample. A simple investigation of the BHCs sample will reveal that there is a significant difference between the sizes of the BHCs (there are upper outliers and lower outliers). The number of BHCs with total assets less than \$100 trillion is in the range of 30-40 BHCs during our study period while only about 10-20 BHCs are greater than \$100 trillion. Also, within the less than \$100 trillion bracket there are about 15-20 BHCs ranging between \$20 million and \$100 million, and about 15-30 BHCs have less than \$20 trillion in total assets value. This significant difference in the distribution of the BHCs total assets may suggest that there is a significant difference in the marginal propensity to risk (MPR) which implies that significant differences in risk management policies for each group of the BHCs. Therefore, each group will include 18

BHCs. The 18 big BHCs count for at least 80% of total assets of all BHCs in our sample with about 12% for the 18 medium BHCs and only 2% for the 18 small BHCs.

We employ a panel data model (random effects), instead of a simple time-series OLS or cross-section OLS for two main reasons. First, neither one of these two (time-series or cross-section) methods alone will yield sufficient degrees of freedom in regression analysis. Second, regressions based on cross-section cannot be used to account for shifts in market measures of risk and accounting data through time; also time series analysis alone cannot be used easily to study inter-bank relationships and comparisons. Following is the result of the econometric analysis for each group and each risk measure.

5.4.1.1 OBS guarantees contracts:

Unused Commitments: The results reported demonstrate that unused commitments contracts are statistically significant for all the risk measures for the big BHCs group. The market participants value these activities as risk-reducing factors for both systematic and the unsystematic risk measures. Figure (5-1) reports that unused commitments form 21% of the overall amount of OBS guarantees positions held by BHCs which might be viewed as a reason why market participants consider these type of guarantees in their risk valuations. In both the medium- and the small-sized groups, unused commitments positions are statistically insignificant on all risk measures included in our analysis (systematic CAPM risk (Beta), the standard deviation of equity return measure (σ_{it}^{E}) and the implied asset volatility measure (σ_{it}^{V})). This insignificant relation between unused commitments and the risk measures imply that investors do not price the risk of these contracts that BHCs may incur by having these positions in the case of

medium- and small-sized BHCs. The reasons for this insignificance might be because of the small portion of the unused commitments contracts relative to BHCs total assets. Moreover, unused commitments seem to add a good deal to the diversification position of big banks' asset portfolios while there is no impact on the diversification positions for both medium and small BHCs.

Standby Letters of Credi: **T**he results propose that SLCs are viewed as a risk-reducing factor for both the standard deviation of equity return measure (σ_{it}^{E}) and the implied asset volatility measure (σ_{it}^{V}); while it is statistically insignificant in the case of systematic risk measure (BETA) for the three BHCs size groups. The negative impact between SLCs and two of the risk measures ($\sigma_{it}^{E}, \sigma_{it}^{V}$) imply that market participants view standby letters of credit as risk-reducing factors in the risk measures where both systematic and unsystematic risk is represented; however it has no impact on the unsystematic risk measure (beta). In other words, SLCs are a successful way to diversify a bank's specific risk measure while it has no significant role in the level of market systematic risk. Moreover, the negative relation may come from the nature of the standby letters of credit positions since it includes a portion that guarantees some bond issuance, commercial or municipal bonds, which might be viewed as a safe guarantees and will be fulfilled by these municipals and it is not a high risk source.

Commercial Letters of Credit, unlike SLCs, CLCs are statistically insignificant for almost all the risk measures across the three BHCs groups. However, there exists a significant negative relation between the Beta measure and CLCs in the case of big and small BHCs groups. The insignificant relation between CLCs and the risk

measures imply that investors do not price the risk of these contracts that BHCs may incur by having these positions. The reasons for this insignificance might be because of the small portion of these contracts relative to other OBS guarantees positions. Moreover, CLCs seem to add no impact on the diversification position of a bank's asset portfolios. Interestingly, CLCs are considered a risk reducing factor in the case of the systematic risk which can be interpreted from the nature of CLCs since they are used as a facilitator to the general trade environment in the market which will affect the overall level of risk in the market negatively.

Participations: This type of guarantees activity is a risk-reducing factor in the case of the big BHCs for the three risk measures (both the systematic and the unsystematic) and it is statistically insignificant for both the medium and small BHCs. The negative relation can be viewed as market participants value this position in their required rate of return, and they consider it as a risk-reducing factor according to the three risk measures (Beta, σ_{it}^{E}, σ_{it}^{V}) for the big BHCS group. This means that participations positions are a concern for the well-diversified investors. Although participations contracts are significantly risk-reducing factors for big BHCs, they are statistically insignificant for both the medium BHCs and the small BHCs. This insignificant impact might be interpreted as meaning the market participants believe that the medium and small BHCS are not able to deal with these contracts that need highly qualified skills and risk management tools that might not be available in the small BHCs. We also find a significant positive relation between participations and beta risk measure in the medium BHCs sample, which might be a result of hetroskedasticity, seen from the LM multiplier reported at the bottom of each table.

5.4.1.2. On-Balance-Sheet Accounting Measures:

Generally the on-balance-sheet accounting measures hold their expected sign as suggested by theory explanation although they are not always. However, for completeness we will discuss each of them separately.

Leverage (LEV): There is a significant positive impact on two risk measures (σ_{it}^{E}, and σ_{it}^{V}) for large and small size BHCs and it is statistically insignificant for the Beta risk measure. Interestingly, it is insignificant for the equity risk and the implied asset risk (σ_{it}^{V}) for the medium BHCs and significantly negative for the Beta risk measure. The positive significant relation indicates that as a bank's leverage increases the market includes this in their risk valuation, suggesting that OBS guarantees contracts will contribute to the total leverage of BHCs and thus will increase their risk.

Diversification (DIV): This variable carries a significant negative relation to the equity risk (σ_{it}^{E}) and the implied asset risk (σ_{it}^{V}) for the three groups, which is expected. Nevertheless, it carries a significant positive relation with the systematic bank's risk (Beta) for the small-sized and insignificant positive sign for the big and medium size groups. The negative sign suggest that as banks become more diversified they will be able to eliminate that portion of the unsystematic risk. The positive sign, in the Beta model, suggests that diversification will not eliminate/reduce the systematic market risk. Thus, guarantees contracts will diversify the unsystematic risk but they will not diversify the systematic risk. Figure (2) indicates that our sample BHCs are not well diversified and they are using mainly participations and commitments in addition to other non-traditional activities as diversification tools.

Credit Risk (LOSS): This factor has a significant and positive influence on all market risk measures for the big BHCs, as expected. It is also significantly positive on both the equity return risk (σ_{it}^{E}) and the implied asset risk (σ_{it}^{V}), but statistically insignificant on the Beta measure for medium BHCs. It is insignificant for almost all risk measures for the small BHCs. The positive sign supports our theoretical considerations and it suggests that as banks' default risk increases, market participants will reflect this in their evaluation. It also suggests that when OBS guarantees positions are held by banks more default risk will be expected by the market.

Interest rate risk (GAP): As expected, this variable holds the positive sign on two market measures of risk, equity return risk (σ_{it}^{E}) and implied asset risk (σ_{it}^{V}), for the three BHCS groups, which suggests that the greater the absolute value of the interest rate gap the greater the bank's risk. The results however report an inverse relation on the Beta risk measure, which may be explained by the fact that banks use high gap values to hedge their asset portfolios and hence reduce risk.

Operational Risk (SIZE): The results indicate a significant negative relation between size and two of the risk measures, equity return risk (σ_{it}^{E}) and implied asset risk (σ_{it}^{V}), for the three bank group. For the Beta risk measure the sign is unexpectedly positive for the big and small-sized BHCs, and insignificantly positive for the medium BHCs. The positive relation between size and Beta risk can be viewed as security from increases in operations. Consequently the market will translate this expansion as a transitory period which will include more risk since banks may hold more assets than they can manage. The insignificant relation can be justified as the Beta measure of risk

includes only market systematic risk which can't be diversified by increasing a bank's operations.

Earning Variability Risk (POR): This variable carries the expected sign for both the big and medium BHCs on both equity return risk, σ_{it}^{E} and implied asset risk (σ_{it}^{V}), and it is insignificant for the Beta measure. It also has insignificant impact on the three risk measures in the case of medium BHCs.

5.4.2. Size interactions analysis:

Tables 5-14 to 5-17 report the results of regression equations 11-13, where we examine the interaction between bank's size and OBS guarantees contracts on market risk measures. The OBS guarantees coefficients generally carry the same directional relation with banks' market risk. However, the quantitative relation is higher, in other words the BHCs size increase the sensitivity level between the percentage changes in these OBS guarantees and the market risk behavior. For example, SLCs contracts are found to be a significant risk reducing factor ($\sigma_{it}^{E}, \sigma_{it}^{V}$) for the three size BHCs groups in our separate-groups analysis. Although SLCs hold the same significant risk reducing impact for the same groups, the sensitivity is different when guarantees activities interact with the size dummy variables. Moreover, the market participants' valuation of OBS guarantees contracts on banks market risk is different from one size group to another. For instance, if we consider three banks, the first one is from the big BHCs group, the second one is from the medium BHCs group, and the third one is from the small BHCs group, and all of them decide to increase their position on SLCs in the market by the same amount, then we should expect that the impact of these on the banks' market risk valuation to be

different from one group to another. Generally speaking, the risk sensitivity is higher in the case of the small-sized banking firms than the medium-sized. The smallest impact will be on the largest banking firms, i.e., the bank's size is adversely related to bank's risk sensitivity of guarantees contracts.

The interaction analysis suggests that unused commitments contracts are significant risk-reducer factors for the three BHCs size groups, while this type was a significant risk reducer for only the big BHCs group in the separate-groups analysis. Moreover, the on-balance-sheet factors generally hold their expected impact on market risk.

5.5. Summary Conclusion and Policy Implications:

This research aims to test the market discipline existence of OBS guarantees contracts and bank holding companies' market risk. In addition to the traditional market risk measures, we employ a contingent claim model that accounts for the non-linear relationship between OBS guarantees and the market risk. Therefore, we have three risk measures, systematic risk (Beta), standard deviation of equity return, and the implied asset volatility (from the contingent claim model). We include four OBS guarantees contracts, unused commitments, SLCs, CLCs, and participations, and six on-balance-sheet risk measures as control variables.

Our analysis is designed in a way to capture the differences in the marginal propensity to risk (MPR) which might be affected by the operational size differences between BHCs. We believe that the operation size of each BHCs should be an important factor in determining the marginal propensity to risk factors (on- and off-balance-sheet).

In other words, large BHCs should react differently from small BHCs or medium-size BHCs. In order to test this prediction, we divide our BHCS sample into three groups, big, medium, and small.

Several conclusions may be drawn from these results. First, unused commitments, SLCs, and participations contracts are all significant players on market risk valuation in big BHCs, and they are being viewed as risk-reducers according to the three risk measures. Secondly, SLCS contracts are also a significant risk-reducing factor for both medium- and small-sized BHCs. Third, unused commitments, CLCs, and participations do not seem to have much influence on the valuation of banks three market risk measures (Beta, σ_{it}^{E} , and σ_{it}^{V}) for the three BHCs groups. Fourth, market participants generally view OBS guarantees as potential risk-diversification tools. Fifth, small BHCs have different MPR than both big and medium BHCs, which may follow the economies of scope concept and the "big to fail" doctrine. Sixth, the on-balance-sheet variables are consistent with the existing literature and they do have an impact on the pricing process of a bank's equity. To a certain extent, the relation between these accounting risk variables and different market risk measures varies among the BHCs groups. Therefore, more capital requirements and regulations on banks OBS guarantees activities may distort the large banks market positions.

References:

[1] Angbazo, L., "Commercial Bank Net Interest Margins, Default Risk, Interest Rate Risk and Off-Balance Sheet Banking", *Journal of Banking and Finance*, 1997, 21, 55-87.

[2] Angelidis, D., and Lyroudi, K., "The Magnitude of Off Balance Sheet Activities for The Evaluation Of Banking Productivity", working paper, *International Conference on Finance*, Copenhagen-Denmark, September 2-4, 2005.

[3] Avery, Robert, and Elijah Brewer, "Risk-Based Capital and Off-Balance Sheet Activities" Proceeding of a Conference on Bank Structure and Competition, *Federal Reserve Bank of Chicago*, 1988, 261-287.

[4] Avery, R. B. and A. N. Berger, "Loan Commitments and Bank Risk Exposure", *Journal of Banking and Finance*, February 1991, 15, 173-92.

[5] Beaver W., Kettler K., and Scholes M., "I The Association Between Market Determined and Accounting Determined Risk Measures", *The Accounting Review,* October 1970, 654-682.

[6] Bennett, B., "Off Balance Sheet Risk in Banking: The Case of Standby Letters of Credit" *Federal Reserve Bank of San Francisco Economic Review*, No. 1, 1986, 19-29.

[7] Benveniste, L. M. and A. N. Berger. "An Empirical Analysis of Standby Letters of Credit," Proceedings of the Conference on Bank Structure and Competition. *Chicago: Federal Reserve Bank of Chicago,* 1986, 387-412.

[8] Benveniste, L. M. and A. N. Berger. "Securitization with Recourse: An Instrument that offers Uninsured Bank Depositors Sequential Claims", *Journal of Banking and Finance*, 11, September 1987, 403-424.

[9] Berger, A. N. and G. F. Udell. "Collateral, Loan Quality, and Bank Risk", *Journal of Monetary Economic*, 25, January 1990, 21-42.

[10] Berger, A. N. "Market Discipline in Banking", Proceedings of the Conference on Bank Structure and Competition, *Chicago: Federal Reserve Bank of Chicago*, 1991, 419-427.

[11] Berger, A.N. and G.F.Udell, "Relationship Lending and Lines of Credit in Small Firm Finance" *Journal of Business*, 1995, 68, 351-382

[12] Brewer, E., and Cheng L., "How the Market Judges Bank Risk", *Federal reserve bank of Chicago economic perspective,* 10(6), 1986, 25-31.

[13] Cates D. C., and Henry A. D., “Risk Management of Off-Balance Sheet Activities”, *The Journal of Commercial Lending”,* January 1989, 27-36.

[14] Chaudhry M. X., “Commercial Bank’s Off-Balance Sheet Activities and Their Relationship With Market-Based Risk Measures”, *4th AFIR International Colloquium,* Orlando*,* United States, April 20-22, 1994.

[15] Davis, S., “*The Diffusion of Financial Innovations”*, *Cambridge: Cambridge University Press*, 1979.

[16] Fama, E.F., “Short-term Interest Rates as Predictors of Inflation”, *American Economic Review,* June 1975, 269-282.

[17] Fama, E.F., “Inflation Uncertainty and the Expected Return on Treasury Bills”, *Journal of Political Economy*, June 1976. 427- 448.

[18] Fama E.F., and Gibbons M., “Inflation, Real Returns, and Capital Investments”, *Journal of Monetary Economic*, May 1982, 397-424.

[19] French K., Rubach R., and Schwert G., “Effects of Nominal Contracting on Stock Returns,” *Journal of Political Economy*, 1983, 91, 70-96.

[20] Furlong, F.T., and M.C.Keeley, “Capital Regulation and Bank Risk-Taking”, *Journal of Banking and Finance*, 1989, 35, 883-891.

[21] Gorton, Gary, and Anthony M. Santomero, “Market Discipline and the Valuation of Bank Subordinated Debt”, *Journal of money, credit and Banking*, February 1990, 22, 118-128.

[22] Hamada, R.S, “The Effect of the Firm's Capital Structure on the systematic Risk of Common Stocks”, *Journal of Finance*, May 1972, Vol. 27, 435-452.

[23] Hassan, M. K. “The Market Perception of the Riskiness of Large U.S. Bank Commercial Letters Of Credit”, *Journal of Financial Services Research*, 6, September 1992, 207-221.

[24] Hassan, Gordon, and Peterson, “Off-Balance Sheet Activities and Bank Default-Risk Premia: A Comparison of Risk Management”, *Journal of Economic and Finance*, 1993, Vol 17, No. 3, 69-83.

[25] Hassan, M. K., G. V. Karels and M. O. Peterson, “Deposit Insurance, Market Discipline and Off- Balance Sheet Banking Risk of Large U.S. Commercial Banks”, *Journal Of Banking And Finance*, May 1994, Vol.18, No.3, 575-594.

[26] Hassan, M. K., Lai, V. S., and Yu, M. T., “Market Discipline of the Canadian Bank’s Letters of Credit Activities: An Empirical Examination”, *The Service Industries Journal,* Volume 22, No. 4, October 2002, 187-208.

[27] Hassan, M. Kabir; Sackley, William H., "Determinants of Thrift Institution Off-Balance Sheet Activities : An Empirical Investigation", *Journal of Financial Management & Analysis*, Jan-Jun2006, Vol. 19 Issue 1, p1-13.

[28] Jagtiani, J., "Characteristics Of Banks That Are More Active In The Swaps Market", *Journal Of Financial Services Research*, 1995, Volume 9, No. 4.

[29] Jagtinai,J., A.Saunders And G.Udell, "The Effect of Bank Capital Requirements on Bank Off-Balance Sheet Financial Innovations", *Journal Of Banking And Finance*, 1995, 19, 647-658.

[30] Jacques, K. And P.Nigro, "Risk-Based Standards, Portfolio Risk and Bank Capital: A Simultaneous Equations Approach", *Journal Of Economic And Business*, 1997, 49, 533-547.

[31] Koppenhaver, G. O., "The Effects of Regulation of Bank Participations in the Guarantee Market", *Research In Financial Services,* 1989, 165-80.

[32] Koppenhaver, G. O. and R. D. Stover, "Standby Letters of Credit and Large Bank Capital: An Empirical Analysis", *Journal of Banking and Finance*, 15, 1991, 315-327.

[33] Lieu, P., Yeh, T., and Chiu, Y., "Off-Balance Sheet Activities and Cost Inefficiency in Taiwan's Banks", *The Service Industries Journal*, Vol.25, No.7, October 2005, pp.925–944.

[34] Mandelker G. N. and S. Ghon R., "The Impact of Degrees of Operating and Financial Leverage on Systematic Risk of Common Stock", *Journal of Financial and Quantitative Analysis*, March 1984, 19 No.1, 45-57.

[35] Mansfield, E, "Technical Change and the Rate of Imitation", *Econometrica*, 1961, 29, 741-766.

[36] Pavel, C. and D.Philis, "Why Commercial Banks Sell Loans: An Empirical Analysis" Economic Perspectives*, Federal Reserve Bank of Chicago*, 1987, May/June, 3-14.

[37] Pavel, C., "Loan Sales Have Little Effect on Bank Risk", Economic Perspectives, *Federal Reserve Bank of Chicago*, 1988, May/June, 23-31.

[38] Ronn, Ehud, and A.K. Verma, "Pricing Risk-Adjusted Deposit Insurance: An Option-Based Model", *Jornal of Finance*, September 1986, 41, 871-895.

[39] Saunders A., Strock E. and Travlos N. G., "Ownership Structure, Deregulation, and Bank Risk Taking", *The Journal of Finance*, June 1990, 45 No. 2, 643-654.

[40] Sinha, Ram Pratap, "Off Balance Sheet Exposure of Indian Commercial Banks - Some Emperical Results", *Indian Institute of Capital Markets 9th Capital Markets Conference* Paper Available at SSRN: http://ssrn.com/abstract=877813.

Figure (5-1): Distribution of Guarantees Contracts

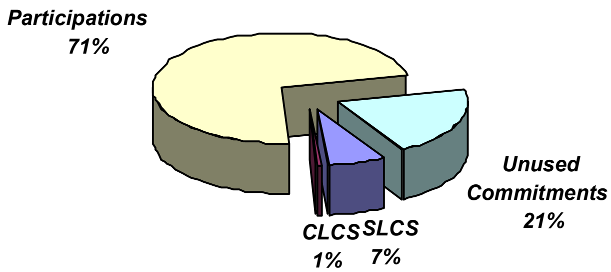

Figure (5-2): Distribution of Loans-to-Assets Ratios

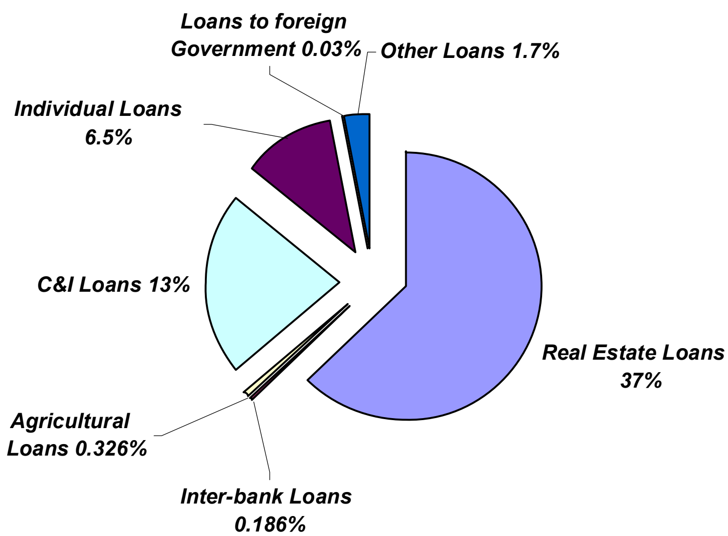

Table (5-1): Correlation Coefficients[¤]
N=324.

	UCOM	SLCS	CLCS	PARTI	LEV	DIV	LOSS	GAP	SIZE	POR
UCOM	1.0000									
SLCS	0.93564	1.00000								
CLCS	0.96803	0.91175	1.00000							
PARTI	0.49139	0.53601	0.53336	1.00000						
LEV	0.080899	0.070288	0.065181	0.070411	1.00000					
DIV	-0.18842	-0.19772	-0.22030	-0.18769	-0.21456	1.0000				
LOSS	0.22292	0.20211	0.17798	0.14896	-0.04343	-0.0629	1.00000			
GAP	-0.15276	-0.17509	-0.21425	-0.18536	-0.25077	0.26808	0.18528	1.00000		
SIZE	0.14839	0.17873	0.158859	0.34855	0.056220	-0.2380	0.20349	-0.3024	1.00000	
POR	0.063253	0.070970	0.071085	0.064501	0.18242	0.00983	0.14695	`0.13250	0.0039579	1.00000

[¤] **Note:** The correlation coefficients above show a high correlation between OBS guarantees (UCOM, SLCS, CLCS, PARTI), because of this high correlation we estimated our models using each one in a separate model in order to avoid the multicolinearity problem.

Table (5-2): BHCs Panel Results-Unused Commitments

	Panel (A): Big BHCs			Panel (B): Medium BHCs			Panel (C): Small BHCs		
	β	σ_{it}^{E}	σ_{it}^{V}	β	σ_{it}^{E}	σ_{it}^{V}	β	σ_{it}^{E}	σ_{it}^{V}
Constant	1.42012 (.967486)	-.051894 (1.17585)	-.38694 (-.80069)	-.3191 (-.1834)	.0873 (1.8344)^	.1153 (2.2022)**	-6.6097 (-1.8193)^	-.00037 (-.00732)	.2019 (.35975)
Unused Commitments	-.060035 (-2.48934)*	-.00066 (-1.930)**	-.0078 (-2.019)**	.1142 (.2165)	.0123 (.8404)	.0135 (.8457)	.5546 (.0645)	-.1848 (-1.4953)	-.8159 (-1.5987)^
LEV	-1.52852 (-1.1677)	.1297 (3.1370)*	.22348 (2.8961)*	-3.0575 (-2.6984)*	.01398 (.4444)	-.5124 (-.14832)	4.40385 (1.3110)	.10327 (2.2178)**	.8699 (1.7072)^
DIV	.612812 (1.52245)	-.04852 (-4.0532)*	-.5405 (-4.1354)*	.39751 (1.4704)	-.01835 (-2.4648)*	-.90031 (-2.4828)*	2.2629 (3.5659)*	-.03071 (-3.3070)*	-.53332 (-3.2903)*
LOSS	19.1515 (2.49031)*	.7436 (3.3353)*	.81344 (3.3624)*	-6.2566 (-.58697)	.71789 (2.3798)*	.97987 (2.4163)*	31.308 (1.2317)	-.16380 (-.4676)	-.48620 (-.48556)
GAP	-25.9839 (-5.32907)*	.3272 (2.2533)**	.47496 (2.3632)**	-2.7777 (-.6794)	.23909 (2.0966)**	.56764 (2.1382)**	-39.599 (-4.0703)*	.58244 (4.2178)*	.74472 (4.27466)*
SIZE	.189083 (2.03707)**	-.00652 (-2.3318)**	-.0737 (-2.4054)**	.52233 (3.5747)*	-.01258 (-3.1218)*	-.07394 (-3.1476)*	.63310 (1.93665)**	-.01223 (-2.52108)*	-.32294 (-2.4460)**
POR	-.013875 (-1.71361)	-.000618 (-2.5769)*	-.06652 (-2.5412)*	.09274 (.55626)	.006685 (1.4527)	.07265 (1.4366)	.01430 (.081969)	-.004417 (-1.9682)**	-.05775 (-1.9375)**
R^2	.351310	.366193	.393882	.2603	.3021	.311	.2378	.3571	.3836
LM	26.0929 (.000)*	8.51349 (.004)*	7.6904 (.006)*	.14561 (.703)	13.151 (.000)*	13.496 (.000)*	1.7894 (.181)	5.4679 (.019)**	5.0001 (.025)**
DW	1.00267 (.000,.000)*	.966538 (.000,.000)*	.966219 (.000,.000)*	.85068 (.000,.000)*	.87600 (.000,.000)*	.87674 (.000,.000)*	.5006 (.000,.000)*	.80301 (.000,.000)*	.82242 (.000,.000)*
χ^2	21.864 (.0027)*	29.292 (.0001)*	30.121 (.0001)*	15.361 (.0316)**	18.461 (.0101)*	18.626 (.0094)*	17.236 (.0159)**	16.657 (.0197)**	16.223 (.0232)**

Notes:
(1) The dependent variables show in the second row, the independent variables show in the first column.
(2) The numbers between parentheses below variable's coefficients are t-statistics,
(3) The numbers between parentheses below econometric' tests (LM, DW, χ^2) are P-values.
(4) Significance level: * = 1%, ** = 5%, ^ = 10%.

Table (5-3): BHCs Panel Results-SLCs

	Panel (A): Big BHCs			Panel (B): Medium BHCs			Panel (C): Small BHCs		
	β	σ_{it}^{E}	σ_{it}^{V}	β	σ_{it}^{E}	σ_{it}^{V}	β	σ_{it}^{E}	σ_{it}^{V}
Constant	2.2770 (1.8207)^	-.0528 (-1.2581)	-.399 (-.8670)	-.1544 (-.0971)	.0429 (.9711)	.661 (1.3643)	-6.6212 (-1.8366)^	.0251 (.5266)	.491 (.9415)
SLCS	-.0932 (2.4346)*	-.01643 (-2.717)*	-.1776 (2.5343)*	4.2575 (1.4853)	-.2966 (-3.8437)*	-.4260 (-3.8578)*	-1.4961 (-.03716)	-1.9989 (-3.8180)*	-2.2315 (-3.8992)*
LEV	-.8544 (-.7038)	.1158 (2.9598)*	.51838 (-2.5343)*	-2.795 (-2.466)*	.0124 (.3988)	-.06668 (-.1953)	4.27503 (1.3128)	.07465 (1.7425)^	.5667 (1.2110)
DIV	.6291 (1.6576)^	-.0501 (-4.2509)*	-.558 (-4.3344)*	.38683 (1.4180)	-.01978 (-2.5989)*	-.2178 (-2.6068)*	2.27407 (3.5513)*	-.02628 (-3.0474)*	-.33849 (-3.03113)*
LOSS	20.0892 (2.4539)*	.77064 (3.5648)*	.8420 (3.5885)*	-3.3918 (-.3171)	.6383 (2.2134)**	.70938 (2.2461)**	-31.6227 (-1.27941)	-.005828 (-.01798)	-.05077 (-.01433)
GAP	-25.514 (-5.4605)*	.30143 (2.0930)**	.44727 (2.2076)**	-3.0454 (-.7430)	.27792 (2.4763)*	.51098 (2.5278)*	-39.5466 (-4.0362)*	.42377 (3.1566)*	.66775 (3.1990)*
SIZE	-.003811 (-.05127)	-.004598 (-1.8369)^	-.0522 (-1.9037)**	.4647 (3.6121)*	-.005952 (-1.6862)^	-.0663 (-1.7137)^	.6530 (2.7989)*	-.01164 (-3.6184)*	-.1258 (-3.5922)*
POR	-.008652 (-1.0903)	-.000735 (-3.1151)*	-.0794 (-3.0837)*	.1045 (.6213)	.004536 (.97435)	.04821 (.94412)	.015355 (.08846)	-.00438 (-2.0651)**	-.04767 (-2.1649)**
R^2	.3724	.3858	.4079	.2644	.3075	.3934	.2377	.4308	.4499
LM	22.4375 (.000)*	6.5294 (.011)*	5.7732 (.016)*	.08524 (.770)	6.7739 (.009)*	6.8434 (.009)*	1.7572 (.185)	3.0793 (.079)^	2.8111 (.094)^
DW	1.0908 (.000,.000)*	.9618 (.000,.000)*	.96001 (.000,.000)*	.8509 (.000,.000)*	.62885 (.000,.000)*	.62860 (.000,.000)*	.501412 (.000,.000)*	.88188 (.000,.000)*	.90448 (.000,.000)*
χ^2	10.427 (.0565)**	28.849 (.0002)*	29.672 (.0001)*	14.881 (.0439)**	22.470 (.0021)*	22.504 (.0021)*	18.573 (.0096)*	17.076 (.0169)*	16.712 (.0194)**

Notes:
(1) The dependent variables show in the second row, the independent variables show in the first column.
(2) The numbers between parentheses below variable's coefficients are t-statistics,
(3) The numbers between parentheses below econometric' tests (LM, DW, χ^2) are P-values.
(4) Significance level: * = 1%, ** = 5%, ^ = 10%.

Table (5-4): BHCs Panel Results-CLCS

	Panel (A): Big BHCs			Panel (B): Medium BHCs			Panel (C): Small BHCs		
	β	σ_{it}^{E}	σ_{it}^{V}	β	σ_{it}^{E}	σ_{it}^{V}	β	σ_{it}^{E}	σ_{it}^{V}
Constant	1.6940 (1.1515)	-.04032 (-.8962)	-.2594 (-.5269)	-1.1712 (-.7047)	.0737 (1.6067)^	.1003 (1.9884)**	-6.1499 (-1.7936)^	.0120 (.2353)	.346 (.6173)
CLCS	-4.1205 (1.6796)^	-.005925 (-.0808)	-.02836 (-.03546)	-57.156 (1.2096)	.34147 (.26382)	.59264 (.27563)	-844.243 (2.0106)^	-1.4111 (-.24076)	-2.7372 (-.2699)
LEV	-1.3310 (-1.0177)	.13148 (3.3309)*	.32564 (2.9143)*	-2.8121 (-2.4587)*	.01719 (.53924)	-.01536 (-.04385)	3.70602 (1.25606)	.13040 (2.9941)*	.2187 (2.4875)*
DIV	.5498 (1.3510)	-.0483 (-3.9592)*	-.5377 (-4.0324)*	.38846 (1.4182)	-.01880 (-2.48606)*	-.20178 (-2.4998)*	2.0296 (3.4033)*	-.03505 (-3.8604)*	-.383 (-3.8625)*
LOSS	18.7687 (2.4086)**	.73640 (3.2996)*	.80598 (3.3285)*	-2.3324 (-.21059)	.71803 (2.28848)**	.7979 (2.3200)**	-34.6165 (-1.4582)	-.06574 (-.18942)	-.7095 (-.18648)
GAP	-25.669 (-5.2703)*	.34025 (2.3256)**	.48833 (2.4307)**	-2.3328 (-.5633)	.23878 (2.0586)**	.66752 (2.1010)**	-36.379 (-3.9748)*	.57836 (4.1194)*	.6392 (4.1627)*
SIZE	-.13026 (1.4459)	-.008275 (-2.9769)*	-.09291 (-3.05004)*	.6096 (4.8107)*	-.01099 (-3.1270)*	-.1220 (-3.1573)*	.65819 (3.4724)*	-.017954 (-5.8364)*	-.1961 (-5.8457)*
POR	-.01161 (-1.4430)	-.000554 (-2.3130)**	-.0595 (-2.2749)**	.09154 (.5443)	.0063167 (1.3551)	.06845 (1.3360)	.04140 (.24069)	-.0047878 (-2.1243)**	-.05204 (-2.1050)**
R^2	.3531	.3861	.39786	.2602	.2900	.33825	.2844	.3340	.3804
LM	22.776 (.000)*	7.3924 (.007)*	6.6343 (.010)*	.7908 (.374)	8.4631 (.004)*	8.6507 (.003)*	1.6182 (.203)	7.3925 (.007)*	6.6984 (.010)*
DW	1.0379 (.000,.000)*	.9407 (.000,.000)*	.9415 (.000,.000)*	.8286 (.000,.000)*	.85504 (.000,.000)*	.85504 (.000,.000)*	.58388 (.000,.000)*	.7573 (.000,.000)*	.7727 (.000,.000)*
χ^2	21.198 (.0035)*	28.731 (.0002)*	29.558 (.0001)*	17.934 (.0113)**	17.711 (.0133)**	17.785 (.0130)**	18.716 (.0091)*	17.917 (.0124)*	17.535 (.0143)*

Notes:
(1) The dependent variables show in the second row, the independent variables show in the first column.
(2) The numbers between parentheses below variable's coefficients are t-statistics,
(3) The numbers between parentheses below econometric' tests (LM, DW, χ^2) are P-values.
(4) Significance level: * = 1%, ** = 5%, ^ = 10%.

Table (5-5): BHCs Panel Results-Participations

	Panel (A): Big BHCs			Panel (B): Medium BHCs			Panel (C): Small BHCs		
	β	σ_{it}^{E}	σ_{it}^{V}	β	σ_{it}^{E}	σ_{it}^{V}	β	σ_{it}^{E}	σ_{it}^{V}
Constant	1.7462 (1.4714)	-.02828 (-.65990)	-.1354 (-.2885)	-.9283 (-.6379)	.0653 (1.5098)	.909 (1.9103)**	-7.3960 (-2.0312)**	.0140 (.28188)	.373 (.6850)
Participations	-.07460 (1.7557)^	-.002691 (-1.8543)^	-.02927 (1.8473)^	.49875 (2.7690)*	.003668 (.68096)	.02397 (.6708)	-2.7985 (-.7640)	.02867 (.57249)	.4011 (.75094)
LEV	-.47906 (-.40797)	.12158 (3.0604)*	.21486 (2.6478)*	-2.6627 (-2.5078)*	.021407 (.6852)	.03110 (.09078)	4.5930 (1.4788)	.12736 (3.0087)*	.5148 (2.4793)*
DIV	.71132 (1.9265)**	-.05206 (-4.3036)*	-.5784 (-4.3827)*	.70553 (2.53966)*	-.01664 (-2.0196)**	-.1846 (-2.0403)**	2.35005 (3.7092)*	.12736 (-3.8381)*	-.3655 (-3.8174)*
LOSS	20.4765 (2.5470)*	.71629 (3.2814)*	.78305 (3.3059)*	-5.1371 (-.4994)	.76302 (2.5549)*	.84782 (2.5924)*	-35.319 (-1.4178)	-.04579 (-.13506)	-.435 (-.11730)
GAP	-22.9456 (-4.8213)*	.26287 (1.7230)^	.30477 (1.8310)^	2.3798 (.55959)	.76302 (2.23616)**	.81246 (2.2738)**	-43.1387 (-4.1539)*	.58367 (4.0835)*	.65086 (4.1680)*
SIZE	.007350 (.143622)	-.008209 (-3.9346)*	-.09129 (-3.9763)*	.52495 (4.9678)*	-.0106 (-3.37252)*	-.1175 (-3.4008)*	.74039 (3.5533)*	-.01794 (-6.0799)*	-.1965 (-6.1280)*
POR	-.008764 (-1.1654)	-.000587 (-2.5573)**	-.0633 (-2.5285)*	.04416 (.28055)	.005760 (1.2329)	.062429 (1.2166)	.02867 (.16995)	-.00478 (-2.154)**	-.05185 (-2.1219)**
R^2	.2951	.35319	.38496	.30856	.34088	.3931	.2248	.3494	.3689
LM	18.265 (.000)*	8.6767 (.003)*	7.8415 (.005)*	.32080 (.571)	8.2625 (.004)*	8.4369 (.004)*	2.5432 (.111)	8.1177 (.004)*	7.6421 (.006)*
DW	1.1321 (.000,.000)*	.92615 (.000,.000)*	.92469 (.000,.000)*	.92145 (.000,.000)*	.88811 (.000,.000)*	.8876 (.000,.000)*	.4970 (.000,.000)*	.79075 (.000,.000)*	.81703 (.000,.000)*
χ^2	13.254 (.0562)**	30.403 (.0001)*	31.300 (.0001)*	14.285 (.0463)**	22.806 (.0018)*	23.113 (.0016)*	24.925 (.0008)*	24.695 (.0009)*	24.139 (.0011)*

<u>**Notes**</u>:
(1) The dependent variables show in the second row, the independent variables show in the first column.
(2) The numbers between parentheses below variable's coefficients are t-statistics,
(3) The numbers between parentheses below econometric' tests (LM, DW, χ^2) are P-values.
(4) Significance level: * = 1%, ** = 5%, ^ = 10%.

Table (5-6): The interactions of size dummies with UNUSED COMMITMENTS

	β	σ_{it}^{E}	σ_{it}^{V}
UCD1	-.097535 [.016]	-.00203421 [.007]	-.0422800 [.007]
UCD2	1.10306 [.243]	-.035102 [.047]	-.68879 [.044]
UCD3	26.3997 [.000]	-.398247 [.002]	-.966323 [.002]
LEV	-3.26797 [.036]	.136143 [.000]	.328525 [.000]
DIV	.691703 [.143]	-.029810 [.001]	-.32834 [.001]
LOSS	1.00677 [.917]	.745215 [.000]	1.0814393 [.000]
GAP	-17.9108 [.003]	.574678 [.000]	.842658 [.000]
POR	.00204593 [.870]	-.000740351 [.002]	-.00802199 [.002]
R^2	.411460	.500234	.522928
LM	2.17850 [.140]	10.0034 [.002]	8.82957 [.003]
DW	.829674 [.000,.000]	1.42525 [.000,.000]	1.43597 [.000,.000]

Notes:
(1) The dependent variables show in the first row, the independent variables show in the first column.
(2) The numbers between parentheses are P-values.
(3) UCD1 = [(1 if big BHCS, 0 if otherwise) * Unused commitments (where unused commitments= notional value/total assets)].
UCD2 = [(1 if medium BHCS, 0 if otherwise) * Unused commitments (where Unused commitments= notional value/total assets)].
UCD3 = [(1 if small BHCS, 0 if otherwise) * Unused commitments (where Unused commitments= notional value/total assets)].

Table (5-7): The interactions of size dummies with SLCS

	β	σ_{it}^{E}	σ_{it}^{V}
SLD1	-.176114 [.610]	-.028950 [.000]	-.31640 [.000]
SLD2	8.96800 [.079]	-.406420 [.000]	-.645497 [.000]
SLD3	110.077 [.001]	-2.80647 [.000]	-3.08430 [.000]
LEV	-2.79117 [.086]	.098838 [.000]	.87715 [.004]
DIV	.932537 [.047]	-.033542 [.000]	-.36957 [.000]
LOSS	1.79920 [.856]	.727600 [.000]	.795673 [.000]
GAP	-16.5487 [.007]	.466741 [.000]	.523788 [.000]
POR	.00119501 [.925]	-.000824687 [.000]	-.00895056 [.000]
R^2	.389452	565915	.595891
LM	2.58479 [.108]	8.89850 [.003]	7.61118 [.006]
DW	.836148 [.000,.000]	1.45846 [.000,.000]	1.47159 [.000,.000]

Notes:
(1) The dependent variables show in the first row, the independent variables show in the first column.
(2) The numbers between parentheses are P-values.
(3) SLD1 = [(1 if big BHCS, 0 if otherwise) * SLD (where SLD = notional value/total assets)].
SLD2 = [(1 if medium BHCS, 0 if otherwise) * SLD (where SLD = notional value/total assets)].
SLD3 = [(1 if small BHCS, 0 if otherwise) * SLD (where SLD = notional value/total assets)].

Table (5-8): The interactions of size dummies with CLCS

	β	σ_{it}^{E}	σ_{it}^{V}
CLD1	-11.7427 [.015]	-.182236 [.043]	-.698669 [.044]
CLD2	10.0244 [.933]	-1.62913 [.465]	-1.85962 [.470]
CLD3	-428.334 [.294]	-1.49238 [.844]	-1.97384 [.829]
LEV	-4.56148 [.004]	.160570 [.000]	.255332 [.000]
DIV	1.03736 [.029]	-.038081 [.000]	-.41928 [.000]
LOSS	-1.64480 [.870]	.796147 [.000]	.870458 [.000]
GAP	-21.9764 [.000]	.648802 [.000]	.723807 [.000]
POR	.00662415 [.610]	-.000781158 [.001]	-.00847569 [.001]
R^2	.374609	.471570	.493421
LM	2.20855 [.137]	8.93473 [.003]	7.63747 [.006]
DW	.846359 [.000,.000]	1.38935 [.000,.000]	1.39903 [.000,.000]

<u>Notes</u>:
(1) The dependent variables show in the first row, the independent variables show in the first column.
(2) The numbers between parentheses are P-values.
(3) CLD1 = [(1 if big BHCS, 0 if otherwise) * CLCS (where CLCS = notional value/total assets)].
CLD2 = [(1 if medium BHCS, 0 if otherwise) * CLCS (where CLCS = notional value/total assets)].
CLD3 = [(1 if small BHCS, 0 if otherwise) * CLCS (where CLCS = notional value/total assets)].

Table (5-9): The interactions of size dummies with PARTICIPATIONS

	β	σ_{it}^{E}	σ_{it}^{V}
PAD1	-.134560 [.214]	-.00642814 [.001]	-.0702428 [.001]
PAD2	-.166867 [.735]	-.00865669 [.330]	-.0969371 [.319]
PAD3	-2.69181 [.490]	-.179410 [.011]	-.385222 [.016]
LEV	-4.15470 [.009]	.153285 [.000]	.347681 [.000]
DIV	.988024 [.040]	-.039029 [.000]	-.42962 [.000]
LOSS	-.214669 [.983]	.735475 [.000]	.903653 [.000]
GAP	-23.6925 [.000]	.581815 [.000]	.651721 [.000]
POR	.00106588 [.934]	-.000857270 [.000]	-.00630265 [.000]
R^2	.363012	.496372	.517401
LM	2.57204 [.109]	3.27809 [.070]	3.11747 [.077]
DW	.835254 [.000,.000]	1.38815 [.000,.000]	1.39673 [.000,.000]

Notes:
(1) The dependent variables show in the first row, the independent variables show in the first column.
(2) The numbers between parentheses are P-values.
(3) PAD1 = [(1 if big BHCS, 0 if otherwise) * Participations (where Participations = notional value/total assets)].
PAD2 = [(1 if medium BHCS, 0 if otherwise) * Participations (where Participations = notional value/total assets)].
PAD3 = [(1 if small BHCS, 0 if otherwise) * Participations (where Participations = notional value/total assets)].

Table (5-10): List of sample BHCs.

Big BHCS	Small BHCS
A B N AMRO HOLDING N V	AMCORE FINANCIAL INC
AMSOUTH BANCORPORATION	BANCORPSOUTH INC
B B & T CORP	FIFTH THIRD BANCORP
BANK NEW YORK INC	FIRST CITIZENS BANCSHARES INC NC
BANK OF AMERICA CORP	FIRST TENNESSEE NATIONAL CORP
CITY NATIONAL CORP	FIRSTMERIT CORP
COMMERCE BANCORP INC NJ	FULTON FINANCIAL CORP PA
FIRST BANCORP NC	H S B C HOLDINGS PLC
FIRSTMERIT CORP	KEYCORP NEW
INVESTORS FINANCIAL SERVS CORP	NATIONAL CITY CORP
M & T BANK CORP	NEW YORK COMMUNITY BANCORP INC
NATIONAL PENN BANCSHARES INC	P N C BANK CORP
OLD NATIONAL BANCORP	REGIONS FINANCIAL CORP
POPULAR INC	SKY FINANCIAL GROUP INC
SUNTRUST BANKS INC	SOUTH FINL GROUP INC
U S BANCORP DEL	U M B FINANCIAL CORP
WACHOVIA CORP NEW	VALLEY NATIONAL BANCORP
WELLS FARGO & CO NEW	WASHINGTON TRUST BANCORP INC
A B N AMRO HOLDING N V	AMCORE FINANCIAL INC
Medium BHCS	
ASSOCIATED BANC CORP	
B O K FINANCIAL CORP	
COMERICA INC	
COMMERCE BANCSHARES INC	
COMPASS BANCSHARES INC	
CULLEN FROST BANKERS INC	
FIRST MEDIUMWEST BANCORP DE	
MARSHALL & ILSLEY CORP	
MELLON FINANCIAL CORP	
MERCANTILE BANKSHARES CORP	
NORTH FORK BANCORPORATION NY INC	
NORTHERN TRUST CORP	
PROVIDENT BANKSHARES CORP	
REGIONS FINANCIAL CORP	
SYNOVUS FINANCIAL CORP	
T C F FINANCIAL CORP	
UNIONBANCAL CORP	
ZIONS BANCORP	

Chapter Six

Systematic and Unsystematic Risk of Derivative Activities in Bank Holding Companies: Contingent and Non-Contingent Claim Analysis

Abstract

This study employs both contingent and non-contingent claim models to test for the existence of the market discipline hypothesis for OBS derivative contracts in the banking industry. In addition to the CAPM systematic risk measure and the standard deviation of a bank's equity return, we applied the Ronn-Verma option pricing model to see whether the market participants account for derivatives positions when they a value bank's market risk. The benefit of using the contingent claim model is that the traditional linear models seem to be inadequate to estimate the non-linear relation between OBS derivatives and bank risks. In order to capture the differences in the marginal propensity to risk (MPR) between banks in different size groups we divide our bank holding company (BHC) sample into three groups, big, medium, and small. The conclusions are as follows (1) Among the derivatives contracts, swaps are the major player on the market risk valuation, and it is being viewed as risk reducer according to the three risk measures (Beta, equity return risk, and implied asset volatilities) for both big and medium BHCs. (2) Futures, forwards, and options do not seem to be a major influencers on the valuation of bank market risk measures for the three BHCs groups. However, we found a positive significant relation between these three types of derivatives on market systematic risk (Beta). (3) Generally, market participants view OBS derivatives, measured by swaps positions, as more potential risk diversification tools. (4) Small BHCs have a different MPR than both big and medium BHCs. (5) More capital requirements and regulations on bank derivatives activities may distort the large banks market positions.

Derivatives Bank Holding Companies' Systematic and Unsystematic Risks: Contingent and Non-Contingent Claim Models

6.1. Introduction:

During the period 1990-2006 the banking industry faced many types of regulations and risk - credit risk, interest rate risk and foreign exchange risk - which has forced banking firms to extend their operations to include off-balance-sheet (OBS) activities in addition to on-balance-sheet activities. OBS activities have both risk-reducing as well as risk-increasing attributes, and when used appropriately, they can reduce market risk. Recently, the 1997-1998 Asian crisis left banks that had large positions in the Asian derivatives securities markets with large losses. Other examples are the failure of the U.K. investment bank Barings and the bankruptcy of Orange County in California in the 1990s, also linked to OBS activities in derivatives[25].

Theory about how a bank's risk is affected by OBS activities suggests that OBS activities may be related to bank risk in three ways. First, OBS activities are an obligation against a bank and the bank's customers to make a payment in the future under certain circumstances in which the banks and their customers would prefer not to make the payment. Thus OBS activities will increase a bank's risk. Second, OBS activities will reduce a bank's customer risk, in sense that there will be more professional management, a size factor, and other factors. Third, Avery and Berger (1988) claim that OBS activities may reduce risk if they are used to hedge rather than to speculate.

---

[25] Saunders, Anthony and Cornett, Marcia; "Financial Markets and Institutions: a Modern Perspective", second edition, Mc Graw Hill, 2004.

The use of derivatives contracts accelerated during the 1992-2005 period and accounted for much of the growth in OBS activities. Examples of these contracts would be futures, forward, options, and swaps. These financial products, in addition to providing fee income, manage to hedge interest rate risk and foreign exchange risk. Also, use of these instruments have led to an excess of different types of risks for banking institutions. In this study a two-stage analysis has been developed; in stage one we have estimated our dependent variables, which include three market risk measures (1) the systematic market risk (from CAPM, β), (2) the standard deviation of a bank's equity return (σ_E), and (3) the implied asset volatility from the Ronn-Verma option model (σ_V). The second stage has been to regress these dependent variables on the on- and off-balance-sheet risk variables using a panel econometric technique for the bank holding companies (BHCs) sector. The study is organized as follows. Section three presents the methodology of analysis. Section three includes data and empirical analysis. The empirical results are in section four and conclusions and policy implications are presented in section five.

6.2. Methodology:

In this section we intend to test a bank's risk level that might be affected by on and off-balance-sheet bank activities. Our analysis is compromised of two stages, the first stage is to estimate BHCs market risk from the perspective of the equity holders. Three different risk measures are used to estimate BHCs market risk; the first one is market systematic risk (beta), derived from CAPM, second is the standard deviation of bank's equity return (σ_{it}^E), daily return data is used to estimate the yearly BHCs risk, and thirdly

we use a contingent option pricing model to estimate the BHCs implied asset volatility (σ_{it}^{V}) as a measure of BHCs risk. (More detailed discussion will follow). The second stage is to regress these three estimated risk measures (beta, standard deviation of equity return (σ_{it}^{E}), and implied asset volatility (σ_{it}^{V})) as the dependent variables on off- and on-balance-sheet risk measures. Following is a discussion of each of these risks.

6.2.1. Market Risk Measures:

4)*Beta or Systematic Risk* β_{it} *:* in the CAPM framework, risk is measured by the variance of possible returns. However, variance is not a universal measure of riskiness. Our first risk measure is derived from the CAPM return generating process according to the following equation:

$$R_{it} = \alpha_i + \beta_{it} R_{Mt} + \varepsilon_{it} \text{...(1)}$$

where $R_{it} = r_{it} - R_{ft}$ is the holding period return (r_{it}) for the i^{th} over the period t in excess of the risk-free rate of interest (R_{ft}). $R_{mt} = r_{mt} - R_{ft}$ is the holding period return (r_{mt}) for the market portfolio over period t in excess of the risk-free rate of interest (r_{ft}). α_i is the intercept, and ε_{it} is the i^{th} bank-specific factor which is independent of R_{mt}. c represents the systematic risk which measures the security's sensitivity to market-wide events which cannot be diversified away. It reflects differing investor expectations about the relationship between each bank’s return and the market return.

5)*Standard Deviation of Equity Return* σ_{it}^{E}: We are using the standard deviation of bank’s equity return as a measure for the market risk which will include both the market

risk and bank-specific risk. The standard deviation of bank's equity return will be estimated using the following formula:

$$\sigma_{RE} = \sqrt{\sum_{t=1}^{n}(\overline{K}_t - \overline{K}_{Avg})^2} \text{ ....(2)}$$

$\overline{K}_t$ is the Ex-post equity return in period t, $\overline{K}_{Avg}$ is the average annual return during the year.

6)*<u>Contingent Claim Models</u>*: The standard linear approaches to estimate the bank's market risk might be inadequate because not all the risk measures are neither linear nor monotonic functions of a bank's risk. The contingent claim models correct for this nonlinearity of a bank's risk. Ronn and Verma (1986) introduced a contingent claim model nested from Black and Sholes (1973) option pricing model; following is an explanation of this model.

Ronn and Verma introduce the risk-based deposit insurance measure that can be estimated from the market value of a bank's equity and the instantaneous equity's standard deviation. They state that the empirical estimation of risk and deposit insurance premium is measurable when time series data on the market value of a bank's equity and the book value of its debt are available. The equity of a bank can be written as:

$$E = VN(X) - \rho BN(X - \sigma_v \sqrt{T}) \text{ ....(3)}$$

Where:

$$X = \frac{\left(\ln \frac{V}{\rho b} + \frac{\sigma_v^2 T}{2} \right)}{\sigma_v \sqrt{T}} \text{..(4)}$$

$$\sigma_v = \sigma_E \frac{E}{VN(X)} \text{..(5)}$$

where, E is the market value of equity, σ_E is the instantaneous standard deviation of equity return, V is the unobserved post-insurance value of bank assets, B is the book value of debt liabilities, σ_v is the instantaneous standard deviation of asset return, N(~) is the univariate cumulative normal distribution function, and T represents the time until the next audit of bank assets. Equations (4 and 5) can be solved simultaneously for two unknowns, V and σ_v, for each observed E and σ_E. An exogenously determined closure rule is required to solve these simultaneous equations. Banks are audited each year, and at audit time banks are closed if V_T is less than ρB where V_T is the terminal value of assets at time T, and $\rho \leq 1$ is a policy parameter; therefore, the maturity of debt is assumed to be 1.

6.2.2. On-Balance-Sheet Accounting Risk Factors:

7)*Leverage Risk (LEV):* Beaver, Kettler, and Scholes (1970) indicate that as additional debt is added the equity holder’s estimate of return volatility is increased. Hamada (1972) reports that approximately one quarter of systematic risk is explained by the degree of financial leverage. On the other hand, Mandelker and Rhee (1984) find that both operating and financial leverage jointly determine systematic risk. Therefore, if these leverage ratios increase, it may lead to higher variability of bank’s equity returns and

therefore its market risk. Financial leverage is constructed by taking a ratio of total liabilities and total assets.

8)*Diversification Risk (DIV):* a heavy investment in one category of assets will generate a diversification risk. In other words, as banks concentrate their loan operations on one type of clients then the bank will be considered less diversified and the diversification risk will increase and it will directly and indirectly affect the market risk. The Herfindahl Index (HI) can be used to measure the degree of loan portfolio diversification, an increased levels of loan concentration associated with large HI values (i.e. less loan diversification) will increase a bank's risk. Hence, greater diversification is expected to cause less variability in earnings. Thus, the HI measure of loan concentration should be positively related to systematic and unsystematic market risk measures. In this study we will use the inverse of the HI to translate it from a concentration index to a diversification index.

$$HI = \frac{1}{\sum_{i=1}^{n} L_i^2} \quad \text{..(6)}$$

Where n = number of loans types.

9)*Credit Risk (LOSS):* this type of risk is the risk associated with the quality of a bank's earning assets, namely its loans. Low quality bank assets (loans) cause high probability of future defaults that may be expected to reduce earnings and dividends; in other words it will increase the bank's risk. Since banks are highly leveraged, Brewer and Lee (1986) conclude that large nonperforming loans or large security losses can bring about insolvency. Furthermore, major fluctuations in interest rates can greatly influence the market value of long-term fixed rate assets. Similarly, a decline in asset quality can lead

to write-offs and reduced earnings from the loan portfolio. Thus, *LOSS* is expected to affect the market measures of risk positively. The credit measure used in this study is calculated by dividing loan loss provision by total assets.

10)*The Interest Rate Risk (GAP):* This type of risk arises because the maturity composition of assets and liabilities may be different, and therefore banks may be affected negatively, as changing market interest rates may have a differentiated impact on the value of assets and liabilities. French, Ruback, and Schwert (1983) introduce the nominal contracting hypothesis to explain the sensitivity of commercial bank stock returns. Nominal contracts are those assets which have cash flows that are fixed in nominal terms. On the other hand, cash flows generated by real assets fluctuate with the price level. Overall, most of the assets and liabilities of depository financial institutions can be postulated to be nominal contracts. Thus, according to the nominal contracting hypothesis, a firm's holding of nominal assets is important in order to achieve the objective of maximizing stockholder's wealth. Studies by Fama (1975, 1976), and Fama and Gibbons (1982), establish that unexpected changes in interest rates are directly related to inflationary expectations. Hence, the nominal contracting hypothesis supports the notion that unanticipated changes in the interest rate would affect a bank's equity value depending on the duration of nominal assets and liabilities held by the firm. The greater the amount of net nominal assets and the longer the duration of these assets, the higher would be the interest rate sensitivity of a bank's common stock. In other words, the greater the absolute value of GAP, the more the bank is exposed to unexpected changes in interest rates. Therefore, GAP is expected to be positively related to market-related risk measures.

11)*Operating Risk (Bank's Size Risk) (SIZE):* According to Saunders, Strock, and Travlos (1990), the larger the size of a bank holding company the greater its ability to diversify away its asset risk. Furthermore, the "too big to fail" doctrine enables large banking firms to maximize the value of implicit failure guarantees associated with deposit insurance and bank closure policy. The larger the bank is, the more analysis will be conducted about the bank's equity and debt, thus low risk. Investors may also believe that larger banking firms may be protected by some regulatory rules than the small banking firms. All these reasons together suggest a negative relation between bank size and market risk measures for BHCs.

12)*Dividend Payout Variability Risk (POR):* According to Brewer and Lee (1986), bank equities are affected by the earning power of bank assets. Therefore, a bank's stock price is negatively related to the variability of its rate of return. BHCs will always want to keep a stable dividend policy after it is established, and it will be reluctant to cut down the dividend payout ratio. Furthermore, a higher dividend payout ratio may be considered as a sign of higher earning levels. Also stability in the dividend payout ratio suggests stability in the bank's earning levels, implying a lower level of market risk. Thus, a high dividend payout ratio is associated with low risk and *POR* is expected to affect market risk measures negatively.

6.2.3. Off-Balance Sheet Guarantees Risk Factors:

Off-balance sheet (OBS) items are contingent assets and liabilities that may affect the future status of a financial institution's balance sheet. Although OBS activities are now an important source of fee income for almost all BHCs, they have the potential

to produce positive as well as negative future cash flows. Some OBS activities may involve risks that add to the banking firm's overall risk exposure; others may hedge or reduce their interest rate, credit, and foreign exchange risks. Following is a discussion of the impact of OBS activities on banking firm's risk.

2)*Commitments Risk:* A loan commitment agreement is a contractual commitment by a bank to loan a customer a certain maximum amount at given interest rate terms. The commitment contract also defines the period over which the customer will be able to utilize his contracted loan. It is true that the bank will generate fee income by making these commitments to the borrowers, but it will also generate more credit and liquidity risks. Bennett (1986) claims that off-balance-sheet activities lead to credit risk since these activities provide an opportunity to increase leverage significantly without additional regulatory requirements. Cates and Davis (1989) suggest that credit risk due to off-balance sheet activities may be transferred to other bank assets. As an example, if a bank buys an option, interest rate risk may be reduced but credit risk can increase. Of the activities that are likely to contribute significantly to credit risk, loan commitments may be the largest contributor. Bennett (1986) identifies liquidity risk as another element that may contribute to the riskiness of the banking firm when exposed to off-balance-sheet activities. Nevertheless, the bank is exposed to liquidity risk due to these loan commitments. Liquidity risk arises because of the possibility that many customers may decide to borrow from the bank at the same time. This will be especially true in the event that alternative sources of funds may be unavailable. In order to satisfy this unexpected need of funds, banks may have to compete for funds aggressively. All the points discussed so far about the loan commitments were increasing risk factors but not

decreasing risk factors. Loan commitments can be viewed as risk management tools that reduce a bank's risk when these contracts are added to the diversified bank's activities portfolio. This is especially true when there is extensive competition with the other non-banking financial firms, and more importantly, when we consider the competition internationally. In other words, instead of having only the traditional banking activities, there will be a more diversified portfolio to invest a bank's assets.

Letters of Credit (LC): banks deal with two types of LC, Commercial Letters of Credit (CLCs) and the Standby Letters of Credit (SLCs). LCs are essentially guarantees to underwrite performance that a depository institution sells to the buyers of guarantees for fees while at the same time adding to its contingent future liabilities. Although both CLCs and SLCs have the same type of risk exposure, default risk, they are different in the severity of the risk exposure. In the case of CLCs, the bank's role is to provide a formal guarantee that payment for goods shipped or sold internationally or domestically will be forthcoming regardless of whether the buyer of the good defaults on payment. With SLCs, the bank's role is to provide a formal guarantee of payment to cover contingencies that are potentially more severe and less predictable, like bond performance. SLCs mean a higher level of default risk exposure. At the same time, LCs may have a risk-reducing impact through the diversification effect.

6.3. Data and Empirical Analysis

Data comes from three different sources: CRSP, COMPUSTAT, and FDIC. Our sample includes 54 bank holding companies (BHCs) during the period 2000 - 2005. We are limited to this number of BHCs and the time span because we have restricted our

study to those BHCs that are available in the CRSP database. There is a trade-off between including more time-series points but less cross-section points, or less time-series points with more cross-section points. Given this trade-off we chose to have more cross-section points since our primary interest is in the impact of the off-and on-balance-sheet measures on BHCS's market risks between the largest number of BHCs. However, a six year period should be reasonable relative to recent research in this area.

First, we collected the following data from CRSP; daily return for our sample BHCs, equally weighted return to proxy for the market portfolio's return, and daily rate of return for one month treasury bills to proxy for the risk free rate. Then we estimated the yearly value of the systematic risk measure (β), equation (1), using the ordinary least square (OLS) method for each BHC. Second, using the daily rate of return for each BHC, we calculated the standard deviation of equity return (σ_{RE}), equation (2), to get our second measure of market risk. Yearly average rate of return is computed from the daily rate of return for each BHCS.

Third, we have collected data about market value of equity (E) and book value of debt (B) from COMPUSTAT, used along with the data collected from CRSP to solve equation (4) and (5) simultaneously to get the value of the unobserved implied asset volatility (σ_{it}^{V}) and the unobserved post-insurance value of bank assets (V). We used a numerical routine to get the simultaneous solution of our two unknowns. Following Ronn and Verma (1986), the initial estimate that we used for the value of V was the sum of market value of equity and the face value of the debt, while that for σ_V was σ_E scaled

down by the leverage ratio. The values of the cumulative normal probability distribution N(--) were obtained using the polynomial approximation as follows

$$N(z) = 1 - \frac{1}{\sqrt{2\pi}}[\exp(-z^2/2)][a_1k + a_2k^2 + a_3k^3 + a_4k^4 + a_5k^5]........(7), \text{ for } z > 0$$

and obtaining N(z) for z<0 by symmetry, N(0) equal exactly to ½. Where; $k = \frac{1}{1+pz}$,

P = 0.2316419; a_1 = 0.31938153; a_2 = -0.356563782;

a_3 = 1.781477937; a_4 = -1.821255978; a_5 = 1.330274429.

From the first stage we estimated our dependent variables, the three market risk measures β, σ_E, and σ_V. The second stage of our study was to regress these dependent variables on the on and off balance sheet variables as they appear in the following equations.

$$\beta_{it} = \alpha_0 + \alpha_1 DERV_{it}^K + \alpha_2 LEV_{it} + \alpha_3 DIV_{it} + \alpha_4 LOSS_{it} + \alpha_5 GAP_{it} + \alpha_6 SIZE_{it} + \alpha_7 POR_{it} + \upsilon_{it} ....(8)$$

$$\sigma_{it}^E = \alpha_0 + \alpha_1 DERV_{it}^K + \alpha_2 LEV_{it} + \alpha_3 DIV_{it} + \alpha_4 LOSS_{it} + \alpha_5 GAP_{it} + \alpha_6 SIZE_{it} + \alpha_7 POR_{it} + \upsilon_{it} .....(9)$$

$$\sigma_{it}^V = \alpha_0 + \alpha_1 DERV_{it}^K + \alpha_2 LEV_{it} + \alpha_3 DIV_{it} + \alpha_4 LOSS_{it} + \alpha_5 GAP_{it} + \alpha_6 SIZE_{it} + \alpha_7 POR_{it} + \upsilon_{it} .....(10)$$

where the dependent variables are:

β_{it} : the systematic risk measure for bank i at time t.

σ_{it}^E : the standard deviation of equity returns for BHCS i at time t.

σ_{it}^{V} : the implied asset volatility from estimated from the Ronn-Verma model for bank i at time t.

We collected the data required to compute the independent variables, both on and off balance sheet, from the Federal Depository Insurance Corporation (FDIC) for the same 54 BHCs during the same period of time. We discussed earlier the expected relation of these on balance sheet variables to market risk measures; however, these on-balance-sheet variables are used as control variables, and we are interested in checking the relation of OBS derivatives contracts with a bank's market risk from the equity holder's point of view. Following is brief definition of the variables in equation 8-9.

$DERV_{it}^{K}$: Represents the notional value of OBS derivative contracts for bank i at time t, K represent the type of OBS derivative contracts, futures, forwards, options, and swaps. Each of these types includes the notional value of the interest rate contracts, exchange rate contracts, commodity exchange contracts, and equity exchange contracts.

LEV_{it}: The leverage variable is computed as the ratio of total liabilities to total assets.

DIV_{it}: The diversification variable is computed using seven different types of loans, as reported in schedule HC-C of the report of income for BHCs, employing the inverse of Herfindahl Index (HI) reported in equation (6).

$LOSS_{it}$: The credit risk variable is calculated as the ratio of loan loss provision to total assets.

GAP_{it}: The interest rate risk variable is calculated as the difference between the total market rate assets and the total market rate liabilities divided by the total assets.

$SIZE_{it}$: The operational risk variable is computed by taking the natural logarithm of bank assets to avoid the linearity problem.

POR_{it}: The earning variability risk is calculated by dividing the cash dividend by the total assets.

Equations 8-9 have been regressed on the independent variables using a panel data collected for the BHCs in the U.S. banking industry. We employed the random effect methodology, as it appears to be better estimate than the fixed effect model from the Husman test (χ^2 values are reported in the table results).

Dummy variables have been employed to test OBS derivatives strength on a bank's market risk given a bank's size group. To achieve this purpose we estimated the regression equations (11-13) using panel data methodology employing all the BHCs included in our sample (54 BHCs) during the period 2000-2005. We imposed dummy variables to represent the bank's size. In other words, any OBS derivative contracts is inserted in the regression as three variables - one is [(SIZEDUM=1 if big, and 0 otherwise) * DERV], second [(SIZEDUM=1 if medium, and 0 otherwise) * DERV], and third [(SIZEDUM=1 if small, and 0 otherwise) * DERV].

$$\beta_{it} = \alpha_1 SIZEDUM_{(BIG/MID/SMALL)} * DERV_{it}^{K} + \alpha_2 LEV_{it} + \alpha_3 DIV_{it} + \alpha_4 LOSS_{it} + \alpha_5 GAP_{it} + \alpha_7 POR_{it} + \upsilon_{it} ..(11)$$

$$\sigma_{it}^{E} = \alpha_1 SIZEDUM_{(BIG/MID/SMALL)} * DERV_{it}^{K} + \alpha_2 LEV_{it} + \alpha_3 DIV_{it} + \alpha_4 LOSS_{it} + \alpha_5 GAP_{it} + \alpha_7 POR_{it} + \upsilon_{it} ..(12)$$

$$\sigma_{it}^{V} = \alpha_1 SIZEDUM_{(BIG/MID/SMALL)} * DERV_{it}^{K} + \alpha_2 LEV_{it} + \alpha_3 DIV_{it} + \alpha_4 LOSS_{it} + \alpha_5 GAP_{it} + \alpha_7 POR_{it} + \upsilon_{it} ..(13)$$

This way we estimate, not only the directional impact of OBS derivatives on market risk in a given size group, but also the strength impact of these activities given the size group. Therefore, the size group may enhance the effect of OBS derivative contracts on a bank's risk, or discourage the effect of OBS derivatives contracts on the bank's risk.

6.4. Result Analysis

6.4.1. Size Separation Analysis:

Here we report the empirical results of the random effect estimations. Our analysis is designed in a way to capture the differences in the marginal propensity to risk (MPR) which might be affected by the operational size differences between BHCs. We believe that the operation size of each BHCs should be an important factor in determining the marginal propensity to risk factors (on- and off-balance-sheet), in other words, large BHCs should react differently than small BHCs or medium size BHCs. In order to test this hypothesis, we divide our BHCS sample into three groups, big, medium, and small. This size classification should not interfere with the SIZE factor included in the regression model. The independent variable SIZE is included as a control variable in order to measure the impact of OBS guarantees contracts on the market overall risk,

while the three size classifications are to see the differences in the MPR between the three size groups. It may also be viewed as a statistical smoothing process in order to eliminate some of the outliers from of our sample. A simple investigation of the BHCs sample will reveal that there is a significant difference between the sizes of the BHCs (there are upper outliers and lower outliers). The number of BHCs with total assets less than $100 trillion is in the range of 30-40 BHCs during our study period while only about 10-20 BHCs are greater than $100 trillion. Also, within the less than $100 trillion bracket there are about 15-20 BHCs ranging between $20 million and $100 million, and about 15-30 BHCs have less than $20 trillion in total assets value. This significant difference in the distribution of the BHCs total assets may suggest that there is a significant difference in the marginal propensity to risk (MPR) which implies that significant differences in risk management policies for each group of the BHCs. Therefore, each group will include 18 BHCs. The 18 big BHCs count for at least 80% of total assets of all BHCs in our sample with about 12% for the 18 medium BHCs and only 2% for the 18 small BHCs.

This part of the study reports the empirical results of the random effect estimations. Our analysis is designed in a way to capture the differences in the marginal propensity to risk (MPR) which might be affected by the operational size differences among BHCs. We believe that the operation size of each BHC should be an important factor in determining the marginal propensity to risk factors (on- and off-balance-sheet). In other words, large BHCs should react differently than the small BHCs or medium size BHCs. In order to accomplish this, we divided our BHC sample into three groups, big, medium, and small. It is important that to mention that this size classification should not interfere with the SIZE factor included in the regression model. The independent variable

SIZE is included as a control variable in order to measure the impact of OBS derivative contracts on the market overall risk, while the three-size classification is to see the differences in the MPR between the three size groups. Also it can be viewed as a statistical smoothing process in order to eliminate some of the outliers from of our sample. A simple investigation of the BHCs sample will reveal that there is a significant difference between the sizes of BHCs (there are upper outliers and lower outliers). The number of BHCs with total assets less than 100 trillion dollars is in the range of 30-40 BHCs and, during our study period and only about 10-20 BHCs are in the more than 100 trillions dollars bracket. Also, within the less than 100 trillion bracket there are about 15-20 BHCs ranging between 20 million to 100 million and about 15-30 BHCs have less than 20 trillion total assets value. This significant difference in the distribution of the BHCs total assets may suggest that there is a significant difference in the MPR which apply significant differences in the risk management policies for each group of the BHCs. Therefore, each group includes 18 BHCs. The biggest 18 BHCs account for at least 80% of total assets of all BHCs in our sample, about 12% for the 18 medium-size BHCs and only 2% for the 18 smallest BHCs.

We employed a panel data model (random effect), instead of simple time series OLS or cross-section OLS for two reasons. First, neither one of these two (time-series or cross-section) methods alone will yield sufficient degrees of freedom in regression analysis. Second, regression based on cross-section cannot be used to account for shifts in market measures of risk and accounting data through time. Also time series alone cannot be used easily to conduct inter-bank relationships and comparisons. Following is the result of the econometric analysis for each group and each risk measure.

6.4.1.1. OBS derivative contracts:

Futures: Results reported in our tables suggest that futures contracts are statistically insignificant for all the risk measures for the big and small-size groups. In the medium group case, futures contracts are statistically insignificant on the standard deviation of equity return measure (σ_{it}^{E}) and the implied asset volatility measure (σ_{it}^{V}), while it is positively significant on the systematic risk measure (BETA). The insignificant relation between futures contracts and the risk measures imply that investors do not price the risk of these contracts that BHCs may incur by having these positions. The reason for this insignificance might be the small portion of the futures contracts relative to other OBS derivative positions see figure (6-1). Moreover, futures seem to have no impact on the diversification position of bank's assets portfolios. The significant relation between the Beta measure and futures in the medium BHCS group means that market participants price the risk of these contracts in the overall market systematic risk and thus it will be reflected in the required rate of return. However, this inconsistent relation between futures and Beta might be a result of hetroskedasticity as we may see from the LM multiplier reported at the bottom of each table.

Forwards: The results propose that, similar to futures, forward contracts are statistically insignificant for all the risk measures for the big and small-size groups. Forward contracts are statistically insignificant on the standard deviation of equity return measure (σ_{it}^{E}) and the implied asset volatility measure (σ_{it}^{V}), but they are positive and significant on the systematic risk measure (BETA) for the medium BHCs group. The insignificant relation between forward contracts and the risk measures imply that

investors do not price the risk of these contracts that BHCs may incur by having these positions. The reasons for this insignificancy might be the small portion of forward contracts relative to other OBS derivative positions. Moreover, forwards seem to add no further impact on the diversification position of a bank's assets portfolios. The significant relation between the Beta measure and forwards in the medium BHCS group means that market participants price the risk of these contracts in the overall market systematic risk and thus it will be reflected in the required rate of return. However, this inconsistent relation between forwards and Beta might be a result of a hetroskedasticity problem.

Option: Consistent with futures and forward contracts, option contracts are also insignificant for the three size groups according to the three risk measures also. However, we do have the same significant positive relation between options and Beta risk measure. The similar econometric results between futures, forwards, and options might be because of the relatively small portion of the overall notional value of derivative positions held by the BHCS sample during our period of study. It seems that market participants value the volume effect of this position more than the risk effect. This might be true since the amount of each type of contract is small relative to the BHC's total assets. However, we believe that although each one of these types is small relative to the BHC's assets, they are large when they considered together, hence they should be priced.

Swaps: The swaps contracts form about 61% of the total OBS derivative positions. Fortunately, the market participants price this position in their required rate of return, and they consider it as a risk-reducing factor according to the three risk measures (Beta, σ_{it}^{E}, σ_{it}^{V}) for both big BHCs and the medium BHCS groups. This means that

swaps positions are a concern for well-diversified investors. This negative relation can be viewed that as swaps' market price increases, the bank's risk will be affected negatively. One can argue about the difference between the price effect and the volume effect of these contracts however, we include the swaps notional value which illustrates the net effect of these two directions. Although swaps contracts are significantly risk-reducing factors for big and medium sized BHCs, they are statistically insignificant for the small BHCs. This insignificant impact might be interpreted as meaning that market participants believe that small BHCS are not able to deal with these contracts that need highly qualified skills and risk managements tools which might not be available to the small BHCs.

6.4.1.2. On-Balance-Sheet Accounting Measures:

Generally the on-balance-sheet accounting measures hold their expected sign as suggested by theory, but that is not always the case. However, for completeness purposes we will discuss each of them separately.

Leverage (LEV): There is a significant positive impact on two risk measures (σ_{it}^{E}, and σ_{it}^{V}) for large size BHC, and it is statistically insignificant for the Beta risk measure. It is also significantly positive on the three risk measures for the small BHCs. Interestingly, it was insignificant for the equity risk and the implied asset risk (σ_{it}^{V}) for the medium BHCs and significantly negative for Beta risk measure. The positive significant relation this indicates that as a bank's leverage increases, the market includes this in its risk valuation, which suggests that OBS derivative contracts will contribute to the total leverage of BHCs and thus will increase their risk.

Diversification (DIV): This variable carries a significant negative relation on the equity risk (σ_{it}^{E}) and the implied asset risk (σ_{it}^{V}) for the three groups, which is unexpected. But, it carries a significant positive relation with the systematic bank's risk (Beta) for the three groups. The negative sign suggests that as banks become more diversified they are able to eliminate that portion of risk which is unsystematic risk. The positive sign, in the Beta model, suggests that diversification will not eliminate/reduce systematic market risk. Thus, derivative contracts will diversify the unsystematic risk, but they will not diversify the systematic risk. Figure (6-2) indicates that our sample BHCs are not well-diversified and, they are using mainly swaps in addition to some other non-traditional activities as diversification tools.

Credit Risk (LOSS): This factor has a significant positive influence on all market risk measures for the big BHCs, as expected. Also it is significantly positive on both the equity return risk (σ_{it}^{E}) and the implied asset risk (σ_{it}^{V}) but statistically insignificant on the Beta measure for the medium BHCs. It is insignificant for almost all of the risk measures for the small BHCS. The positive sign supports our theoretical discussion and it recommends that as banks' default risk increase, market participants will reflect this on their evaluation, which also suggests that when OBS derivative positions held by banks more default risk will be expected by the market.

Interest rate risk (GAP): As expected this variable holds a positive sign on two market measures of risk, equity return risk (σ_{it}^{E}) and implied asset risk (σ_{it}^{V}), for the three BHCS groups, which suggests that the greater the absolute value of the interest rate gap the greater the bank's risk. The results however report an inverse relation on beta risk

measure which can be explained by the fact that banks may use high gap values to hedge their asset portfolios and hence reduce risk.

Operational Risk (SIZE): The results indicate a significant negative relation between size and two of the risk measures, equity return risk (σ_{it}^{E}) and implied asset risk (σ_{it}^{V}), for the three bank groups. For the Beta risk measure the sign however is unexpectedly positive for the medium and small-size BHCs and insignificant for the big BHCs. The positive relation between size and Beta risk can be viewed as follows. When banks' operations increase the market will translate this expansion as a transitory period which will include more risk since banks may hold more assets than they really can manage. The insignificant relation can be justified that Beta measure of risk includes only market systematic risk which can't be diversified by increasing a bank's operations.

Earning Variability Risk (POR): This variable carries the expected sign for both the big and medium BHCs on both equity return risk, σ_{it}^{E}, and implied asset risk (σ_{it}^{V}), and it is insignificant for the Beta measure. It also has an insignificant impact on the three risk measures in the case of medium BHCs.

6.4.2. Size Interaction Analysis:

Tables (6-6 to 6-9) report the results of regression equations 11-13, where we examine the interaction between a bank's size and OBS derivative contracts on market risk measures. The OBS derivative coefficients, generally, carry the same directional relation to the bank's market risk. However the quantitative relation is higher; in other words, the BHC's size determines the sensitivity level between the percentage changes in

these OBS derivatives and the market risk behavior. For example, swaps contracts are found to be a significant risk-reducer factor for both the big and the medium BHCs groups. In our separate-groups analysis, although swaps still hold the same significant risk-reducing impact for the same groups, in addition for third group, the sensitivity is different when derivative activities interact with the size dummy variables. Moreover, the market participants' valuation of OBS derivative contracts on a bank's market risk is different from size-group to another. For instance, if we consider three banks, the first one from the big BHCs group, the second one from the medium BHCs group, and the third one from the small BHCs group, and they decide to increase their positions on swaps in the market by the same amount, then we should expect that the impact of these swaps on the banks' market risk valuation to be different from one group to another. Generally speaking, the risk sensitivity is higher in the case of the small-size banking firms than the medium size and the smallest impact will be on the large banking firms, i.e., the bank's size is adversely related to bank's risk sensitivity to the derivative contracts.

The interaction analysis also suggests that options and futures contracts are significantly risk-reducer factors for the big BHCs while they are insignificant in the separate-groups analysis. Moreover, the on-balance-sheet factors generally hold their expected impact with market risk.

6.5. Summary Conclusion and Policy Implication:

This research aims to test the market discipline existence of OBS derivative contracts and bank holding companies' market risk. In addition to the traditional market risk measures, we employed a contingent claim model that accounts for the non-linear

relationship between OBS derivatives and market risk. Therefore, we have three risk measures, systematic risk (Beta), standard deviation of equity return, and implied asset volatility (from the contingent claim model). We included four OBS derivative contracts, futures, forwards, options, and swaps, and six on-balance-sheet risk measures as control variables.

Our analysis is designed in a way to capture the differences in the marginal propensity to risk (MPR) which might be affected by the operational size differences between BHCs. We believe that the operational size of each BHC should be an important factor to determine the marginal propensity to risk factors (on and off balance sheet), in other words, large BHCs should react differently from small BHCs or medium size BHCs.

The results suggest, first, that swaps contracts are the major player in market risk valuation, and is viewed as a risk-reducer according to the three risk measures for big and medium BHCs. Second, futures, forwards, and options do not have much influence on the valuation of banks in the three market risk measures (Beta, SigmaE, and SigmaV) for the three BHC groups. This result may be due to the small value of these contracts relative to swaps contracts, and thus the market participants do not pay as much attention to these positions as risk factors. However, we find a positive and significant relationship between these three types of derivatives on market systematic risk (Beta). Third, market participants generally view OBS derivatives, measured by swaps positions, as more potential risk diversification tools. Four, small BHCs have a different MPR than both big and medium BHCs, which may follow the economy of scope concept and the “big to fail” doctrine. Generally speaking, the risk sensitivity is higher in the case of the small-size

banking firms than the medium-size and the smallest impact on the largest banking firms, i.e., the bank's size is adversely related to bank's risk sensitivity to the derivative contracts. Five, the on-balance-sheet variables are consistent with the existing literature and they do have an impact on the pricing process of a bank's equity. To a certain extent, the relation between these accounting risk variables and different market risk measures varies between each BHCS group.

Therefore, more capital requirements and regulations on banks' OBS derivative activity may distort the large banks market position. Moreover, market participants do not price futures, forwards, and options in their calculations of market risk although these contracts together should have significant impact on the overall bank's risk and therefore should be considered in market valuation.

References:

[1] Allen, Franklin, and Anthony M. Santomero, "What Do Financial Intermediaries Do?" Journal of Banking & Finance, 2001, 25, 271-294.

[2] Angbazo, L., "Commercial Bank Net Interest Margins, Default Risk, Interest Rate Risk and Off-Balance Sheet Banking", *Journal of Banking and Finance*, 1997, 21, 55-87.

[3] Angelidis, D., and Lyroudi, K., "The Magnitude of Off Balance Sheet Activities for The Evaluation Of Banking Productivity", working paper, *International Conference on Finance*, Copenhagen-Denmark, September 2-4, 2005.

[4] Avery, Robert, and Elijah Brewer, "Risk-Based Capital and Off-Balance Sheet Activities" Proceeding of a Conference on Bank Structure and Competition, *Federal Reserve Bank of Chicago*, 1988, 261-287.

[5] Avery, R. B. and A. N. Berger, "Loan Commitments and Bank Risk Exposure", *Journal of Banking and Finance*, February 1991, 15, 173-92.

[6] Beaver W., Kettler K., and Scholes M., "I The Association Between Market Determined and Accounting Determined Risk Measures", *The Accounting Review,* October 1970, 654-682.

[7] Bennett, B., "Off Balance Sheet Risk in Banking: The Case of Standby Letters of Credit" *Federal Reserve Bank of San Francisco Economic Review*, No. 1, 1986, 19-29.

[8] Benveniste, L. M. and A. N. Berger. "An Empirical Analysis of Standby Letters of Credit," Proceedings of the Conference on Bank Structure and Competition. *Chicago: Federal Reserve Bank of Chicago,* 1986, 387-412.

[9] Benveniste, L. M. and A. N. Berger. "Securitization with Recourse: An Instrument that offers Uninsured Bank Depositors Sequential Claims", *Journal of Banking and Finance*, 11, September 1987, 403-424.

[10] Berger, A. N. and G. F. Udell. "Collateral, Loan Quality, and Bank Risk", *Journal of Monetary Economic*, 25, January 1990, 21-42.

[11] Berger, A. N. "Market Discipline in Banking", Proceedings of the Conference on Bank Structure and Competition, *Chicago: Federal Reserve Bank of Chicago*, 1991, 419-427.

[12] Berger, A.N. and G.F.Udell, "Relationship Lending and Lines of Credit in Small Firm Finance" *Journal of Business*, 1995, 68, 351-382

[13] Brewer, E., and Cheng L., "How the Market Judges Bank Risk", *Federal reserve bank of Chicago economic perspective,* 10(6), 1986, 25-31.

[14] Brewer, E., William E. Jackson, and James T. Moser, "The Value of Using Interest Rate Derivatives to Manage Risk at U.S. Banking Organizations", *Economic Perspectives, Federal Reserve Bank of Chicago*, 2001, 3Q, 49-66.

[15] Cates D. C., and Henry A. D., "Risk Management of Off-Balance Sheet Activities", *The Journal of Commercial Lending",* January 1989, 27-36.

[16] Carter D., Simpson W., and Tandon A., "Managerial ownership and compensation and the use of interest-rate derivatives by U.S. Banks", Working paper, *FMA conference 2006*, Slat Lake City.

[17] Chaudhry M. X., "Commercial Bank's Off-Balance Sheet Activities and Their Relationship With Market-Based Risk Measures", *4th AFIR International Colloquium,* Orlando*,* United States, April 20-22, 1994.

[18] Davis, S., "*The Diffusion of Financial Innovations"*, *Cambridge: Cambridge University Press*, 1979.

[19] Fama, E.F., "Short-term Interest Rates as Predictors of Inflation", *American Economic Review,* June 1975, 269-282.

[20] Fama, E.F., "Inflation Uncertainty and the Expected Return on Treasury Bills", *Journal of Political Economy*, June 1976. 427- 448.

[21] Fama E.F., and Gibbons M., "Inflation, Real Returns, and Capital Investments", *Journal of Monetary Economic*, May 1982, 397-424.

[22] French K., Rubach R., and Schwert G., "Effects of Nominal Contracting on Stock Returns," *Journal of Political Economy*, 1983, 91, 70-96.

[23] Furlong, F.T., and M.C.Keeley, "Capital Regulation and Bank Risk-Taking", *Journal of Banking and Finance*, 1989, 35, 883-891.

[24] Gorton, Gary, and Anthony M. Santomero, "Market Discipline and the Valuation of Bank Subordinated Debt", *Journal of money, credit and Banking*, February 1990, 22, 118-128.

[25] Hamada, R.S, "The Effect of the Firm's Capital Structure on the systematic Risk of Common Stocks", *Journal of Finance*, May 1972, Vol. 27, 435-452.

[26] Hassan, M. K. "The Market Perception of the Riskiness of Large U.S. Bank Commercial Letters Of Credit", *Journal of Financial Services Research*, 6, September 1992, 207-221.

[27] Hassan, Gordon, and Peterson, “Off-Balance Sheet Activities and Bank Default-Risk Premia: A Comparison of Risk Management”, *Journal of Economic and Finance*, 1993, Vol 17, No. 3, 69-83.

[28] Hassan, M. K., G. V. Karels and M. O. Peterson, “Deposit Insurance, Market Discipline and Off- Balance Sheet Banking Risk of Large U.S. Commercial Banks”, *Journal Of Banking And Finance*, May 1994, Vol.18, No.3, 575-594.

[29] Hassan, M. K., Lai, V. S., and Yu, M. T., “Market Discipline of the Canadian Bank’s Letters of Credit Activities: An Empirical Examination”, *The Service Industries Journal,* Volume 22, No. 4, October 2002, 187-208.

[30] Hassan, M. Kabir; Sackley, William H., “Determinants of Thrift Institution Off-Balance Sheet Activities : An Empirical Investigation”, *Journal of Financial Management & Analysis*, Jan-Jun2006, Vol. 19 Issue 1, p1-13.

[31] Jagtiani, J., “Characteristics Of Banks That Are More Active In The Swaps Market”, *Journal Of Financial Services Research*, 1995, Volume 9, No. 4.

[32] Jagtinai,J., A.Saunders And G.Udell, “The Effect of Bank Capital Requirements on Bank Off-Balance Sheet Financial Innovations”, *Journal Of Banking And Finance*, 1995, 19, 647-658.

[33] Jacques, K. And P.Nigro, “Risk-Based Standards, Portfolio Risk and Bank Capital: A Simultaneous Equations Approach”, *Journal Of Economic And Business*, 1997, 49, 533-547.

[34] Khambata, D., and Bagdi, R., “Off-balance-sheet credit risk of the big 20 Japanese banks” *Journal of International Banking Regulation*, Vol. 5, No. 1, 2003, 57-71.

[35] Khambata, D., and Bagdi, R., “Off-balance-sheet credit risk of the big 20 European banks” *Journal of International Banking Regulation*, Vol. 4, No. 2, 2002, 107-122.

[36] Koppenhaver, G. O., “The Effects of Regulation of Bank Participations in the Guarantee Market”, *Research In Financial Services,* 1989, 165-80.

[37] Koppenhaver, G. O. and R. D. Stover, “Standby Letters of Credit and Large Bank Capital: An Empirical Analysis”, *Journal of Banking and Finance*, 15, 1991, 315-327.

[38] Lieu, P., Yeh, T., and Chiu, Y., “Off-Balance Sheet Activities and Cost Inefficiency in Taiwan’s Banks”, *The Service Industries Journal*, Vol.25, No.7, October 2005, pp.925–944.

[39] Mandelker G. N. and S. Ghon R., “The Impact of Degrees of Operating and Financial Leverage on Systematic Risk of Common Stock”, *Journal of Financial and Quantitative Analysis*, March 1984, 19 No.1, 45-57.

[40] Mansfield, E, “Technical Change and the Rate of Imitation”, *Econometrica*, 1961, 29, 741-766.

[41] Pavel, C. and D.Philis, “Why Commercial Banks Sell Loans: An Empirical Analysis” Economic Perspectives, *Federal Reserve Bank of Chicago*, 1987, May/June, 3-14.

[42] Pavel, C., “Loan Sales Have Little Effect on Bank Risk”, Economic Perspectives, *Federal Reserve Bank of Chicago*, 1988, May/June, 23-31.

[43] Ronn, Ehud, and A.K. Verma, “Pricing Risk-Adjusted Deposit Insurance: An Option-Based Model”, *Jornal of Finance*, September 1986, 41, 871-895.

[44] Saunders A., Strock E. and Travlos N. G., “Ownership Structure, Deregulation, and Bank Risk Taking”, *The Journal of Finance*, June 1990, 45 No. 2, 643-654.

[45] Sinha, Ram Pratap, "Off Balance Sheet Exposure of Indian Commercial Banks - Some Emperical Results", *Indian Institute of Capital Markets 9th Capital Markets Conference* Paper Available at SSRN: http://ssrn.com/abstract=877813.

[46] Sinkey, J.F., Jr., Carter, D. A., “Evidence on the financial characteristics of banks that do and do not use derivatives”, *The Quarterly Review of Economic and Finance*, 2000, 40, pp. 431-449.

[47] Zhao F. and Moser J, “Bank Lending and Interest-Rate Derivatives”, working paper, *FMA conference 2006*, Slat Lake City.

Figure (6-1): Distribution of Derivatives Contracts

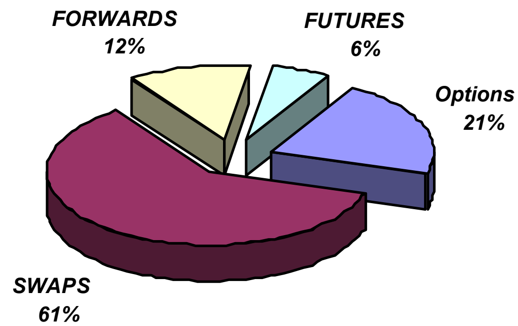

Figure (6-2): Distribution of Loans-to-Assets Ratios

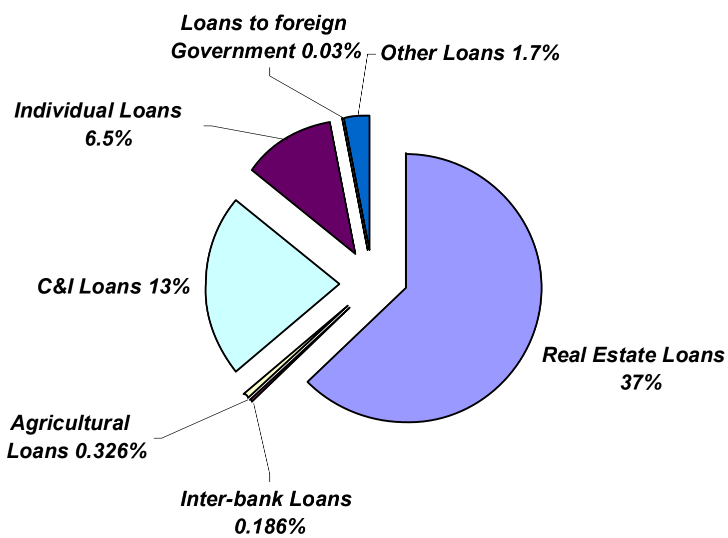

Table (6-1): Correlation Coefficients[¤]
N=324.

	FUT	FOR	OPT	SWAP	LEV	DIV	LOSS	GAP	SIZE	POR
FUT	1.0000									
FOR	0.93442	1.00000								
OPT	0.95076	0.98245	1.00000							
SWAP	0.86128	0.96210	0.95569	1.00000						
LEV	0.080899	0.070288	0.065181	0.070411	1.00000					
DIV	-0.18842	-0.19772	-0.22030	-0.18769	-0.21456	1.0000				
LOSS	0.22292	0.20211	0.17798	0.14896	-0.04343	-0.0629	1.00000			
GAP	-0.15276	-0.17509	-0.21425	-0.18536	-0.25077	0.26808	0.18528	1.00000		
SIZE	0.14839	0.17873	0.158859	0.34855	0.056220	-0.2380	0.20349	-0.3024	1.00000	
POR	0.063253	0.070970	0.071085	0.064501	0.18242	0.00983	0.14695	`0.13250	0.0039579	1.00000

[¤] **Note:** The correlation coefficients below show a high correlation between OBS derivatives (FUT, FOR, OPT, SWAP), because of this high correlation we estimated or models using each one in a separate model in order to avoid the multicolinearity problem.

Table (6-2): BHCs Panel Results-Futures

	Panel (A): Big BHCs			Panel (B): Medium BHCs			Panel (C): Small BHCs		
	β	σ_{it}^{E}	σ_{it}^{V}	β	σ_{it}^{E}	σ_{it}^{V}	β	σ_{it}^{E}	σ_{it}^{V}
Constant	2.422 (1.726)^	-.0445 (-.9672)	-.03038 (-.6032)	-1.166 (-.7854)	.0586 (1.3516)	.828 (1.741)^	-7.2568 (-1.9983)**	.0171 (.33144)	.402 (.71088)
Futures	.00189 (.2381)	-.00007 (-.2988)	-.00671) (-.2555)	3.007 (2.465)*	.03875 (1.087)	.4501 (1.154)	112.84 (1.0303)	-1.2704 (-.9076)	-1.3921 (-.9042)
LEV	-1.1084 (-.8793)	.1337 (3.356)*	.18278 (2.938)*	-2.3166 (-2.112)**	.02587 (.8115)	.0835 (.2390)	4.8732 (1.5654)^	.1278 (2.9319)*	.2159 (2.4258)**
DIV	.6412 (1.645)^	-.0487 (-4.023)*	-.5402 (-4.099)*	.5968 (2.2312)**	-.01562 (-2.004)**	-.01706 (-1.996)**	2.3524 (3.7677)*	-.03586 (-3.9402)*	-.3922 (-3.9410)*
LOSS	19.501 (2.396)*	.7440 (3.337)*	.9132 (3.362)*	-9.1277 (-.8853)	.7152 (2.4001)*	.7930 (2.4301)*	-40.627 (-1.5570)^	.03628 (.09996)	.04162 (.10458)
GAP	-25.563 (5.405)*	.3406 (2.330)**	.7889 (2.437)*	-.0230 (-.00575)	.2697 (2.318)**	.30264 (2.373)*	-38.195 (-3.9743)*	.56344 (3.9984)*	.62275 (4.0401)*
SIZE	.00772 (.0991)	-.0080 (-3.051)*	-.0597 (-3.122)*	.5267 (4.965)*	-.0102 (-3.302)*	-.1163 (-3.324)*	.6586 (3.3215)*	-.01827 (-5.9647)*	-.3997 (-5.978)*
POR	-.0086 (1.079)	-.00056 (-2.353)*	-.00061 (-2.313)**	.1142 (.7370)	.006101 (1.348)	.05660 (1.3317)	.01823 (.1056)	-.004925 (-2.2069)**	-.0536 (-2.1845)**
R^2	.3711	.2875	.3597	.4310	.2146	.3056	.2458	.3348	.3488
LM	22.21 (.000)*	7.853 (.005)*	7.0477 (.008)*	.000314 (.986)	7.9703 (.005)*	7.9139 (.005)*	2.277 (.131)	7.9599 (.005)*	7.295 (.007)*
DW	1.088 (.000,.000)*	.9418 (.000,.000)*	.7422 (.000,.000)*	.9550 (.000,.000)*	.9332 (.000,.000)*	.9398 (.000,.000)*	.53074 (.000,.000)*	.7427 (.000,.000)	.7572 (.000,.000)*
χ^2	14.277 (.0465)**	31.04 (.0001)*	31.845 (.0000)*	14.879 (.037)**	20.29 (.005)*	20.306 (.0049)*	16.989 (.0175)*	18.495 (.0099)	18.217 (.0110)**

__Notes__:
(1) The dependent variables show in the second row, the independent variables show in the first column.
(2) The numbers between parentheses below variable's coefficients are t-statistics,
(3) The numbers between parentheses below econometric' tests (LM, DW, χ^2) are P-values.
(4) Significance level: * = 1%, ** = 5%, ^ = 10%.

Table (6-3): BHCs Panel Results-Forwards

	Panel (A): Big BHCs			Panel (B): Medium BHCs			Panel (C): Small BHCs		
	β	σ_{it}^{E}	σ_{it}^{V}	β	σ_{it}^{E}	σ_{it}^{V}	β	σ_{it}^{E}	σ_{it}^{V}
Constant	3.197 (2.581)**	-.0333 (-.6960)	-.174 (-.3321)	-1.217 -.8237	.0634 (1.451)	.887 (1.8485)	-6.8817 (-1.8986)**	.0157 (.31495)	.391 (.7138)
Forwards	.0077 (2.260)*	.000036 (.2571)	.00525 (.3218)	.8243 (2.8212)*	.00604 (.6984)	.07665 (.7002)	-.58011 (-.1142)	.05351 (.7940)	.667 (.90352)
LEV	-1.240 (-1.084)	.1284 (3.129)*	.4214 (2.709)*	-2.441 (-2.270)**	.0226 (.7169)	.004501 (.1297)	4.4011 (1.4200)	.1261 (2.9706)*	.21376 (2.448)**
DIV	.6339 (1.783)*	-.0477 (-3.931)*	-.0953 (-4.001)*	.7253 (2.588)*	-.0163 (-1.980)**	-.01811 (-1.994)**	2.3097 (3.6859)*	-.03366 (-3.8381)*	-.366 (-3.8290)*
LOSS	17.985 (2.207)*	.7259 (3.209)*	.9820 (3.227)*	-4.674 (-.4559)	.7606 (2.539)*	.8452 (2.575)*	-32.708 (-1.317)	-.04739 (-.1395)	-.54797 (-.1290)
GAP	-23.64 (-5.314)*	.3467 (2.345)*	.6966 (2.457)*	2.908 (.6715)	.2829 (2.219)**	.3160 (2.2596)**	-40.1150 (-4.0493)*	.5741 (4.1776)*	.6357 (4.233)*
SIZE	-.08201 (-1.264)	-.0088 (-3.379)*	-.0919 (-3.456)*	.5337 (5.0215)*	-.0105 (-3.349)*	-.05165 (-3.3758)*	.6757 (3.3238)*	-.01798 (-6.1003)*	-.1968 (-6.1370)*
POR	-.00677 (-.8997)	-.00052 (-2.136)**	-.00056 (-2.084)**	.0365 (.2312)	.00575 (1.233)	.0622 (1.215)	.021944 (.1273)	-.004758 (-2.135)**	-.05163 (-2.107)**
R^2	.4021	.2830	.3747	.4376	.2046	.2932	.2352	.3532	.3904
LM	22.263 (.000)*	6.458 (.011)*	5.5700 (.018)*	.5437 (.461)	7.999 (.005)*	8.1433 (.004)*	1.9564 (.162)	7.9211 (.005)*	7.3488 (.007)*
DW	1.107 (.000,.000)*	.9330 (.000,.000)*	.9321 (.000,.000)*	.9193 (.000,.000)*	.8856 (.000,.000)*	.8857 (.000,.000)	.5002 (.000,.000)*	.8008 (.000,.000)	.8228 (.000,.000)*
χ^2	19.050 (.0265)**	30.69 (.0001)*	31.417 (.0001)*	15.230 (.0332)**	21.78 (.002)*	21.98 (.0026)*	20.951 (.0038)*	23.773 (.0012)*	23.367 (.0015)*

Notes:
(1) The dependent variables show in the second row, the independent variables show in the first column.
(2) The numbers between parentheses below variable's coefficients are t-statistics,
(3) The numbers between parentheses below econometric' tests (LM, DW, χ^2) are P-values.
(4) Significance level: * = 1%, ** = 5%, ^ = 10%.

Table (6-4): BHCs Panel Results-Options

	Panel (A): Big BHCs			Panel (B): Medium BHCs			Panel (C): Small BHCs		
	β	σ_{it}^{E}	σ_{it}^{V}	β	σ_{it}^{E}	σ_{it}^{V}	β	σ_{it}^{E}	σ_{it}^{V}
Constant	2.546 (1.859)**	-.0436 (-.9909)	-.5296 (-.6151)	-.7503 (-.4981)	.0662 (1.556)	.917 (1.963)**	-5.772 (-1.6118)^	.00490 (.0953)	.265 (.4725)
Options	.00078 (.4161)	-.000022 (-.3659)	-.004021 (-.3184)	1.324 (2.250)*	.0143 (.8579)	.21686 (.9188)	29.1714 (1.4167)	-.2891 (-1.069)	-.3240 (-1.0912)
LEV	-1.217 (-.9611)	.1323 (3.358)*	.4264 (2.938)*	-2.574 (-2.328)**	.0219 (.6967)	.00385 (.1117)	3.6823 (1.2004)	-.28914 (-1.069)	.1249 (2.6308)*
DIV	.6486 (1.649)^	-.0486 (-4.028)*	-.1541) (-4.104)*	.5174 (1.937)**	-.01705 (-2.254)**	-.03087 (-2.255)**	2.2993 (3.7436)*	.13584 (3.1328)*	-.303828 (-3.8990)*
LOSS	18.87 (2.356)*	.7437 (3.331)*	.8729 (3.355)*	-10.963 (-1.036)	.6863 (2.264)**	.8593 (2.286)**	-24.8075 (-1.0017)	.12857 (-.36629)	-.4403 (-.3648)
GAP	-25.08 (-5.169)*	.3322 (2.250)**	.6807 (2.3626)*	-.0095 (-.00229)	.2666 (2.260)**	.6996 (2.3166)**	-41.9564 (-4.3574)*	.5964 (4.240)*	.65902 (4.2844)*
SIZE	.00285 (.0382)	-.0079 (-3.178)*	-.0880 (-3.246)*	.5034 (4.542)*	-.01075 (-3.4272)*	-.11921 (-3.460)*	.6140 (3.1314)*	-.01768 (-5.8260)*	-.1932 (-5.8416)*
POR	-.0080 (-1.014)	-.00057 (-2.393)*	-.00681 (-2.354)**	.1202 (.7487)	.006475 (1.425)	.0704 (1.413)	.01254 (.0728)	-.00483 (-2.163)**	-.0526 (-2.142)**
R^2	.3742	.2890	.3611	.4079	.2073	.2977	.2557	.2970	.3277
LM	23.165 (.000)*	7.949 (.0005)*	7.1216 (.008)*	.0557 (.813)	7.206 (.007)*	7.1316 (.008)*	1.7203 (.159)	9.3908 (.002)*	8.659 (.003)*
DW	1.088 (.000,.000)	.945634 (.000,.000)*	.94577 (.000,.000)*	.8515 (.000,.000)*	.8845 (.000,.000)*	.8872 (.000,.000)*	.5069 (.000,.000)*	.7802 (.000,.000)*	.7955 (.000,.000)*
χ^2	19.501 (.0068)*	30.545 (.0001)*	31.325 (.0001)*	16.25 (.0223)**	20.982 (.0038)*	21.056 (.0037)*	15.95 (.0256)**	16.857 (.0183)*	16.542 (.0206)**

__Notes__:
(1) The dependent variables show in the second row, the independent variables show in the first column.
(2) The numbers between parentheses below variable's coefficients are t-statistics,
(3) The numbers between parentheses below econometric' tests (LM, DW, χ^2) are P-values.
(4) Significance level: * = 1%, ** = 5%, ^ = 10%.

Table (6-5): BHCs Panel Results-Swaps

	Panel (A): Big BHCs			Panel (B): Medium BHCs			Panel (C): Small BHCs		
	β	σ_{it}^{E}	σ_{it}^{V}	β	σ_{it}^{E}	σ_{it}^{V}	β	σ_{it}^{E}	σ_{it}^{V}
Constant	2.4960 (1.829)**	-.0519 (-1.195)	-.387 (-.8142)	.2863 (.1819)	.0443 (.9708)	.670 (1.3386)	-6.8064 (-1.8822)^	.0115 (.2256)	.340 (.6077)
Swaps	-.00018 (-3.3269)*	-.000019 (-2.0785)*	-.0003 (2.0303)**	-1.1734 (1.662)^	-.0393 (-1.866)^	-.4539 (-1.902)*	-1.4828 (-.1497)	.0706 (.5102)	.8376 (.5523)
LEV	-1.1960 (-.9454)	.1330 (3.408)*	.5272 (2.9832)*	-3.125 (-2.840)*	.0365 (1.1803)	.10202 (.5967)	4.3225 (1.3906)	.1344 (3.084)*	.1234 (2.5864)*
DIV	.6436 (1.639)^	-.0490 (-4.104)*	-.0646 (-4.184)*	.4897 (1.8105)**	-.0242 (-3.124)*	-.58267 (-3.1409)*	2.3009 (3.3675)*	-.03465 (-3.837)*	-.4378 (-3.8370)*
LOSS	19.004 (2.366)*	.7563 (3.393)*	.8265 (3.416)*	-5.442 (-.5159)	.7621 (2.696)*	.8453 (2.737)*	-32.088 (-1.288)	-.0765 (-.2205)	-.0833 (-.2191)
GAP	-25.207 (-5.196)*	.3099 (-2.115)**	.3570 (2.2317)**	-1.033 (-.2499)	.2249 (1.968)**	.4531 (2.025)**	-40.419 (-3.8306)*	.6043 (4.0116)*	.96997 (4.064)*
SIZE	.0073 (.0998)	-.0068 (-2.8314)*	-.077 (-2.898)*	.4326 (3.415)*	-.00894 (-2.489)*	-.09861 (-2.5068)*	.6773 (3.1968)*	-.01858 (-5.7987)*	-.2036 (-5.827)*
POR	-.0082 (-1.033)	-.00062 (-2.625)*	-.00567 (-2.587)*	.1065 (.6571)	.00573 (1.233)	.0606 (1.1909)	.02163 (.12556)	-.00483 (-2.163)*	-.0526 (-2.142)**
R^2	.3730	.3006	.3496	.3946	.1478	.2314	.2359	.3370	.3717
LM	22.8193 (.000)*	9.945 (.002)*	9.0184 (.003)*	.0947 (.758)	3.379 (.066)^	3.358 (.067)**	1.9238 (.165)	7.9894 (.005)*	7.3664 (.007)*
DW	1.08755 (.000,.000)*	.9659 (.000,.000)*	.9657 (.000,.000)*	.8659 (.000,.000)*	.6953 (.000,.000)*	.6888 (.000,.000)	.4994 (.000,.000)	.7577 (.000,.000)*	.7730 (.000,.000)*
χ^2	18.793 (.0089)*	30.435 (.0001)*	31.236 (.0001)*	12.935 (.0737)^	39.64 (.0000)*	40.329 (.0000)*	18.846 (.0087)	18.502 (.0099)*	18.169 (.0112)**

Notes:
(1) The dependent variables show in the second row, the independent variables show in the first column.
(2) The numbers between parentheses below variable's coefficients are t-statistics,
(3) The numbers between parentheses below econometric' tests (LM, DW, χ^2) are P-values.
(4) Significance level: * = 1%, ** = 5%, ^ = 10%.

Table (6-6): The interactions of size dummies with FUTURES

	β	σ_{it}^{E}	σ_{it}^{V}
FUD1	-.027560 [.175]	-.000761225 [.042]	-.00827935 [.043]
FUD2	1.81148 [.586]	-.047116 [.442]	-.58263 [.471]
FUD3	25.6720 [.779]	-1.77835 [.291]	-1.94656 [.290]
LEV	-3.86980 [.016]	.160210 [.000]	.551302 [.000]
DIV	1.04033 [.030]	-.038099 [.000]	-.41963 [.000]
LOSS	.646463 [.949]	.832038 [.000]	.909791 [.000]
GAP	-22.2705 [.000]	.653231 [.000]	.728022 [.000]
POR	.00254330 [.844]	-.000834434 [.001]	-.00905950 [.001]
R^2	.363392	.473774	.495500
LM	2.10027 [.147]	8.35674 [.004]	7.11905 [.008]
DW	.834711 [.000,.000]	1.38775 [.000,.000]	1.39779 [.000,.000]

Notes:
(1) The dependent variables show in the first row, the independent variables show in the first column.
(2) The numbers between parentheses are P-values.
(3) FUD1 = [(1 if big BHCS, 0 if otherwise) * Futures (where futures = notional value/total assets)].
FUD2 = [(1 if medium BHCS, 0 if otherwise) * Futures (where futures = notional value/total assets)].
FUD3 = [(1 if small BHCS, 0 if otherwise) * Futures (where futures = notional value/total assets)].

Table (6-7): The interactions of size dummies with FORWARDS

	β	σ^{E}_{it}	σ^{V}_{it}
FOD1	.010399 [.645]	-.000441865 [.288]	-.00469971 [.302]
FOD2	-.180082 [.809]	-.00161730 [.906]	-.0193036 [.898]
FOD3	-.401387 [.935]	-.145399 [.108]	-.551447 [.126]
LEV	-3.95177 [.013]	.170327 [.000]	.166011 [.000]
DIV	.999312 [.038]	-.039125 [.000]	-.053068 [.000]
LOSS	1.86495 [.852]	.829041 [.000]	.9686623 [.000]
GAP	-22.9076 [.000]	.628091 [.000]	.789967 [.000]
POR	.000681945 [.958]	-.000860591 [.000]	-.00934502 [.000]
R^2	.358624	.469596	.480860
LM	2.94510 [.086]	6.83855 [.009]	5.92601 [.015]
DW	827327 [.000,.000]	1.38447 [.000,.000]	1.39261 [.000,.000]

<u>**Notes**</u>:
(1) The dependent variables show in the first row, the independent variables show in the first column.
(2) The numbers between parentheses are P-values.
(3) FOD1 = [(1 if big BHCS, 0 if otherwise) * Forward (where forward = notional value/total assets)].
FOD2 = [(1 if medium BHCS, 0 if otherwise) * Forward (where forward = notional value/total assets)].
FOD3 =[(1 if small BHCS, 0 if otherwise) * Forward (where forward = notional value/total assets)].

Table (6-8): The interactions of size dummies with OPTIONS

	β	σ_{it}^{E}	σ_{it}^{V}
OPD1	-.010145 [.064]	-.000220152 [.031]	-.00439784 [.031]
OPD2	.629390 [.621]	-.00135437 [.954]	.0732958 [.998]
OPD3	31.5867 [.081]	-.115409 [.732]	-.531934 [.720]
LEV	-4.15583 [.009]	.159380 [.000]	.354399 [.000]
DIV	1.00431 [.034]	-.037630 [.000]	-.41432 [.000]
LOSS	1.05074 [.917]	.791121 [.000]	.863722 [.000]
GAP	-22.2915 [.000]	.653424 [.000]	.830042 [.000]
POR	.00197094 [.878]	-.000828958 [.001]	-.00689198 [.001]
R^2	.374356	.471721	.493585
LM	2.32772 [.127]	8.58287 [.003]	7.33306 [.007]
DW	.830294 [.000,.000]	1.38609 [.000,.000]	1.39546 [.000,.000]

<u>**Notes**</u>:
(1) The dependent variables show in the first row, the independent variables show in the first column.
(2) The numbers between parentheses are P-values.
(3) OPD1 = [(1 if big BHCS, 0 if otherwise) * Option (where option = notional value/total assets)].
OPD2 = [(1 if medium BHCS, 0 if otherwise) * option (where option = notional value/total assets)].
OPD3 = [(1 if small BHCS, 0 if otherwise) * option (where option = notional value/total assets)].

Table (6-9): The interactions of size dummies with SWAPS

	β	σ_{it}^{E}	σ_{it}^{V}
SWD1	-.00258876 [.075]	-.0000737711 [.004]	-.00801538 [.005]
SWD2	1.93706 [.322]	-.158649 [.000]	-.574533 [.000]
SWD3	12.4923 [.169]	-.333004 [.039]	-.655418 [.044]
LEV	-3.91819 [.013]	.142115 [.000]	.335327 [.000]
DIV	1.02242 [.032]	-.036227 [.000]	-.39856 [.000]
LOSS	1.47222 [.885]	.655458 [.000]	.715573 [.000]
GAP	-19.9902 [.001]	.532876 [.000]	.697712 [.000]
POR	.00149173 [.907]	-.000831776 [.000]	-.00901938 [.000]
R^2	.372706	.520263	.532933
LM	2.88194 [.090]	7.42291 [.006]	6.51211 [.011]
DW	.834158 [.000,.000]	1.41037 [.000,.000]	1.42107 [.000,.000]

Notes:
(1) The dependent variables show in the first row, the independent variables show in the first column.
(2) The numbers between parentheses are P-values.
(3) SWD1 = [(1 if big BHCS, 0 if otherwise) * Swaps (where swaps = notional value/total assets)].
SWD2 = [(1 if medium BHCS, 0 if otherwise) * Swaps (where swaps = notional value/total assets)].
SWD3 = [(1 if small BHCS, 0 if otherwise) * Swaps (where swaps = notional value/total assets)].

Table (6-10): List of sample BHCs.

Big BHCS	Small BHCS
A B N AMRO HOLDING N V	AMCORE FINANCIAL INC
AMSOUTH BANCORPORATION	BANCORPSOUTH INC
B B & T CORP	FIFTH THIRD BANCORP
BANK NEW YORK INC	FIRST CITIZENS BANCSHARES INC NC
BANK OF AMERICA CORP	FIRST TENNESSEE NATIONAL CORP
CITY NATIONAL CORP	FIRSTMERIT CORP
COMMERCE BANCORP INC NJ	FULTON FINANCIAL CORP PA
FIRST BANCORP NC	H S B C HOLDINGS PLC
FIRSTMERIT CORP	KEYCORP NEW
INVESTORS FINANCIAL SERVS CORP	NATIONAL CITY CORP
M & T BANK CORP	NEW YORK COMMUNITY BANCORP INC
NATIONAL PENN BANCSHARES INC	P N C BANK CORP
OLD NATIONAL BANCORP	REGIONS FINANCIAL CORP
POPULAR INC	SKY FINANCIAL GROUP INC
SUNTRUST BANKS INC	SOUTH FINL GROUP INC
U S BANCORP DEL	U M B FINANCIAL CORP
WACHOVIA CORP NEW	VALLEY NATIONAL BANCORP
WELLS FARGO & CO NEW	WASHINGTON TRUST BANCORP INC
A B N AMRO HOLDING N V	AMCORE FINANCIAL INC
Medium BHCS	
ASSOCIATED BANC CORP	
B O K FINANCIAL CORP	
COMERICA INC	
COMMERCE BANCSHARES INC	
COMPASS BANCSHARES INC	
CULLEN FROST BANKERS INC	
FIRST MEDIUMWEST BANCORP DE	
MARSHALL & ILSLEY CORP	
MELLON FINANCIAL CORP	
MERCANTILE BANKSHARES CORP	
NORTH FORK BANCORPORATION NY INC	
NORTHERN TRUST CORP	
PROVIDENT BANKSHARES CORP	
REGIONS FINANCIAL CORP	
SYNOVUS FINANCIAL CORP	
T C F FINANCIAL CORP	
UNIONBANCAL CORP	
ZIONS BANCORP	

Chapter Seven

Conclusions and Policy Implications

In the last few decades the banking system, in the United States and across the globe, has witnessed an increasing usage of OBS activities. There have been many hypotheses raised by researchers and policy analysts to justify the existence of these activities. These hypotheses include, generating of fee income, avoiding regulatory taxes, more flexibility at breakdown points, and risk management tool. This research has aimed to analyze OBS activities from these different points of view. We divide OBS activities into two types, guarantees contracts and derivatives contracts, and test the hypotheses employing panel approaches using representative U.S commercial banks and international commercial banks data samples. In this chapter I provide summary conclusions and further explanation of results.

Like many other financial activities represented as a transition in the financial system, financial researchers believe that OBS activities are driven by regulatory changes, financial innovations, and the technological progress that is accompanying them. Banks are just like any other firm in that they aim to maximize their revenues and minimize their expenses; the deregulation process during the last few decades has put more constraints in bank's traditional activities which, of course, decreased bank's revenues and increased bank's expenses, decreasing bank's profit. As a result of these regulatory changes bank's escaped from the traditional, on-balance sheet activities where

the regulations applied, to off-balance sheet activities in order to generate new income sources. Although, this hypothesis is true for some new activities and it may be one reason to begin engagement in these sophisticated OBS activities. Our results, consistent with recent research, reveal that bank's regulations do not explain much of the reasons behind the increasing use of these OBS activities, both guarantees and derivatives. I believe, the reasons behind the minimal impact of bank's regulation in explaining OBS activities is that OBS activities are not caused by the new regulations but caused by the reasons that forced the federal reserve authority to regulate this sector. The more sophisticated relationships between firms, banks, and investors, may have been one of the more important reasons for deregulations. Financial institutions provide more services to investors, while at the same time they service the firms at different levels; i.e., the nature of their relationships has changed in a number of ways.

Given this sophisticated financial environment and given the fact that banks are competing over service fees, OBS activities may be considered as a financial innovation where all banks are competing to take advantage of this innovation and introduce more diversified financial services portfolio. OBS diffusion patterns follow the pattern of financial innovation diffusion over time. Mansfield (1961) has shown that the adoption pattern of real innovations often follows a logistic time curve, and these innovations will grow over time until it reaches 100% occupancy. He also shown that at the beginning stages of the diffusion process the innovation will be spinning in an increasing rate and it will slow down at later stages.

Our results support Mansfield's model in which we conclude that banks OBS guarantees are decreasing over time and it is no longer considered a financial innovation

in U.S. banking industry. Further, banks seem to have replaced guarantees with other OBS activities like derivatives. However, OBS derivatives usage is increasing overtime and it follows the financial innovation trend in the banking industry. These results are consistent with Mansfield's innovation model. Guarantees contracts were found in the U.S banking industry in the early 1980s and they were used increasingly during that decade and the early 1990s. We may find that almost all banks are engaged in these activities; thus the slowing stage of these activities has already started as OBS derivatives activities have taken their place. Moreover, derivatives activities are at the early stages of the diffusion process and the high growth rate is the characteristic of this stage. Nevertheless, the diffusion pattern of derivatives activities seems to be spinning at a faster rate than that for guarantees when they were at the same stage. We expect increasing competition, high merge rates, globalization, and higher risks to be the reasons behind the fast diffusion pattern for banks' OBS derivatives activities.

While banks regulatory factors are not a major determinant of OBS activities, bank's non–regulatory factors and macro economic factors are at work to determining OBS usage. The results suggest that OBS guarantees follow the business cycle and the usage decision might be considered much like traditional bank activities. While in the case of derivatives activities, the substitution effect is dominant between OBS activities and traditional bank activities. OBS activities are profit driven and they increase with banks profit.

Banks size affects OBS guarantees negatively which is inconsistent with the market discipline hypothesis, and the usage of guarantees decrease with bank risk. The relation between bank's size and OBS derivatives is positive, which is consistent with the

economy of scale notion since derivatives require higher qualifications than other OBS activities and that is more likely available in the large size banks. Finally, a lack of credibility presented as the non-performing loans will decrease the usage of OBS activities in general. The results also suggest that OBS derivatives do not follow the business cycle and the usage decision does not depend on economic conditions, however, OBS guarantees do tend to follow the business cycle.

OBS activities are taking place not only in the U.S. but abroad. We shed light on these activities in the major regions of the world. Our results demonstrate that OBS activities are no longer considered a financial innovation in the majority of the developed regions; however, OBS activities are a financial innovation in the less developed regions. Following our previous explanation in the case of U.S. banks, OBS activities started in the developed regions long before the developing regions that give OBS activities an increasing rate characteristic in the developing regions. Bank's non-regulatory variables are the main factors in determining the usage of OBS activities in almost all regions. Banks size and Banks Loans are significant in six regions and insignificant in the remaining three. OBS activities are not profit driven and when banks' profit increase due to OBS activities or traditional bank's activities does not affect the decision of OBS usage, hence the profitability factor was insignificant for six regions. The non-performing loans is a major factor in OBS decision, it was significant for most of the regions. The macroeconomic variable is at work with other variable to determine OBS existence in the banking systems' activities.

The level of technology, political environment, and economic development seem to be a positive factor in OBS usage in six regions, USA, NAFTA, G7, The

European Union, Western Europe, and Eastern Europe. These regions are the most developed countries economically and technologically. The financial system in these regions is an open system and more globalized than any other region in the world. These regions are also more stable political environments which also gives the opportunity to improve the financial system and consider more financial innovation, e.g., OBS activities. The technological and political environments have affected OBS activities negatively in The Far East and Central Asia and South & Central America. These two regions are generally less developed than the first set of regions and the financial system does not encourage OBS activities as a financial innovation. The Middle East and Africa are regions with continuous political problems, especially The Middle East. They are also less developed countries, and their financial systems are not supportive of new financial innovations. In other words being a Middle Eastern or African bank does not affect bank's OBS usage.

Consistent with the U.S. banking system, our results reject the regulatory tax hypothesis and suggest that banks' regulations have no major role in OBS activities in the banking system for all the regions except for Africa and The Far East and Central Asia. This suggests that there are alternative hypotheses to explain OBS phenomenon, like technology hypothesis and market discipline hypothesis. Financial system development, economy size, economy openness, Political environment stability are all factors to explain the extensive usage of OBS activities in the world and should not be neglected.

In a further investigation of this phenomenon we have tested the market discipline existence of OBS activities and the bank holding companies market risk. In addition to the traditional market risk measures, we employed a contingent claim model

that account for the non-linear relationship between OBS guarantees and the market risk. Therefore, we have three risk measure, systematic risk (beta), standard deviation of equity return, and the implied asset volatility (from the contingent claim model). We included four OBS guarantees contracts (unused commitments, SLCs, CLCs, and participations), and four OBS derivative contracts (futures, forward, options, and swaps), in addition to six on balance sheet risk measures as control variables.

Our analysis is designed in a way to capture the differences in the marginal propensity to risk (MPR) which might be affected by the operational size differences between BHCs. We believe that the operation size of each BHCs should be an important factor to determine the marginal propensity to risk factors (on and off balance sheet), in other word, large BHCS should react differently than the small BHCS or the medium size BHCS. In order to achieve this investigation we divide our BHCS sample into three groups, big, medium, and small, we also imposed dummy variables analysis in a separate regression.

The results suggest, first, unused commitments, SLCs, and participations contracts are all significant player on market risk valuation in big BHCs, and they are being viewed as risk reducer according to the three risk measures. Second, SLCS contracts are significant risk reducing factor for both the medium and small sized BHCs, in addition to the big group. Third, unused commitment, CLCs, and participations seem to be not major influencer on the valuation of banks three market risk measures (Beta, σ_{it}^{E} , and σ_{it}^{V}) for the three BHCs groups. Fourth, generally the market participants view OBS guarantees as more potential risk diversification tools. Fifth, small BHCs have

different MPR than both big and medium BHCs, which may follow the economy of scope concept and the big to fail doctrine. Sixth, the on balance sheet variables are consistent with the existing literature and they do have impact on the pricing process of bank's equity. To a certain extent, the relation between these accounting risk variables and different market risk measures varies between each BHCS group. Therefore, more capital requirements and regulations on bank's OBS guarantees activities may distort the large banks market positions.

The results in the derivative section of the study suggest, swaps contracts are the major player on the market risk valuation, and it is being viewed as risk reducer according to the three risk measures for the big and medium BHCs. However it is insignificant for the small sized BHCs. In the contrast, futures, forwards, and options seem to be not major influencer on the valuation of banks the three market risk measures (Beta, SigmaE, and SigmaV) for the three BHCs groups. This result may be due to the small value of these contracts relative to the swap contracts, and the market participants do not pay attention to these positions as risk factors. However, we found a positive significant relation between these three types of derivative on the market systematic risk (Beta). Generally the market participants view OBS derivatives, majored by swaps positions, as more potential risk diversification tools.

Small BHCs have different MPR than both big and medium BHCs, which may follow the economy of scope concept and the big to fail doctrine. Generally speaking, the risk sensitivity is higher in the case of the small sized banking firms then the medium sized and the smallest impact will be on the largest banking firms, i.e., the bank's size is adversely related to bank's risk sensitivity of the derivative contracts. Finally, on-balance

sheet variables are consistent with the existing literature and they do have impact on the pricing process of bank's equity. To a certain extent, the relation between these accounting risk variables and different market risk measures varies between each BHCS group.

Therefore, more capital requirements and regulations on bank's OBS derivatives activities may distort the large banks market positions. Moreover, the market participants do not price futures, forwards, and options in their calculations of market risk although these contracts together should have a significant impact on the overall bank's risk and should be considered in market valuation.

VITA

Ahmad Khasawneh was born in Idoun-Jordan, on June 23rd, 1977. He received his Bachelor and Masters in Economics from Yarmouk University, Irbid-Jordan in 1999 and 2002, respectively. He also received his Masters in Financial Economics from the University of New Orleans in 2006. He currently resides in Metairie and soon will join his wife and his two beautiful sons in Amman-Jordan where he will be working as an assistant professor at the college of economics and business administration at Hashemite University, Zerqa-Jordan.