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IMPLICATIONS OF OFF-BALANCE
SHEET ACTIVITIES IN MENA COUNTRIES
COMMERCIAL BANKS

Ahmad Khasawneh and Kabir Hassan

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OFF-BALANCE SHEET ACTIVITIES IN MENA COUNTRIES
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Abstract

Although there is literature about off-balance sheet (OBS) activities in the banking system, this is the first paper that investigates the off-balance sheet activities in the Middle East and North Africa (MENA) banking industry. It aims to test the tax regulatory hypothesis and the market discipline hypothesis in determining OBS activities of MENA commercial banks using a panel dataset for the period 1996–2007. We employ Mansfield's (1961) logistic diffusion model and we consider OBS activities as real financial innovation following a time trend diffusion curve. The model is modified to include regulatory and non-regulatory bank-specific factors in addition to macroeconomic factors. We also added a country dummy vector to incorporate the country's institutional and financial environment and time dummy vector to control for the political and economic events over time. The results reveal that OBS activities do not follow Mansfield's financial diffusion model, and that adoption is decreasing over time. Regulatory tax hypothesis is rejected for the case of MENA banks since most of them face high regulatory pressure which negatively affects the OBS adoption. The results also suggest that OBS activities follow the business cycle notion and that the usage decision depends on economic conditions. Moreover, there exists an informational economy of scope between loans and OBS activities. Banks will participate more in OBS activities to reduce their risk resulting from loans. Also, OBS activities are profit driven. Political and economic events negatively affect MENA banks' OBS activities. The implications of these results suggest that regulations, institutional and technological deficiency in MENA countries prevent the banking system from adopting different financial innovations.

ملخص

بالرغم من وجود العديد من المؤلفات عن الأنشطة غير المذكورة في الميزانية (OBS) في النظام المصرفي، فإن هذه الورقة لها فضل السبق في الأنشطة غير المدرجة في الميزانية في الصناعة المصرفية في الشرق الأوسط وشمال إفريقيا. وتهدف الورقة إلى اختبار الافتراض المنظم للضرائب وافتراض تنظيم السوق في تحديد الأنشطة غير المدرجة في الميزانية في البنوك التجارية في الشرق الأوسط وشمال إفريقيا باستخدام مجموعة من جداول البيانات في الفترة من 1996-2007. ولقد استخدمنا نموذج مانسفيلد للانتشار اللوجستي (1961) واعتبرنا الأنشطة غير المدرجة في الميزانية ابتكاراً مالياً حقيقياً يتبعه منحى انتشار اتجاه الوقت. يتم تعديل النموذج ليشتمل على العوامل البنكية التنظيمية وغير التنظيمية بالإضافة إلى عوامل الاقتصاد الكلي. لقد أضفنا أيضاً القوة الموجهة الزائفة للبلاد لتشمل البيئة المالية والمؤسسية للبلاد وتوقيت القوة الموجهة الزائفة للتحكم في الأحداث السياسية والاقتصادية على مر الوقت. وتكشف النتائج أن الأنشطة غير المذكورة في الميزانية لا تتبع نموذج مانسفيلد للانتشار المالي ويقبل التبني بمرور الوقت. وفي حالة البنوك في الشرق الأوسط وشمال إفريقيا يرفض الافتراض المنظم للضرائب لأن معظم هذه البنوك تواجه ضغوطاً منظمة كبيرة تؤثر سلباً على تبني الأنشطة غير المذكورة في الميزانية. وتوحي النتائج أيضاً أن الأنشطة غير المذكورة في الميزانية تتبع فكرة دورة العمل وأن قرار الاستخدام يعتمد على الظروف الاقتصادية. وأضف إلى ذلك أنه ثمة اقتصاد معلوماتي ذو بال بين القروض والأنشطة غير المذكورة في الميزانية. وسوف تساهم البنوك بصورة أكبر في الأنشطة غير المذكورة في الميزانية لتقليل المخاطر الناتجة عن القروض. كما أن الأنشطة غير المذكورة في الميزانية تهدف إلى تحقيق الربح، وتؤثر الأحداث السياسية والاقتصادية سلباً على الأنشطة غير المذكورة في الميزانية في بنوك الشرق الأوسط وشمال إفريقيا. وتوحي دلائل هذه النتائج بأن النقص التنظيمي والمؤسسي والتكنولوجي في دول الشرق الأوسط يحول بين النظام البنكي وبين تبني أفكار مالية مختلفة.

1. Introduction

In the last few decades, the banking industry has witnessed a wide range of financial developments resulting from global commercial relations. These developments affected traditional and non-traditional banking and impacted both risk and income faced by the banks. As a result, governments decided to deregulate the banking sector to protect the depositor and reduce the banks' risk. Banks, however, engage in off-balance sheet (OBS) activities to earn additional fee income to make up for declining margins on their traditional lending business, hedge risks, avoid regulatory costs and taxes since reserve requirements and deposit insurance premiums are not levied on OBS activities. Since OBS activities are only shown as notes to financial statements/balance sheet, banks don't need to make extensive changes to the on-balance sheet items. OBS activities include issuing various types of guarantees, such as letters of credit, participations and commitments (which have a strong insurance underwriting element), and making future commitments to lend and engaging in derivatives transactions using futures, forwards, options and swaps.

The foregoing hypotheses were concluded based on developed economies studies. The financial structure, institutional and legal environment of developed and developing countries are not comparable. This study will focus on the motivations behind the OBS activities in the Middle East and North Africa (MENA) banking industry as developing economies. The MENA region includes twenty one countries, namely, Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Malta, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates, West Bank and Gaza, and Yemen¹. The MENA region is economically diverse in that it comprises both the oil-producing economies and resource-scarce economies. However, MENA countries share a common culture, religion and language. Like other countries in the world, the MENA banking industry faces deregulation efforts and increasing risk, thus, banks have resorted to OBS activities.

This research tries to explain why MENA banks engage in OBS activities. We consider the OBS activities as a financial innovation following Mansfield (1961) diffusion model. The independent variables are classified into four groups; bank specific non-regulatory factors, bank specific regulatory factors, macroeconomics factors and country institutional and technological dummies. We perform the test using panel data techniques. The rest of the paper is organized as follows. Section 2 gives a brief literature review on OBS activities. Section 3 outline the hypothesis and empirical model. Section 4 documents research variables and data sources. Empirical results and their implications are discussed in Section 5 and Section 6 provides concluding remarks.

2. Literature Review

Previous research on the topic of OBS activities in the banking industry can be divided into three dimensions based on the hypotheses the research support. The first group supports the regulatory tax hypothesis, the second supports the moral hazard hypothesis, and the third group supports the market discipline hypothesis. The regulatory tax hypothesis asserts that there is a positive relation between banks' OBS activities and the regulatory taxes on on-balance sheet assets and liabilities. The regulatory taxes are usually forced by imposing limits on banks' reserves, deposit insurance premia and capital. These limits encourage banks to substitute OBS activities with on-balance sheet activities. The moral hazard hypothesis states that banks with high probabilities of failure have greater moral hazard incentives and impetus to engage in OBS activities. It proposes that the underpriced fixed rate deposit insurance and capital requirements provide incentives to the banks to increase financial leverage through

¹ The World Bank, countries profile, permanent URL: <http://go.worldbank.org/7UEP77ZCB0>

OBS activities that are not subject to regulations. This hypothesis argues that poorly capitalized banks are more likely to engage in OBS activities than well-capitalized banks. Moreover, banks at the precipice of failure use OBS items which are not subject to accounting rules. This allows the banks to recognize OBS fees/income immediately unlike interest income from on-balance sheet items which cannot be recognized until when earned. Finally, the market discipline hypothesis argues that since OBS activities are uninsured dependent future claims related to other claims on the banks, banks with safer liquidity and capital positions will engage in more OBS activities to hedge and minimize risk. Bank customers will value these claims more when banks are safer; hence banks with lower OBS items have the incentives to issue additional OBS items to improve their risk position.

Pavel and Phillis (1987) examine the determinants of commercial loan sales activities. They conclude that diversification, capital, binding capital constraints and reserve requirements have an important impact on loan sales. Moreover, this study proposes that banks should start selling loans when capital ratios are low and charge-offs are high. Avery and Berger (1988) support the moral hazard hypothesis and suggest that standby letters of credit (SLC) 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) notes that there is no relation between loan sales and bank risk. Koppenhaver (1989) considers more OBS activities (loan commitments, SLCs and commercial letters of credit (CLCs)) and studies the determinants of OBS activities employing Logit models. The results suggest that bank size, amount of reserves and loan losses influence the bank's decision to engage in OBS activities, while capital constraint factors are insignificant for a bank's 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. They employ a granger causality test and find that SLCs have a positive impact on bank leverage, while 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 a bank risk-reducer while debt holders are indifferent about CLCs activities. This suggests that more constrained capital requirements are not appropriate for some of the 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 debt holders and equity holders regard OBS activities as bank risk reducers.

International research is mainly concerned with the market discipline hypothesis. Hassan, Lai, and Yu (2002) studied the risk implications of Canadian banks' letters of credit by employing several market measures of risk using one-factor and multi-factor models. Their results

indicate that the various market measures of risk and letters of credit are negatively related. Moreover, banks with greater portfolio risk, (measured in terms of equity and asset risk), 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 percent 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 are 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. 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 the cost inefficiency with and 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. Moreover, 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. They conclude that economies of scope between loans and OBS outputs are practical.

Angelidis and 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 through 2002. They 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, productivity is aggravated. 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 (2005) compares Indian public and private commercial banks' ability to generate income out of off-balance-sheet activities by using the data envelopment approach. The author employs a panel data framework to test the impact of operating efficiency, capital adequacy and non-performing assets (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 OBS activities. Most commercial banks exhibit decreasing returns to scale, a disturbing trend for the banking sector. 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.

Nachane and Ghosh (2007) examine the determinants of OBS activities in the Indian banking sector. They find that regulatory factors and market forces captured by banks-specific characteristics and macro-economic conditions respectively are at play in the diffusion pattern of OBS activities.

3. The Model

Following Jagtiani et al (1995), we employ the logistic diffusion model developed from Mansfield (1961) model. The Mansfield model shows that the adoption pattern of real innovations often follows a logistic time curve. The notional value of total OBS activities is considered as an innovation following the time diffusion pattern.

This study differs from Jagtiani et al (1995) 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. However, we will measure the capital requirement factor in line with the analysis of Jacques and Nigro (1997) and Nachane and Ghosh (2007) by introducing the concept of regulatory pressure with respect to banks' capital adequacy ratios (CARs). Second, in addition to the capital requirement factor and bank specific features, we add macroeconomic conditions as independent variables. The dataset makes this research unique, since, there is no previous research about OBS activities in the MENA banking system. Bank-level panel data is constructed for the twenty one countries in the MENA region 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.

3.1 The logistic diffusion model

Mansfield (1961) introduced a deterministic model to answer two questions: Why are firms so slow to install some innovations and so quick to install others? What factors seem to govern the rate of imitation? The model assumes that the number of firms adopting an innovation between time t and time $t+1$ depends on several factors. First is the number of firms that have previously adopted the innovation. The increase 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 an innovation. Moreover, competitive pressures mount and "bandwagon" effects occur. Second is the profitability of installing the innovation. This has incalculable influence on $\lambda_{ij}(t)$. The more profitable the investment in innovation is relative to others that are available, the greater the chance that a firm's estimate of the profitability will be high enough to compensate for whatever risks are involved. Therefore, 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. This is hinged on the fact that firms tend to be more cautious before committing themselves to such projects and in addition to increased difficulty in financing them. Finally, for equally profitable innovations requiring the same investment, $\lambda_{ij}(t)$ is likely to vary among industries due to different risk affinity across industries. The formal derivation of Mansfield (1961) model is detailed below.

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 percent 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.*,

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

and,

$$\lambda_{ij}(t) = f\left(\frac{m_{ij}(t)}{n_{ij}}, \pi_{ij}, S_{ij}, \dots\right). \quad (2)$$

It is assumed that the number of firms having introduced an innovation can vary continuously rather than only one integer value, and 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

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

Thus,

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

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

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

The solution of which,

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

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 $\frac{m_{ij}(t)}{n_{ij}}$

$$\beta_{ij} = a_{i2} + a_{i5} \pi_{ij} + a_{i6} S_{ij} + \dots, \quad (7)$$

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

$$\lim_{t \rightarrow -\infty} m_{ij}(t) = 0 \quad (8)$$

It follows that,

$$P_t = \frac{m_{ij}(t)}{n_{ij}} = \left[1 + e^{(-\alpha_{ij} - \beta_{ij}t)} \right]^{-1} \quad (9)$$

From the foregoing, 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 is achieved. This is attained at $t = -(\alpha/\beta)$. 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 equation (9)

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

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 banks introduce OBS items.

3.2 The empirical model

Starting from equation (10), we will add three factor vectors: the first to control for bank-specific characteristics, the second to capture the macroeconomic conditions while the third is a dummy variables vector capturing the institutional and technological differences between the MENA countries. The choice of these factors is based on both theoretical literature and policy discussions. Accordingly, equation (11) is the modified econometric model from equation (10).

$$LGTOBS_{it} = \ln \left[\frac{P_{it}}{1 - P_{it}} \right] = \beta t + \gamma X_{it} + \delta Y_{jt} + \phi D_j \varepsilon_{it} \quad (11)$$

where $i = 1, 2, 3, \dots, N$ denotes the number of banks and $t = 1, 2, 3, \dots, T$ 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 notional value of total OBS activities (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 derivatives items. The explanatory variables are shown below.

- i. The time trend (t) accounts for the autonomous diffusion (deterministic trend).
- ii. X_{it} is a vector of bank-specific characteristics.
- iii. Y_{jt} is a vector of general macroeconomic conditions.
- iv. D_j is a vector includes country institutional and technological dummies.

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 double effects 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 to get involved in OBS activities and derive the benefit of the economies of scale. Large banks may be the only banks that have highly qualified risk management and specialized staff. Likewise, sophisticated clients who are more likely to engage in OBS activities may not consider the small banks as a transaction vehicle since they believe that large banks are too big to fail. This is buttressed by perception that as a bank gets bigger, it becomes likely more risk-diversified which suppresses the 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 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 activities. Another rationale 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 as a measure of the bank's creditworthiness as viewed by customers. Profitability will increase the customer valuation of a bank which persuades the customer to work with more profitable as opposed to less profitable banks.

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. The amount of non-performing

loans increases with the decrease in bank's creditworthiness. This will ultimately reduce OBS activities. A counter argument is that as the amount of charge-off increases, default risk for that bank is magnified. Therefore, a risk management instrument might be needed to hedge against this risk and generate another income to compensate for bad loans loss. From this front, an increase in charge-off amount might have a positive impact on OBS activities.

To incorporate regulatory factors in our model, we adopt Jacques and Nigro (1997) model where the capital adequacy ratio (CAR) proxies for capital requirements regulation. CAR is a measure of a bank's buffer capital, used to protect depositors and promote the stability and efficiency of financial systems around the world². There are two possible effects of the CAR on the diffusion pattern of OBS items. On the one hand, a higher CAR increases a bank's creditworthiness, which ultimately whets the banks customers' incentives to transact with the bank in OBS risk management items. On the other hand, a higher CAR reduces bank's marginal gain from increasing risk in asset portfolio (Furlong and Keeley, 1989). As bank capital increases, the ability to assume risks increases, but the need for OBS products to hedge risk exposure may decrease. We also examine the response of banks to the 8% well capitalized total risk-based capital (RBC) standards on the capital ratio³. We classify the banks into two groups of low CAR and high CAR to signal the degree of regulatory pressure brought about by the RBC standards on capital ratio. This is 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 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 RBC ratio less than 8 percent, and zero otherwise. 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 signifies comfortable capital position; therefore, if accompanied with high credit rating, banks become active suppliers of OBS products (Koppenhaver and Stover, 1991). Alternatively, low regulatory pressure reduces the marginal propensity to increase the risk of banks' 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 two categories: general economic performance measure (the real Gross Domestic Product (RGDP)), interest rates spread (the difference between the long and the short-term interest rate). RGDP captures the effects caused by fluctuations in general economic activity. Two arguments can be made about the impact of the RGDP and the usage of OBS activities. First, the demand for OBS products reacts positively to the business cycle due to transactions motive. Second, business risk decreases in economic boom periods which lead to less demand for OBS activities to hedge risk. The interest rate spread also encounters two arguments. First, a large and positive interest rate spread signals high degree of uncertainty about future interest rates or a rise in future short-term interest rates. Thus, high interest rate risk requires more risk management tools (OBS). Second, large and

² CAR can be expressed as $CAR = \frac{TierICapital + TierIICapital}{RiskWeightedAssets}$. It is also called the capital to risk weighted assets ratio (CRAR).

³ 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.

positive interest rate spread gives banks' managers the 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. Therefore, banks' managers will be less attracted to engage in OBS activities.

We believe that the diversity in resources endowment make the MENA countries differ in the level of technology, financial structure and institutional differences. For example, the oil-producing countries may be able to enhance their level of technology and financial environment better than non oil-producing countries. In compendium, the legal and institutional environments and level of technology are not well established in MENA countries to compel MENA banks to engage in sophisticated contracts like derivatives and other OBS activities. In order to incorporate these differences between countries, we include a dummy variable for each country in the sample. The dummy, D_1 , is attached to bank X if it is located in country A and D_2 is attached to bank Y if it is located in country B.

4. Data Sources

The dataset is drawn from the Bureau Van Dijk online electronic publishing 2008, BankScope, and Bureau van Dijk CD-ROM Electronic Publishing 2004, BankScope. The dataset started with 272 banks in the 21 MENA region countries. The filtering process eliminated banks which are not long established, Islamic banks which have different activities in nature and Central banks. Moreover, the fact that our sample comprises developing countries only could be a good pointer that some banks do not report statistics to data collection institutions. The net sample was 192 banks drawn from twelve countries namely, Bahrain, Egypt, Israel, Jordan, Kuwait, Lebanon, Morocco, Oman, Qatar, Tunisia, United Arab Emirates, and Yemen. We collected yearly frequency data during the period 1996 through 2007. The macroeconomic variables, the real GDP and interest rates, are collected from the IFS (International Financial Statistics) online database for the same period. Interest rates on long term government bonds proxy for long-term interest rate while interest rate on Treasury Bills proxy for short-term interest rate. OBS is calculated according to equation (10)

5. Empirical Results

In this section we present the results of our estimates of the logistic diffusion model for OBS activities in the banking sector of MENA countries. Tables (4 – 6) present the random effect estimates⁴ for the logistic diffusion model for the OBS activities in MENA countries banking system. The results unexpectedly, show that OBS activities in MENA commercial banks do not follow the logistic diffusion model. Therefore, OBS activities are not considered innovation or have already reached the fully adoption and are now in the decreasing phase. Banks in the MENA regions consider most OBS activities as risk-increasing.

The non-regulatory bank-specific factors seem to be major factors in determining the OBS activities in the MENA countries. However, bank's size has insignificant impact on the magnitude of OBS activities. This implies that there are no economies of scale impacts resulting from OBS activities in MENA countries. This can be collated by the low OBS activities on the balance sheet activities. Moreover, the traditional banking activities are relatively safer for larger banks and there is less drive to engage in OBS activities without or with low risk to hedge.

Loan ratio has positive and significant impact on the magnitude of OBS activities in the MENA banking system. This implies that loans and OBS activities are not substitutes. Moreover, there exists an informational economy of scope between loans and OBS activities. Banks will participate more in OBS activities to reduce their risk resulting from loans.

⁴ Hausman test has rejected the null hypothesis in all cases; therefore all estimates are random effect.

In addition, the results show that a significantly positive relationship exists between OBS activities usage and net income. This implies that OBS activities are profit driven and banks' customers prefer to deal with the profitable and more creditworthy banks rather than the less profitable ones. The net charge-off ratio has a positively insignificant impact on OBS activities. This means that banks do not use OBS activities to manage risk resultant from bad loans.

The regulatory banks' specific factors are significant in determining the usage of OBS activities in MENA commercial banks. It is noted that high regulatory pressure is the main characteristic for most of the sample banks. The empirical results confirm that high regulatory pressure has a negative effect on the usage of the OBS activities in MENA banks. Low regulatory pressure is statistically insignificant for a few banks. This implies that the high regulatory pressure diminishes the creditworthiness of the banks and reduces the incentives for the customers to engage in OBS activities offered by the sample banks. Therefore, when restrictions imposed on banks' capital increase, the OBS activities decreased. Although the results indicate a significant relation between regulatory pressure and OBS activities, we join the recent literature and reject the regulatory tax hypothesis. Moreover, the regulations seem to be effective in reducing the use of OBS activities, in view of OBS activities being risk increasing factors.

Macroeconomic factors seem to affect the usage of OBS activities in the MENA banking system. The results show that real GDP is a positive and significant factor in determining the usage of OBS activities for the sample banks. This implies that OBS activities follow economic growth and business cycle. As the economic activities intensify, the demand for the OBS activities swells. This is because OBS activities are both a risk management tool and an income generating engagement. The interest rate spread has a statistically insignificant impact on OBS activities. This suggests that banks do not value the uncertainty about future interest rates when they make decisions on OBS contracts.

A country's institutional factors and financial technology are significant in determining OBS activities in MENA banks. Specifically, institutional and technical environment negatively affect OBS usage. Noticeably, MENA countries have defects in their institutional and technological environment that prevent banks from engaging in OBS activities. For instance, bureaucracy, organization structure, legal environment, labor skills and technology level among others are hurdles preventing the usage of OBS activities in MENA banks. There is compelling exigency to adopt restructuring policies for the banking system to adopt the convoluted financial innovations.

The previous estimation tests the time diffusion pattern of OBS activities in MENA countries but does not tell how OBS activities adoption changes over the years. In a further investigation, we analyze OBS activities adoption over time by estimating the model parameters with more emphasis on the time effect year by year. In this realm, we try to investigate the effect of yearly political and economic events and development in the MENA countries during the period of study. To this end, we add a time dummy variable—that takes the value of 1 if the year is, for example, 1996 and zero otherwise—for all years and generated twelve time dummies.⁵

The continued Arab-Israeli conflict, the wars in the Gulf, oil prices, labor mobility, refugees, and other events make the MENA region unstable relative to other regions around the world. The wavering conditions negatively affect the economic and financial developments in these countries and make it impossible to broaden the adoption of some complex financial instruments. The empirical results, reported in Table 6, indicate that years 2000, 2001, 2002,

⁵ See Table 2.

2006 and 2007 had significant events that partly caused the banking industry in the MENA countries to slow down in their OBS activities. All other time dummies affect the OBS usage negatively and are statistically insignificant. The period before 2003 represents the pre third gulf war period with critical events in the MENA region as a whole. The air strikes on Iraq started in 1999 and continued until the war began. Moreover, year 2001 witnessed the September 11 attack which constrained all the international financial transactions. In 2006 and 2007, the oil prices started to increase which also affected all the economic and financial activities. The Lebanon-Israeli war also broke in 2006. In general, all these events negatively affected OBS activities in the MENA banking system.

6. Conclusions and Policy Implications

OBS activities are considered a form of financial innovation. This study identified the determinants of these innovations in MENA banking system. We included five categories of variables to achieve our goal; namely time trend, bank non-regulatory factors, bank regulatory factors, macroeconomics factors, institutional and technological environment dummy and time dummies.

The results reveal that OBS activities in MENA banks do not follow the Mansfield diffusion model, and that the usage of OBS activities is decreasing over time during the period of the study. This result can be attributed to deficiency in the institutional and technological environment which reduces the adoption of the OBS activities in the MENA banking sector. Bank's non regulatory factors are significant in OBS usage. Specifically, there exist informational economies of scope between loans and OBS activities. Banks will participate more in OBS activities to reduce their risk resulting from loans. Moreover, OBS activities are profit driven. The size of the banks and the net charge-off are not significant.

The main regulatory feature for most of our sample MENA banks is the high regulatory pressure. The results suggest that high regulatory pressure negatively affects the OBS usage. However, although a significant effect of high regulatory pressure exists, we continue to reject the regulatory tax hypothesis. At the macroeconomic level, OBS activities follow the economy's business cycle and are positively correlated with the economic activities. However, banks do not value the uncertainty about future interest rates when they make OBS contracts decisions. Political and economic events negatively affect OBS activities in MENA banks.

The implications of these results suggest that regulations, institutional and technological deficiencies in MENA countries deter the banking system from adopting different financial innovations and engaging in OBS activities. The governments should institute strong regulatory reforms, financial sector restructuring, create credible institutional environment and put mechanisms in place to spur technology and qualifications transfer for the financial system to take advantage of the current financial innovations.

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Figure 1: OBS and Total Assets over Time

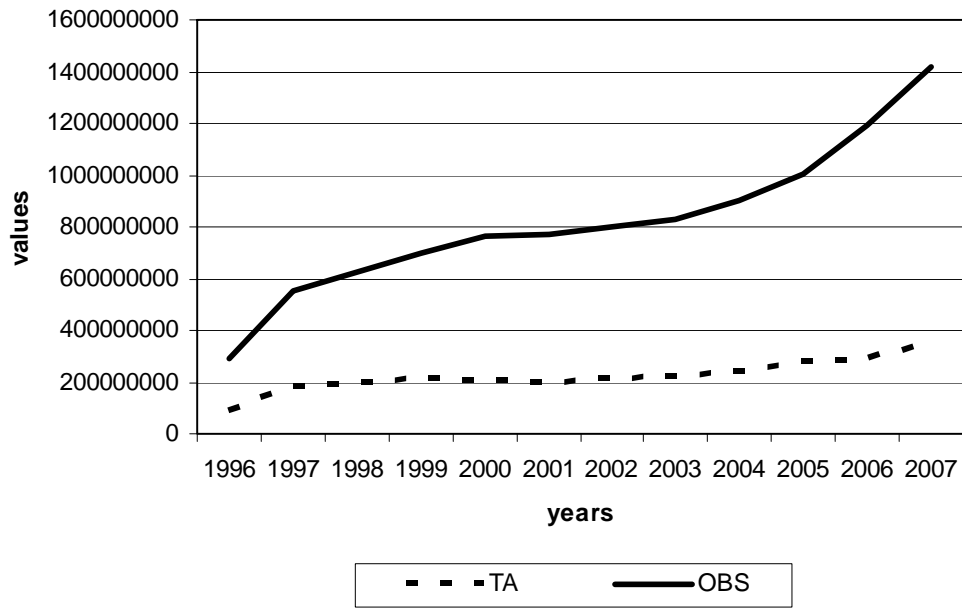


Figure 2: OBS/TA, OBS/ (OBS + TA) over Time Ratio

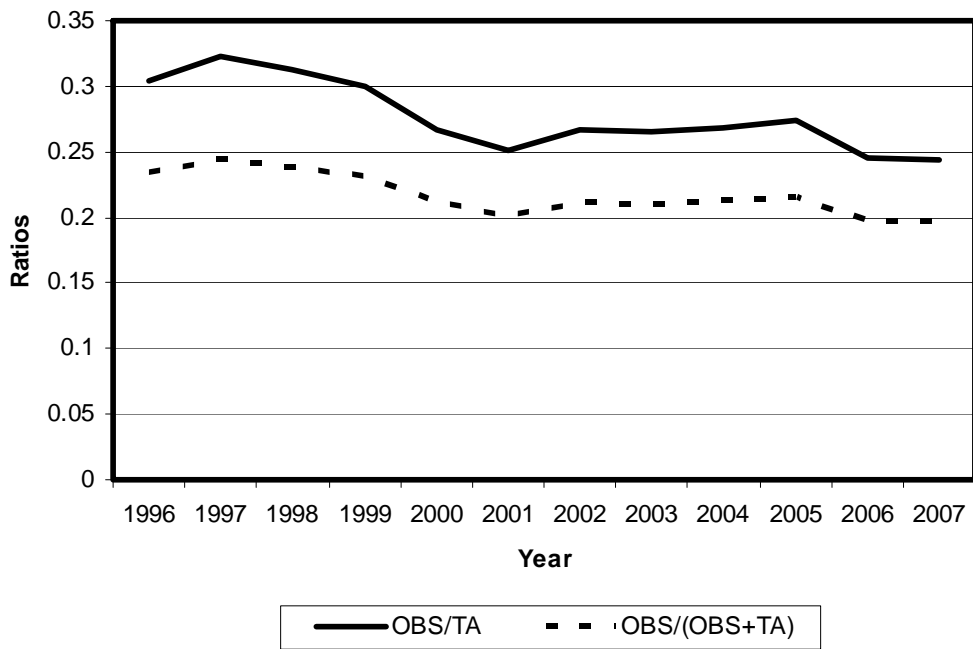


Table 1: Summary of Extant Literature

Study's Author	Objective	Main Results	Support for Hypothesis
U.S. Banking System Studies			
1) Pavel and Phillis, 1987	▪ Examine the determinants of commercial loan sales activities.	▪ Diversification, capital, binding capital constraints, and reserve requirements all have an important impact on loan sales.	Regulatory tax
2) Avery and Berger, 1988	▪ Examine the relationship between SLCs and bank's risk.	▪ SLCs have a positive impact on banks' risk exposure.	Moral Hazard
3) Benveniste & Berger, 1986	▪ Test the determinants of SLCs ▪ Test the relationship between bank's failure and SLCs issuance.	▪ SLCs issuance decreases as banks approach failure. ▪ There is a positive relation between SLCs and leverage.	Moral Hazard Regulatory Tax
4) Benveniste & Berger, 1987	▪ Investigate the relationship between SLCs and bank's risk.	▪ SLCs have a negative relationship with banks' risk.	Market Discipline
5) Pavel, 1988	▪ Study the relationship between loan sales and bank's risk.	▪ Declares that there is no relation between loan sales and bank risk.	Market Discipline
6) Koppenhaver (1989)	▪ Study the determinants of more OBS activities (loan commitments, SLCs and CLCs) employing Logit models.	▪ Bank size, amount of reserves, and loan losses are important factors for banks to engage in OBS activities. ▪ Capital constraint factors are insignificant for banks' OBS activities decisions.	Market Discipline
7) Berger and Udell, 1990	▪ Investigate the impact of loan commitments and bank's risk.	▪ There is a negative relationship between loan commitments and bank risk	Market Discipline
8) Avery and Berger, 1990	▪ Investigate the impact of loan commitments and portfolio's risk.	▪ There is a negative relationship between loan commitments and portfolio risk.	Market Discipline
9) Avery and Berger, 1991	▪ Study the relationship of different bank's risk measures and SLCs.	▪ SLCs have a positive impact on small banks' risk. ▪ SLCs have a negative impact on large banks' risk	Market Discipline
10) Koppenhaver & Stover, 1991	▪ Test if the existing empirical research encounters a simultaneous equation bias between SLCs and bank's leverage.	▪ SLCs have a positive impact on bank leverage. ▪ Bank's leverage has a negative impact on SLCs.	Market Discipline
11) Hassan, 1992	▪ Studies the riskiness of CLCs from the stockholders and bondholders point of view.	▪ Stockholders consider CLCs as bank risk-reducer. ▪ Debtholders are indifferent about CLCs activities.	Market Discipline
12) Hassan, Karels & Peterson, 1994	▪ Using a contingent valuation model to test the market discipline hypothesis of OBS activities for bank subordinated debt.	▪ Debtholders and equityholders regard OBS activities as bank risk reducers.	Market discipline

Table 1: continued

Study's Author	Objective	Main Results	Support for Hypothesis
International Banking Systems Studies			
13) Hassan, Lai, and Yu, 2001	<ul style="list-style-type: none"> ▪ Test the risk implications of Canadian Bank's letters of credit. 	<ul style="list-style-type: none"> ▪ Various market measures of risk and letters of credit are negatively related. ▪ Banks with greater portfolio risk, high leverage and interest rate risk are less likely to issue letters of credit. 	Market Discipline
14) Khambata and Hirche, 2002	<ul style="list-style-type: none"> ▪ Describe OBS credit risk of the top 20 European commercial banks. 	<ul style="list-style-type: none"> ▪ Loan commitments are the largest source of credit risk among traditional OBS instruments. 	
15) Khambata and Hirche, 2003	<ul style="list-style-type: none"> ▪ Describe OBS credit risk across the top 20 Japanese banks. 	<ul style="list-style-type: none"> ▪ Financial derivatives were heavily used by the top four banks. ▪ Loan commitments are the largest source of credit risk among traditional OBS instruments. ▪ Japanese banks are in general more conservative and risk averse than their U.S. or European counterparts. 	
16) Lieu, Yeh and Chiu, 2005	<ul style="list-style-type: none"> ▪ Inspect the influence of OBS activities on the cost efficiency of Taiwan's banks. 	<ul style="list-style-type: none"> ▪ Omitting OBS outputs in estimating the cost frontier function of banks results in an underestimation of bank efficiency by approximately 5 percent. ▪ Cost efficiency and OBS usage are positively related with bank size. ▪ Economies of scope between loans and OBS outputs are also practical. 	Economies of Scale Economies of Scope
17) Angelidis, Lyrودي, 2005	<ul style="list-style-type: none"> ▪ Investigate the impact of banks' OBS activities on the productivity of decision-making units in 11 European countries. 	<ul style="list-style-type: none"> ▪ 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. 	
18) Sinha, 2006	<ul style="list-style-type: none"> ▪ Compares Indian commercial banks (public and private banks) with respect to their ability to generate income out of OBS activities. 	<ul style="list-style-type: none"> ▪ Public sector commercial banks are lagging behind the private sector commercial banks in terms of OBS activities. ▪ OBS activities are positively related to operating profit ratio and negatively related to NPA ratios 	Market Discipline
19) Nachane and Ghosh, 2007	<ul style="list-style-type: none"> ▪ Examine the determinants of OBS activities in the Indian banking sector. 	<ul style="list-style-type: none"> ▪ Regulatory factors, market forces captured by banks-specific characteristics and macro-economic conditions are at work in determining the usage pattern of OBS activities. 	Regulatory Tax Market Discipline

Table 2: Variables Used in the Model

Variable	Symbol	Definition
Time	Time	Deterministic trend
Size	LTA	Log(total assets)
Loan Ratio	LLR	Total loans/total assets
Banks Profitability	LNI	Log(net income)
Bad loans	LCOFF	Net Charge – off
Low Regulatory Pressure	CARL	$CARL = \begin{cases} 1 / CAR_{actual} - 1 / 0.08, & \text{if } CAR_{actual} < 8\% \\ 0, & \text{if } CAR_{actual} > 8\% \end{cases}$
High Regulatory Pressure	CARH	$CARH = \begin{cases} 1 / 0.08 - 1 / CAR_{actual}, & \text{if } CAR_{actual} > 8\% \\ 0, & \text{if } CAR_{actual} < 8\% \end{cases}$
Gross Domestic Product	LGDP	Log(GDP)
Interest rate spread	LINR	Long-term rate – Short term rate
<i>Bahrain</i> Institutional, legal and technological environment	D1	Take the value of 1 if the bank located in <i>Bahrain</i> and zero otherwise.
<i>Egypt</i> Institutional, legal and technological environment	D2	Take the value of 1 if the bank located in <i>Egypt</i> and zero otherwise.
<i>Israel</i> Institutional, legal and technological environment	D3	Take the value of 1 if the bank located in <i>Israel</i> and zero otherwise.
<i>Jordan</i> Institutional, legal and technological environment	D4	Take the value of 1 if the bank located in <i>Jordan</i> and zero otherwise.
<i>Kuwait</i> Institutional, legal and technological environment	D5	Take the value of 1 if the bank located in <i>Kuwait</i> and zero otherwise.
<i>Lebanon</i> Institutional, legal and technological environment	D6	Take the value of 1 if the bank located in <i>Lebanon</i> and zero otherwise.
<i>Morocco</i> Institutional, legal and technological environment	D7	Take the value of 1 if the bank located in <i>Morocco</i> and zero otherwise.
<i>Oman</i> Institutional, legal and technological environment	D8	Take the value of 1 if the bank located in <i>Oman</i> and zero otherwise.
<i>Qatar</i> Institutional, legal and technological environment	D9	Take the value of 1 if the bank located in <i>Qatar</i> and zero otherwise.
<i>Tunisia</i> Institutional, legal and technological environment	D10	Take the value of 1 if the bank located in <i>Tunisia</i> and zero otherwise.
<i>UAE</i> Institutional, legal and technological environment	D11	Take the value of 1 if the bank located in <i>UAE</i> and zero otherwise.
<i>Yemen</i> Institutional, legal and technological environment	D12	Take the value of 1 if the bank located in <i>Yemen</i> and zero otherwise.
Year 1996 dummy	T1	Take 1 if year is 1996 and zero otherwise
Year 1997 dummy	T2	Take 1 if year is 1997 and zero otherwise
Year 1998 dummy	T3	Take 1 if year is 1998 and zero otherwise
Year 1999 dummy	T4	Take 1 if year is 1999 and zero otherwise
Year 2000 dummy	T5	Take 1 if year is 2000 and zero otherwise
Year 2001 dummy	T6	Take 1 if year is 2001 and zero otherwise
Year 2002 dummy	T7	Take 1 if year is 2002 and zero otherwise
Year 2003 dummy	T8	Take 1 if year is 2003 and zero otherwise
Year 2004 dummy	T9	Take 1 if year is 2004 and zero otherwise
Year 2005 dummy	T10	Take 1 if year is 2005 and zero otherwise
Year 2006 dummy	T11	Take 1 if year is 2006 and zero otherwise
Year 2007 dummy	T12	Take 1 if year is 2007 and zero otherwise

Table 3: MENA Banks Aggregated OBS Data

Year	Aggregated OBS	Aggregated Total Assets	OBS/(OBS+TA) ratio	OBS/T.A ratio
1996	88197009.3	289361153.7	0.23359847	0.304799066
1997	179494728.5	556032149.2	0.24403558	0.32281358
1998	196055793.8	627360573.4	0.238100433	0.31250895
1999	210080134.1	699894091.4	0.230863829	0.300159891
2000	204191849.4	764698224.7	0.210748211	0.267022785
2001	193983831.2	770582737.3	0.201109843	0.251736539
2002	213733762.2	800034142.3	0.21083106	0.267155801
2003	220928182.5	831003818.2	0.210021353	0.265857001
2004	241911465.2	900667841.7	0.211724004	0.26859121
2005	275216584.1	1004287537	0.215096286	0.27404162
2006	291797925.6	1190772886	0.196818879	0.245049185
2007	346991907.8	1419198596	0.196463466	0.244498486

Table 4: The Random Effect Estimation of OBS Determinants Model

	COEFF.	P-value
Constant	-1.90597	[.000]
TIME	-0.013917	[.052]
LTA	-0.0914470	[.195]
LLR	0.950610	[.000]
LNI	0.129749	[.000]
LCOFF	0.00000172839	[.747]
CARL	0.020543	[.000]
CARH	-0.014130	[.000]
LGDP	0.205341	[.023]
LINR	-0.045812	[.231]
No. Obs.	1028	
R2	0.194604	
Hausman Test	CHISQ = 15.348, P-value = [.0177]	
F-TEST	F = 5.0586, P-VALUE [0.000]	
L.M	18.8423 [.000]	
D.W	0.328424 [.000,.000]	

The explanatory variables appearing in the first column are classified into time, bank specific characteristics, regulatory variables, and macroeconomic.

Table 5: The Random Effect Estimation of OBS Determinants Model

	COEFF.	P-value
TIME	-0.013559	0.054
LTA	-0.048090	0.280
LLR	0.774904	0.002
LNI	0.068191	0.044
LCOFF	0.000000531	0.319
CARL	0.011659	0.569
CARH	-0.013290	0.000
LGDP	0.11254	0.035
LINR	-0.02896	0.325
D1	-1.70974	0.001
D2	-1.79496	0.001
D3	-2.31116	0.000
D4	-1.55518	0.002
D5	-1.78896	0.001
D6	-2.37597	0.000
D7	-1.73865	0.001
D8	-1.83098	0.001
D9	-1.36025	0.011
D10	-1.23650	0.034
D11	-1.30342	0.014
D12	-1.06120	0.036
No. Obs.	1028	
R²	0.1893	
Hausman Test	CHISQ = 32.118, P-value = [.0000]	
F-TEST	F = 9.0869, P-VALUE [0.000]	
L.M	20.6939 [.000]	
D.W	0.367588 [.000,.000]	

The explanatory variables appearing in the first column are classified into time, bank specific characteristics, regulatory variables, macroeconomic variables and institutional dummies.

Table 6: The Random Effect Estimation of OBS Activities over Time Progress

	COEFF.	P-value
LLR	.839662	[.001]
LTA	-.034892	[.443]
LNI	.058323	[.097]
LOFF	.548835E-06	[.309]
CARL	0.010015	[.458]
CARH	-.013109	[.000]
LGDP	0.187564	[.039]
LINR	-0.012358	[.376]
T2	-.064352	[.577]
T3	-.099839	[.385]
T4	-.148505	[.194]
T5	-.193755	[.095]
T6	-.189987	[.089]
T7	-.185396	[.081]
T8	-.137682	[.243]
T9	-.097404	[.417]
T10	-.150389	[.222]
T11	-.324335	[.009]
T12	-.204095	[.015]
D1	-1.76344	[.001]
D2	-1.84717	[.001]
D3	-2.40188	[.000]
D4	-1.61753	[.002]
D5	-1.84525	[.001]
D6	-2.43522	[.000]
D7	-1.78822	[.001]
D8	-1.88699	[.001]
D9	-1.41752	[.009]
D10	-1.33637	[.025]
D11	-1.35810	[.013]
D12	-1.11977	[.030]
No. Obs.	1028	
R²	0.205040	
Hausman Test	CHISQ = 32.732, P-value = [.0080]	
F-TEST	F = 5.0247, P-VALUE [0.000]	
L.M	19.6215 [.000]	
D.W	0.327965 [.000,.000]	

The explanatory variables appearing in the first column are classified into time, bank specific characteristics, regulatory variables, macroeconomic variables, time dummies, and institutional dummies.