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INCOME SMOOTHING PRACTICES OF US BANKS AROUND THE 2008 FINANCIAL CRISIS

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ABSTRACT

The financial crisis of 2008 had a profound effect on the US banking industry, causing financial distress and the failure of a large number of banks. In this paper, we investigate whether or not banking institutions smoothed their reported earnings upward through the utilization of loan loss provisions during the financially challenging times of the Great Recession. Using a large dataset of commercial banks and thrifts, our empirical results provide support for the income smoothing hypothesis that banking institutions underestimated their provision for loan losses in order to offset their declining earnings in the period after the financial crisis.

JEL: G21, M41

KEYWORDS: Financial Crisis, Income Smoothing, Provision for Loan Losses, Commercial Banks, Thrifts

INTRODUCTION

Many consider the financial crisis of 2008 the worst economic downturn since the Great Depression of the 1930s. The financial crisis, which originated in the US financial sector, quickly spread to the global financial markets and economy. In the United States, the crisis had a severe impact on the workings of the banking system leading to financial distress and the failure of a large number of banking institutions. Given the critical role the banking sector plays in the nation's economy, the effects of the sector's declining position were felt in all aspects of the economic system. Statement of Financial Accounting Standards (SFAS) No. 5 (FASB 1975), *Accounting for Contingencies*, establishes the general financial accounting standards for the recognition of loan losses. SFAS No. 5 requires that creditors record an expense (called provision for loan losses) for an estimated loan loss if it is probable that a loan is impaired and its amount can be reasonably estimated. SFAS No. 114 (FASB 1993), *Accounting by Creditors for Impairment of a Loan*, provides additional and more detailed guidance on loan loss provisioning. Provision for loan losses is a large non-cash expense, and therefore has a significant downward effect on an institution's net income. Ahmed et al. (1999) report that the median ratio of provision for loan losses to earnings before provisions and taxes is 19% in their sample (in our sample, the median ratio is 14.67%). Banks record loan loss provisions in order to maintain a certain balance in their allowance for loan losses, the corresponding contra-asset account used to reserve for estimated loan losses during a given period (throughout this paper, the terms "bank" and "banking institution" refer to commercial banks, savings and loan associations, and savings banks [the latter two are also called "thrifts"] which accept deposits and make loans).

Under generally accepted accounting principles (GAAP), bank managers are allowed considerable subjective judgment in their loan loss provisioning. According to Wall and Koch (2000, p. 2), "although investors and regulators may prefer an accounting philosophy tailored to their needs, ultimately a bank's reported loan-loss allowance is largely under its managers' control, and managers are likely to use any available discretion to attain their own goals". The flexibility employed by banks in determining provisions for loan losses enables them to manage their accounting earnings in an attempt to obscure their true financial

performance (e.g., make it appear more or less favorable) and to achieve particular financial goals. Bank managers have a number of motivations to manage their reported earnings. According to the income-smoothing hypothesis, so as to stabilize earnings and reduce their volatility over the business cycle, banks would have incentives to overstate loan loss provisions under favorable economic conditions (e.g., during an expansion period) when their incomes are generally increasing, and understate loan loss provisions during difficult economic times (e.g., in a downturn) when they experience declining earnings. In addition, Greenawalt and Sinkey Jr. (1988) argue that bank managers have other motives to smooth income. They may use income smoothing to reduce earnings variability (therefore, lower risk perception of their firms) and to manage regulatory capital constraints imposed by regulators. Managers may also avoid dividend cuts and maintain desired dividend levels through income smoothing. Finally, management compensation packages and bonus plans provide incentives for managers to smooth income (see Lambert, 1984 and Healy, 1985 who analyze motivations for income smoothing behavior based on the agency and compensation theories, respectively). Accordingly, motivated by the aforementioned factors, banks are well suited to smooth accounting earnings through the managerial discretion over provisions for loan losses.

The goal of this paper is to examine whether or not US banking institutions managed their earnings in the aftermath of the financial crisis of 2008. In this income-smoothing hypothesis, banks, mainly those which faced more financial distress, had incentives to smooth their income upward by using loan loss provisions amid the financial turmoil of the post-crisis period. The data on institutions included in this study come from the Reports of Condition and Income (Call Reports) and Thrift Financial Reports (TFRs) which are filed quarterly by all commercial banks and thrifts insured by the Federal Deposit Insurance Corporation (FDIC). The dataset consists of over 25,000 observations and covers the period of 2007 to 2010, inclusively. Holding other factors constant, our findings lend support to the income-smoothing hypothesis. The empirical results indicate that banks managed their reported earnings upward by underestimating their provision for loan losses in the post-crisis period. We also find that the nondiscretionary factors played a significant role in the determination of a bank's loan loss provisions for the same period. The remainder of this paper is organized as follows. Section 2 contains a review of the literature and develops our hypothesis. Section 3 describes the dataset and research design; and presents the empirical results. Finally, Section 4 summarizes and concludes the paper.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

A general definition of income smoothing is provided by Fudenberg and Tirole (1995, p. 75) who write that "income smoothing is the process of manipulating the time profile of earnings or earnings reports to make the reported income stream less variable, while not increasing reported earnings over the long run." In the banking industry, provision for loan losses, a substantial expense item (with no cash flow effects) for most banks, provides managers with an effective tool which they can use to smooth income. According to Greenawalt and Sinkey Jr. (1988), income smoothing activity is more likely in the banking industry since bank manager are able to exert a high level of discretion in estimating loan loss reserves. Accounting rules allow a high level of flexibility in establishing an adequate balance for the allowance for loan losses account through loan loss provisions. However, managers may use this discretion to manage reported income downward by overestimating provisions or manage it upward by underestimating provisions in accordance with their potential motives for smoothing income.

There are a number of incentives that motivate managers to engage in earnings management (see Healy and Wahlen, 1999 for a detailed review of earnings management literature and discussion of incentives for earnings management). One of these managerial incentives is the smoothing of reported income with the purpose of diminishing earnings fluctuations of the firm. Holding other factors constant, an increase in earnings volatility of a firm has a negative effect on its market value since uncertainty of future earnings increases the risk perception as well as the cost of capital and borrowing. Accordingly, managers may aim to smooth reported income through discretion allowed by accounting rules in order to achieve income

stability and enhance the value of their firms (Gordon, 1964 and Beidleman, 1973). In regards to the banking industry, the income-smoothing hypothesis argues that bank managers tend to build up surplus loan loss reserves in good years when earnings are high by overstating provisions for loan losses. On the other hand, they tend to understate loan losses provisions in bad years and draw down the excess reserves accumulated in good year in order to offset the effects of declining earnings. Consequently, smoothing income over this cycle allows banks to avoid large variations in reported earnings which would otherwise be perceived as a negative sign.

The existing literature provides considerable empirical evidence that banks manage their earnings by using loan loss provisions. In a recent study, El Sood (2012) compares the pre-crisis period of 2002–2006 with the 2007–2009 period, seeking evidence for income smoothing activities of US bank holding companies in the aftermath of the financial crisis. Her findings suggest that bank holding companies accelerated their provision for loan losses during the profitable years of 2002–2006 in order to smooth their income downward. On the other hand, they smoothed their income upward by delaying provisions in the post-crisis era. The findings of Liu and Ryan (2006) show that profitable banking institutions managed their income downward by accelerating loan loss provisions on homogenous loans (which they define as consumer loans) over the boom period of the 1990s. Liu and Ryan also argue that banks obscured their income smoothing by accelerating loan charge-offs and by recording more gross charge-offs in order to offset the previous recoveries. A number of other prior studies also suggest that banks tend to engage in income smoothing. Greenawalt and Sinkey Jr. (1988) show that large bank holding companies smoothed their reported income over the period of 1976–1984 through utilizing loan loss provisions. According to Ma (1988), the risk level of a bank's loan portfolio is not a strong determinant of provisions for loans losses. Based on a sample of the largest US banks, the findings of Ma indicate that bank managers tend to overestimate loan loss provisions during times of high operating income and underestimate them when operating income is low. Likewise, Kanagaretnam et al. (2003) provide evidence that in good times, bank managers save income for the future by increasing provisions for loan losses, and in bad times, they decrease provisions and draw on previously built reserves in order to prevent a decrease in current income (see, among others, Collins et al., 1995, Lobo and Yang, 2001, and Kanagaretnam et al., 2004 who show that banks smooth reported income via provisions for loan losses). The findings of Ahmed et al. (1999) and Scheiner (1981), on the other hand, do not suggest that banks use loan loss provisions to manage earnings.

When examined in the context of the financial crisis of 2008, income smoothing may have enabled bank managers to avoid sharp declines in reported earnings in the aftermath of the crisis. The discretion used by managers in determining provisions and allowances for loan losses received the attention of the Securities and Exchange Commission (SEC) in the post-crisis period. In August 2009, the SEC sent a letter to certain publicly traded banks providing disclosure suggestions regarding their allowance for loan losses and loan loss provisions accounts (Securities and Exchange Commission, 2009). The letter specified that banks may have to reevaluate their financial reporting procedures for loan loss provisioning in the post-crisis economic environment. In April 2013, the SEC charged Capital One Financial Corporation (as well as two senior executives of the bank) for understating loan losses expense in the second and third quarters of 2007 (Securities and Exchange Commission, 2013). According to the SEC investigation, Capital One failed to account for loan losses incurred amid the deteriorating financial market conditions that ultimately evolved into the 2008 crisis. As a result, the bank agreed to pay a $3.5 million penalty to settle the SEC's charges. In light of the previous research findings and above arguments, banks, particularly those in a weakened financial position, may have engaged in income smoothing using provisions for loan losses in the aftermath of the 2008 financial crisis. Financial markets tend to hold a negative view of earnings volatility which increases the risk profile of a bank and, as a result, discounts the value of its future cash flows. Therefore, managers had strong incentives to smooth income upward through the recent economic downturn in order to lower risk perceptions and preserve the value of their institutions.

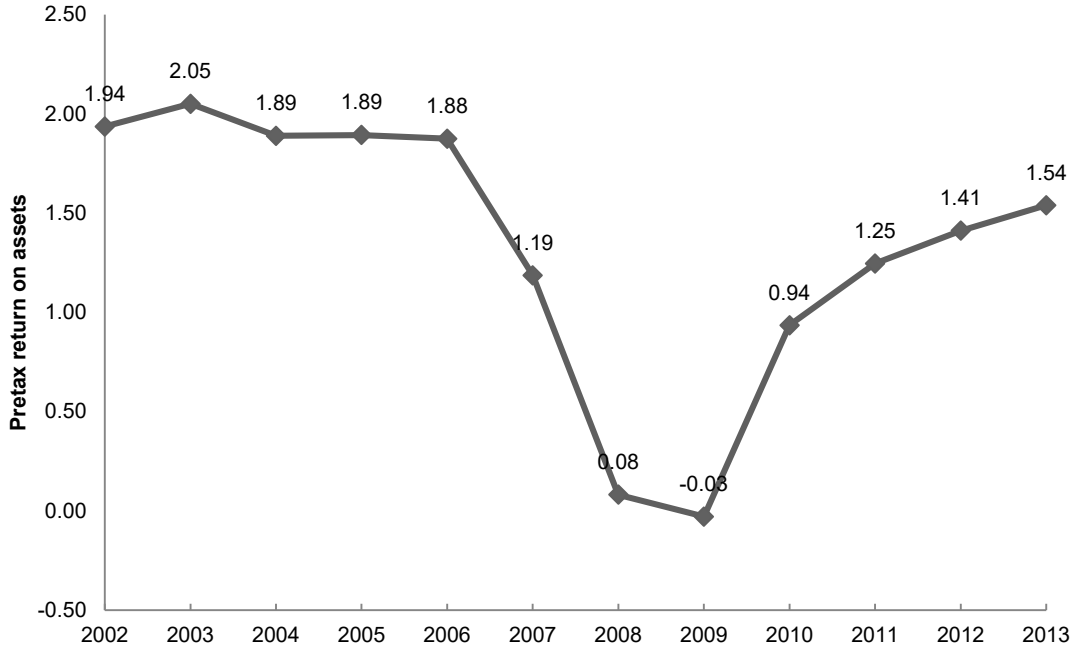
Income smoothing through underestimation (and/or delaying) of loan loss provisions may have also enabled managers to lower the cost of external funding since institutions having a better earnings performance and perceived to be less-risky were likely to borrow at lower costs after the crisis. The finding of Dechow et al. (1996) and Kanagaretnam et al. (2003) show that lowering the cost of external financing is an important incentive for income smoothing. More importantly, in the tightened capital and money markets of the post-crisis period, banks with more stable and higher earnings were likely to have easier access to external financing, particularly from non-deposit sources. Consequently, lower financing costs as well as increased availability of external funds may have provided important incentives for income smoothing in the aftermath of the crisis. Finally, another motivation for smoothing reported earnings may have come from the managerial efforts to avoid regulatory scrutiny over capital adequacy and solvency of their organizations. The financial crisis of 2008 caused financial stress in the entire banking industry leading to significant losses for a large number of institutions. As expected, deteriorating financial health of banks created difficulties in meeting capital and solvency requirements. By smoothing income upward, managers may have presented a better (yet distorted) financial picture of their banks and, hence, attracted less attention from regulators.

DATA AND METHODOLOGY

We utilize the Call Reports and TFRs which report demographic and financial information on all FDIC-insured US banking institutions. Our dataset consists of 25,586 observations gathered from 6,405 institutions and covers the period from 2007 to 2010, inclusively. Our dataset has both cross-sectional and time-series properties since it pools observations on individual banks over a period of four years however, it is not a balanced panel. A number of data points are missing for some of the institutions throughout the four-year period since they were excluded as outliers. In order to identify potential outliers, we calculated the studentized residuals after regressing (using ordinary least squares) the dependent variable (PLL) on our key independent variable (NETINC), and eliminated a total of 34 observations so as to limit the impact of extreme outliers. In order to detect possible earnings management practices by banks in the aftermath of the financial crisis of 2008, we focus on the 2007–2010 period when the banking industry experienced a significant decline in profitability. Figure 1 shows year-end aggregate pretax return on assets for all US banking institutions from 2002 through 2013. Overall, the figure shows that pretax return on assets decreased sharply from 2007 to 2009. Even though the profitability remained below the pre-crisis levels, it, for the most part, stabilized after 2010.

Table 1 describes the variables used in this study. Descriptive statistics are provided in Table 2. The data are annual (as of December 31) and all continuous variables are scaled by total loans and leases. The dependent variables PLL is defined as the percentage of provision for loan and lease losses to total loans and leases. Our primary focus is to test the income-smoothing hypothesis that banks, particularly those in a declining financial position, may have used their loan loss provisions as a tool for earnings management in the period after the financial crisis. In order to do so, we employ our key independent variable NETINC, defined as the percentage of net income before taxes and provision for loan and lease losses to

Figure 1: Pretax Return on Assets (%) 2002–2013



This figure shows year-end aggregate pretax return on assets for all US banking institutions from 2002 through 2013. Source: Federal Deposit Insurance Corporation.

Table 1: Description of Variables

Variable name	Description
PLL	Percentage of provision for loan and lease losses to total loans and leases
NETINC	Percentage of net income before taxes and provision for loan and lease losses to total loans and leases
CHARGE	Percentage of net loan charge-offs to total loans and leases
ALLOW	Lagged percentage of allowance for loan and lease losses to total loans and leases
NONCUR	Lagged percentage of other real estate owned plus noncurrent loans and leases to total loans and leases
BANK	Dummy variable for commercial banks
METRO	Dummy variable for institutions headquartered in a metropolitan area
AGRI	Dummy variable for institutions specialized in agricultural lending
COMM	Dummy variable for institutions specialized in commercial lending
MORT	Dummy variable for institutions specialized in mortgage lending
REGFDIC	Dummy variable for institutions whose federal regulator is the FDIC
REGFED	Dummy variable for institutions whose federal regulator is the Federal Reserve System
Y2008	Dummy variable for observations from the year 2008
Y2009	Dummy variable for observations from the year 2009
Y2010	Dummy variable for observations from the year 2010

This table shows the description of variables used in three different specifications of a fixed effects model testing whether or not US banking institutions engaged in income smoothing using provisions for loan losses in the period after the financial crisis of 2008.

total loans and leases, and hypothesize a positive relationship between NETINC and the dependent variable. In this respect, a positive and significant coefficient on NETINC would support the hypothesis that, in the aftermath of the financial crisis, banks underestimated their provision for loan losses when they expected to post lower earnings. Following the approach by Kanagaretnam et al. (2004), the variables CHARGE, ALLOW, and NONCUR are entered to control for the nondiscretionary component of the response variable LLP. According to Kanagaretnam et al., these variables have been employed in a number of prior studies on banks, including Wahlen (1994); Beaver and Engel (1996); and Kim and Kross (1998). CHARGE is

defined as the percentage of net loan charge-offs to total loans and leases. The coefficient on CHARGE would be expected to be positive, assuming that an increase in net loan charge-offs requires recording a higher provision for loan losses, *ceteris paribus*. ALLOW denotes the lagged (i.e., beginning-of-year) percentage of allowance for loan and lease losses to total loans and leases. Holding other factors constant, the sign on the coefficient of ALLOW is likely to be less than zero since a bank would require a smaller loan loss provision for the current year if it starts the year with a higher loan loss allowance. NONCUR denotes the lagged (i.e., beginning-of-year) percentage of other real estate owned plus noncurrent loans and leases to total loans and leases. The sign on the coefficient of NONCUR is likely to be positive, on the assumption that holding a larger portfolio of noncurrent loans is likely to require a higher provision for loan losses, *ceteris paribus*. We also include a number of other control variables (in one of our empirical specifications) which are likely to influence loan loss provisioning practices of banks. BANK is a dummy variable which takes the value of 1 for commercial banks and 0 for thrifts.

Table 2: Descriptive Statistics

	Mean	Std. Dev.	Minimum	Maximum
PLL	0.7442	1.192	-9.988	11.471
NETINC	9.505	453.19	-2,808.3	40,924
CHARGE	0.6030	1.580	-6.083	186.61
ALLOW	1.382	0.9774	0	57.120
NONCUR	2.069	2.920	0	88.043
BANK	0.8488	0.3583	0	1
METRO	0.5058	0.5000	0	1
AGRI	0.2244	0.4172	0	1
COMM	0.5075	0.5000	0	1
MORT	0.1009	0.3012	0	1
REGFDIC	0.6069	0.4885	0	1
REGFED	0.1081	0.3106	0	1
Y2008	0.2499	0.4330	0	1
Y2009	0.2497	0.4328	0	1
Y2010	0.2503	0.4332	0	1
n	25,586			

This table shows the descriptive statistics of our dataset that consists of 25,586 observations gathered from 6,405 institutions and covers the period from 2007 to 2010, inclusively.

The dummy variable METRO takes the value of 1 when the headquarters of an institution is located in a metropolitan area. The base group includes institutions whose headquarters are not located in a metropolitan area. These variables are included in an attempt to capture the significant characteristic differences between commercial banks versus thrifts, and between rural versus metropolitan institutions. The expected signs of the coefficient of BANK and METRO are unclear, *a priori*.AGRI, COMM, and MORT are dummy variables that denote lending specializations in agricultural, commercial, and mortgage loans, respectively. They are included in order to control for some of the major lending specialization categories. These variables take the value of 1 when the observed institution falls into the appropriate category and 0 otherwise. The omitted base group consists of institutions with other lending specializations. The coefficient on AGRI should be negative, on the assumption that banks specializing in agricultural lending were less likely to experience loan losses than other institutions in the post-crisis period, *ceteris paribus*. On the other hand, we do not have *a priori* expectations for COMM and MORT.

REGFDIC and REGFED denote the FDIC and the Federal Reserve System (Fed), respectively, and are entered as dummy variables controlling for federal regulators of banks. They take the value of 1 when the federal regulator of the observed banking institution falls into the appropriate category and 0 otherwise. The base group includes institutions whose primary federal regulators are the Office of the Comptroller of the Currency (OCC) and the Office of Thrift Supervision (OTS). We have no *a priori* expectations for the signs on the estimated coefficients of REGFDIC and REGFED. Finally, we include time dummy variables Y2008, Y2009, and Y2010 (for years 2008, 2009, and 2010, respectively) to capture year-specific fixed effects. The excluded group includes observations from the year 2007. We use three different specifications

of a fixed effects model to test whether or not US banking institutions engaged in income smoothing using provisions for loan losses in the period after the financial crisis of 2008. The regression model has the following general form:

$$Y = b_0 + b_1 NETINC + b_2 CHARGE + b_3 ALLOW + b_4 NONCUR + b_5 BANK + b_6 METRO + b_7 AGRI + b_8 COMM + b_9 MORT + b_{10} REDFDIC + b_{11} REGFED + b_{12} Y2008 + b_{13} Y2009 + b_{14} Y2010 + \alpha + \varepsilon \quad (1)$$

where α is the bank fixed effect which contains all time invariant factors and ε is the idiosyncratic error term.

EMPIRICAL RESULTS

The estimated fixed effects specifications generate the regression results reported in Table 3. All estimated models are statistically significant at the 1% level. They explain 14.16%, 36.66% and 36.68% of the variation in the dependent variable, respectively.

Table 3: Regression of Loan Loss Provisions on Reported Earnings

	(I)		(Ii)		(Iii)	
	Coefficient	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**
NETINC	0.0002**	0.0001	0.0003***	0.0001	0.0003***	0.0001
CHARGE			0.3019***	0.0041	0.3019***	0.0041
ALLOW			-0.1823***	0.0107	-0.1823***	0.0107
NONCUR			0.0787***	0.0032	0.0788***	0.0032
BANK					-0.1169	0.2158
METRO					0.0613	0.1543
AGRI					-0.0293	0.0519
COMM					0.0543	0.0346
MORT					0.0007	0.0477
REGFDIC					-0.0923	0.1107
REGFED					-0.1985	0.1256
Y2008	0.3510***	0.0161	0.2479***	0.0139	0.2481***	0.0139
Y2009	0.8257***	0.0161	0.5507***	0.0144	0.5522***	0.0145
Y2010	0.6901***	0.0161	0.3701***	0.0154	0.3730***	0.0155
Intercept	0.2763***	0.0114	0.3563***	0.0158	0.4795***	0.2017
F-statistic	790.61		1,585.2		793.17	
p-value	<0.01***		<0.01***		<0.01***	
R^2 (with-in)	0.1416		0.3666		0.3668	
n	25,586		25,586		25,586	
# of groups	6,405		6,405		6,405	

*This table shows the regression results generated by three different specifications of a fixed effects model. Column (i) reports the results from the simplest specification that consists of the key variable NETINC. Column (ii) displays the results based on the specification that includes variables controlling for the nondiscretionary element of a bank's loan loss provisions. Column (iii) shows the findings from the specification employing additional control variables that may impact the loan loss provisioning practices of banking institutions. ***, **, and * denote 1%, 5%, and 10% significance, respectively.*

The results from the simplest specification that consists of the key variable NETINC and time dummy variables are presented in Table 3 column (i). The coefficient on NETINC is positive and statistically significant at the 5% level. This finding provides evidence supporting the income-smoothing hypothesis that banks used their loan loss provisions to manage their income upward in the post-crisis period. Table 3 column (ii) presents results based on the specification that includes variables (CHARGE, ALLOW, and NONCUR) controlling for the nondiscretionary element of a bank's loan loss provisions. The coefficient on NETINC is again positive and, this time, it is statistically significant at the 1% level, providing additional support for the income-smoothing hypothesis. Also, the coefficients on variables CHARGE, ALLOW, and NONCUR have the expected signs and they are all statistically significant at the 1% level, suggesting that these variables play an important role in determining loan loss provisions of a banking institution, *ceteris paribus*. We next test the robustness of our previous findings by employing additional control variables

(BANK, METRO, AGRI, COMM, MORT, REGFDIC, and REGFED) that may impact the loan loss provisioning practices of banking institutions. The main findings presented in Table 3 column (iii) are similar to the previous columns, indicating that banks tended to decrease loan losses provisions during the crisis years in order to offset the effects of declining earnings, *ceteris paribus*. On the other hand, none of the coefficients on the additional explanatory variables are statistically significant.

In order to examine the sensitivity of our main findings, we also estimated the same specifications of our fixed effects model with robust standard errors (the results are not shown in tables). The coefficients on all the variables remained the same. Even though the statistical significance of the coefficients on NETINC declined slightly in case of the second and third specifications, they were still significant at the 5% level. We then estimated the specification employing additional control variables by using three different data samples. Appendix A columns (i) and (ii) show results based on samples covering the period of 2008 through 2010, and the period of 2007 through 2009, respectively. The findings based on a sample of observations from years 2008 and 2009 are provided in Appendix A column (iii). The coefficients on NETINC are positive and statistically significant at the 1% level in all three cases. Overall, these additional results support our main findings.

CONCLUDING REMARKS

The financial crisis of 2008 had a long-lasting impact on the US banking industry causing the failure of a large number of financial institutions. Accounting rules allow bank managers to exercise considerable subjective judgment in determining an adequate balance for the allowance for loan losses account through loan loss provisions. Managers may use this discretion to manage accounting earnings downward by overestimating provisions or manage it upward by underestimating provisions in order to achieve specific financial goals. Possessing this effective tool at their disposal and faced with significantly declining earnings, managers were likely to have strong incentives to smooth income upward under the unfavorable conditions of the post-crisis period.

In this study, we develop and estimate an econometric model to investigate potential earnings management practices of banking institutions in the aftermath of the financial crisis. We use a large dataset comprising over 25,000 observations on commercial banks and thrifts from 2007 to 2010, inclusively. Our paper is one of the few analyses studying the income-smoothing hypothesis in the banking industry that focuses on individual banking institutions rather than bank holding companies. Our study has important policy implications. We find evidence indicating that banking institutions managed their reported earnings upward through loan loss provisioning in the period after the financial crisis. The empirical results suggest that banks understated their provisions in order to artificially boost their declining earnings during the financially difficult times of the Great Recession. In addition, our findings indicate that the nondiscretionary factors also played an important role in determining banks' loan loss provisions in the post-crisis period. In this respect, the SEC's concerns over bank disclosures regarding allowance for loan losses and loan loss provisions accounts seem to be valid, especially during the post-crisis economic environment.

Our study has certain limitations that should be taken into consideration when interpreting the findings; however, these limitations also offer opportunities for further research. First, our analysis may be extended by including observations from pre-crisis years in order to compare the income smoothing practices of banking institutions before and after the financial crisis. Second, the current study does not differentiate between earnings management practices of institutions of different sizes. Further research may aim to separately analyze the income smoothing behavior of large and small banks in the aftermath of the financial crisis, given their significantly different organizational and operational characteristics. Finally, future research may extend this work by studying the relationship between loan loss provisioning practices of banks and their financial profitability through a logistic regression model.

APPENDIX

Appendix A: Regression of Loan Loss Provisions on Reported Earnings Using Different Data Samples

	(I)		(Ii)		(Iii)	
	Coefficient	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**
NETINC	0.0003***	0.0001	0.0003***	0.0001	0.0003**	0.0001
CHARGE	0.2505***	0.0047	0.2296***	0.0044	0.1633***	0.0056
ALLOW	-0.3066***	0.0151	-0.1553***	0.0137	-0.2053***	0.0316
NONCUR	0.0606***	0.0041	0.1328***	0.0050	0.1221***	0.0073
BANK	-0.2470	0.4006	-0.4020	0.2543	-0.4683	0.5938
METRO	-0.1200	0.2269	0.2007	0.2005	-0.0703	0.3409
AGRI	-0.0044	0.0705	-0.0289	0.0643	0.0161	0.1025
COMM	0.0776	0.0482	0.0326	0.0434	0.0728	0.0726
MORT	0.0562	0.0659	-0.0083	0.0592	0.1221	0.0969
REGFDIC	-0.1308	0.1750	-0.1453	0.1359	-0.2079	0.2600
REGFED	-0.1887	0.1994	-0.1987	0.1564	-0.1918	0.3063
Y2008			0.2491***	0.0136		
Y2009	0.3561***	0.0151	0.5303***	0.0147	0.3256***	0.0155
Y2010	0.2286***	0.0166				
Intercept	1.133***	0.3493	0.6180**	0.2445	1.159**	0.5160
F-statistic	348.56		602.47		207.71	
p-value	<0.01***		<0.01***		<0.01***	
R^2 (with-in)	0.2619		0.3803		0.2813	
n	19,186		19,182		12,782	
# of groups	6,405		6,404		6,402	

*This table shows regression results from three different data samples. Columns (i) and (ii) display results based on samples covering the period of 2008 through 2010, and the period of 2007 through 2009, respectively. The findings based on a sample of observations from years 2008 and 2009 are provided in column (iii). ***, **, and * denote 1%, 5%, and 10% significance, respectively.*

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AN EMPIRICAL ANALYSIS OF MONETARY POLICY REACTION FUNCTION: EVIDENCE FROM NIGERIA

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ABSTRACT

The changing and unpredictable nature of the money demand function has led many Central Banks authorities around the world to shift from exchange rate and monetary policy targeting to inflation targeting framework. The gradual shift to inflation targeting has reawakened interest in the Taylor's Rule which states that nominal anchor interest rate must be raised by more than a proportionate change in inflation to achieve price stability. The objective of this study is to examine the Central Bank of Nigeria monetary policy reaction function and how the CBN responds to the dynamic and evolving macroeconomic environment. The monetary policy response function developed for this study is derived following the basic structure of the Taylor's rule. Using secondary time series data sourced from the Central Bank of Nigeria Statistical Bulletin covering the periods 1998:Q1-2014:Q2, the study builds on the Taylor rule to formulate a model that track the Central Bank of Nigeria monetary policy reaction function. The method adopted in carrying out the study is the Auto Regressive Distributed Lag Modeling technique and the Error Correction modeling framework. The stylized fact of the study shows that monetary policy variables are moving along same path accompanied by declining inflation and improved productivity. Results obtained from the study will be used to track stability and dynamics of the Central Bank reaction function and to predict the future direction for monetary policy in Nigeria.

JEL: C11, E52, E58

KEYWORD: Monetary Policy, Central Bank, Reaction Function, Taylor's Rule

INTRODUCTION

The philosophy of achieving internal balance and external viability has remained the strategic anchor of monetary authorities in Nigeria. Conventionally, the goal of maintaining price stability and a stable macroeconomic growth has remained the focus of monetary authorities' all over the world. In Nigeria, the success of monetary policy in the last 5 year is evident in the management of inflation which has been brought down and kept low at a single digit level between 2013 and year end 2014. As at end 2013 inflation in Nigeria at 8.5% was amongst the countries in Sub-Saharan Africa with a single digit inflation level, and an inflation level lower than 10 years average of 11.49% (see exhibit 1). Despite the success recorded by the Central Bank of Nigeria in managing inflation to a single digit level in 2013 and up to Q2:2014, there is now a reawakening of the relevance of Taylor's rule following the 2007 US mortgage crisis. Taylor's rule which was first proposed by Taylor (1993) and Henderson and Mckibbin (1993), relates to how much Central bank should vary nominal interest rate in response to changes in inflation and other notable macroeconomic aggregates. The rule popularly known as the Taylors principle stipulates that for every one percent increase in inflation, the monetary authorities should raise nominal interest rate by one percentage point (Dvig, Leeper and Eric 2007; Anthanasios 2001).

The policy reaction function estimated by Taylor concludes that an interest rate setting rule can be approximated empirically for monetary policy operation. The Taylor's response function points to a rigorous altering of Central Bank's nominal interest rate to impact market rates and influence monetary policy short term and long term decisions. Overtime, the Central Bank of Nigeria has adopted various instruments at their disposal to meet their short term and long term goals. These instruments affect the intermediate and ultimate targets variables through different channels of Monetary Transmission Mechanism. Tools used in recent times include; Open Market Operation (OMO), Reserve money, Exchange rate, and Cash Reserve Ratio (CRR) and the deliberate fixing of the anchor rate at 12% since the fourth quarter of 2011. The paper extends the study of the monetary policy reaction function by focusing on the efficacy of the current CBN monetary policy with the aim of predicting the optimum certainty monetary policy action and the relevance of the Taylor's rule in the management of interest rate and inflation for Nigeria. Following the broad objective of the paper, the rest of the study consists of four sections; Section 2 provides an overview of monetary policy in Nigeria and the review of literature, Section 3 prescribes the theoretical framework and model Section 4 presents the data, methodology and analyses the empirical results. Section 5 summarizes the main findings and draws some policy implications.

LITERATURE REVIEW

Monetary policy rule focuses on the choice of policy instruments which are transmitted through the interest rate and monetary base. The concept of Monetary Policy Reaction Function (MPRF) motivated by the pioneer work of Taylor 1993 emphasis the inverse coefficient of the Philips equation while explaining how central banks reacts to macroeconomic conditions by altering interest rate. In the foundational work of Taylor's Monetary Policy Response function, a linear real GDP trend was used to measure potential output and expected inflation was taken to be 2 percent (Taylor, 1993). The rationale behind this was to show that this rule can stimulate short-term nominal interest rate of the United States. The policy rule obtained therefore is that Central Bank's policy rate rises if inflation increases above the target inflation rate or if GDP rises above potential GDP. On the contrary, the Central Bank policy rates decreases if inflation is below the target rate or f real GDP decreases below potential GDP.

Subsequent studies on Monetary Policy Response function sine Taylor (1993), has continue to build with care on the Taylor's seminal article and has produced various reports regarding the Central Bank response function. In the study carried out by Clarida, Gali and Gertler (1998), they estimated the Central Bank reaction functions using Generalized Method of Moments. In their study, they found the Central Banks in United State, Japan, and Germany pursued an implicit forward-looking inflation targeting which reacts to the expected inflation rather than past inflation. A similar study by Judd and Rudebusch (1998), concluded that the Taylor's rule prescribe guide on the relationships that existed among variables when conducting monetary policy. However, the study by Gerlach and Smets (2000) produced a mixed result. By examining whether monetary policy would respond to shocks in exchange rate, the authors found a mixed result across countries. They found that Australia's Central Bank is insensitive to shocks emanating from exchange rate while the Central Banks in Canada and New Zealand responded significantly to a shock to the exchange rate. Assane and Malamud (2000) using the Vector Auto-regression (VAR) model, having studied the relationship between monetary policy and exchange rates found that a weak dollar causes the Fed to raise the federal funds rate thus a rise in the federal funds rate leads to appreciation of the U.S. dollar.

The study by Romer (2001), focused on estimating the value of the coefficients of output gap and price gap to explain the effectiveness of monetary policy. The result obtained from the study showed that the values the coefficients attains can change the effectiveness of monetary policy through its effects on the level of actual inflation actual output. Hsing (2004), used a Vector Auto Regression modeling technque to estimate the Bank of Canada's monetary policy reaction function. The result from the study, showed that the Taylor rule is extended to include exchange rate since the objectives of the Bank of Canada is to maintain currency stability to promote international trade. By applying the same methodology in estimating the Bank of Korea

monetary policy reaction function, Hsing and Lee (2004) found that bank of Korea call rate react positively to shocks from inflation gap, output gap, exchange rate gap, stock price gap and lagged bank call rates. The result obtained from the study showed that, the most influential short run variables that explained variations in call rates in Korea was exchange rate gap variable and inflation gap variable. The variables that contributed to long run variation in Korea call rates is the output gap variable and stock price gap variable. In a similar study carried out for the European Union countries Galbraith, et al. (2007) found that the Federal Reserve does not react to inflation signals but to the unemployment. Estimating the monetary policy reaction function for European Union countries, Sutherland (2010) found that there exists disparity across countries as to determinants of policy response function. Specifically, the results showed monetary policy in developed economies significantly influenced monetary policy response function in the less developed countries. However, they found little evidence that output gap significantly influences monetary policy response function. Kaytanci (2008) applying vector error-correction model estimated monetary policy reaction function for Turkey based on an extended Taylor rule. He found that the policy rate responds positively to shock to the output gap, the inflation gap, or the lagged overnight rate while responding negatively to exchange rate.

In a much more recent study, Hamori (2009), employing dynamic ordinary least squares (OLS) method to the estimation of a Taylor-type monetary policy reaction function for India, concluded that output gap variable and exchange rate gap variable were statistically significant and having the right signs in explaining monetary policy response function. However, the price gap variable had the wrong sign and failed the test of significance. In Nigeria, there are very few studies that have attempted to explain the monetary policy response function. The study by Iklaga (2009) estimated a Taylor-type monetary policy response function. The result obtained from the study suggests that inflationary pressures played a significant role in influencing monetary policy decisions in Nigeria.

In a more recent study by Apanisile and Ajilore (2013), monetary policy response function was estimated under the Taylor's rule using Engle-Granger approach to co-integration. They authors reached a conclusion that the implementation of monetary policy function was carried out in effect to achieve price stability in Nigeria. The study by Agu (2007) confirm that inflation is the primary determinant of the central bank's reaction though policy targets usually differ from outcome while Doguwa and Essien (2013), found that the monetary policy response function for Nigeria fits the actual monetary policy performance of real monetary policy rate and reserve money. This work extends the body of knowledge on monetary policy response function for Nigeria by drawing extensively on the basic structure of Taylor's rule and the recent work of Doguwa and Essien (2013).

DATA AND METHODOLOGY

Overview of Monetary Policy in Nigeria – Stylized Facts

The monetary authority-the Central Bank of Nigeria (CBN) has the power to alter deliberately monetary instruments (direct and indirect) to achieve the intermediate and ultimate target of monetary policy. Unlike many Central Banks around that have shifted to inflation targeting (IT) framework to achieve macroeconomic goals and objectives, the Central Bank of Nigeria uses a mix of the monetary targeting strategy and inflation targeting strategy as the platform for achieving its policy objectives. The CBN under the monetary targeting platform uses nominal anchors (money supply, exchange rate and interest rate) to manage liquidity and cost, with the overall goal of maintaining a stable macroeconomic environment. The Central Bank of Nigeria explored the Exchange Rate Targeting option from 1959 to 1974. From 1975, the policy choice of target variable shifted to Monetary Targeting which lasted until 2001, when the Central Bank adopted a mix of Inflation Targeting and Monetary Targeting Strategies.

The fundemental distinction between the various types of policy option lies primarily with the set of instruments and variables that are used by the monetary authority to achieve their goals. These strategies are usually supported by interest rate and output targeting. Table 1 shows the evolution of monetary policy instrument in Nigeria as well as the various monetary policy instruments, the intermediate target variables and the ultimate target variables. New changes in monetary policy instruments which became active from October 2013 include the introduction of public deposit CRR and foreign exchange sales (Retail Dutch Action Sales. The ultimate target variable since 2006 include, exchange rate stability, price stability and a stable real GDP growth rate.

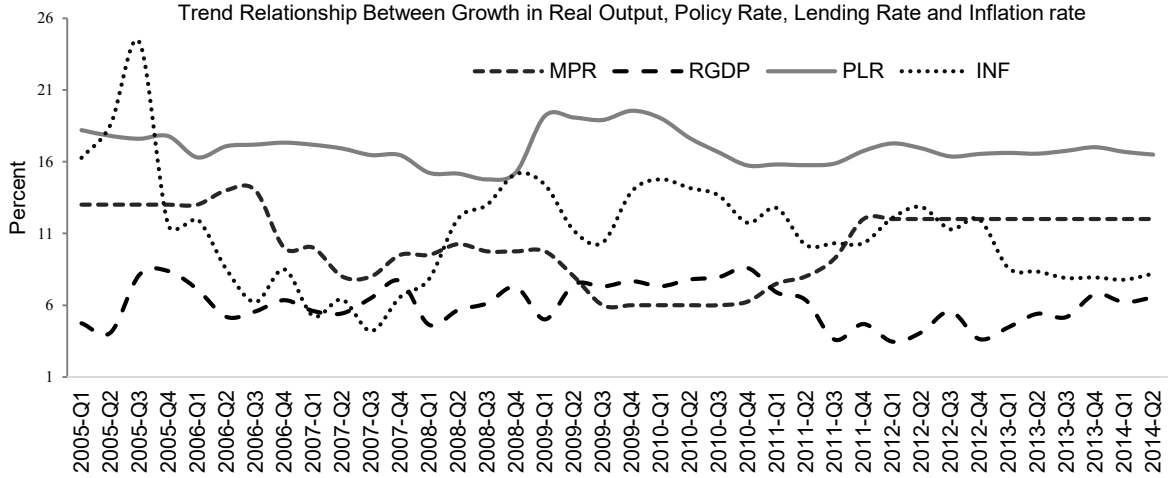
Table 1: Instruments of Monetary Policy in Nigeria

Monetary Policy Instruments	**Intermediate Target**	**Ultimate Target**
Nominal Anchor rates(MRR/MPR; SLF, SDF)	Money Market	Inflation Stability
Liquidity Management-OMO; LR; CRR	Exchange rate market	Exchange rate stability
Fixed Exchange Rate or Exchange Rate Band(Floating Exchange Rate Regime)	Equity Market	GDP Growth
	Bonds Market	
FOREX Sales (WDAS)	Deposit Money Banks (DMBs)	
Sectoral Allocation of Credit		
Credit Facilities		
Stabilization Securitization		
Became Effective 11th December 2006		
Nominal Anchor Rate (MPR, SLF, SDF)	Stability in short term interest rates	Stable value of domestic currency
Liquidity Management-OMO, LR and CRR		Single digit inflation
Became Effective 7th August and 2nd Oct. 2013 Respectively		
Public Deposit CRR, FOREX Sales (RDAS)		

Note: MRR=Minimum Rediscount Rate; MPR=Monetary Policy Rate; SLF=Standing Lending Facility Rate; SDF=Standing Deposit Facility Rates; OMO=Open Market Operation; LR=Lending Rate; CRR=Cash Reserve Ratio; WDAS=Wholesale Dutch Auction Sales; RDAS=Retail Dutch Auction Sales;

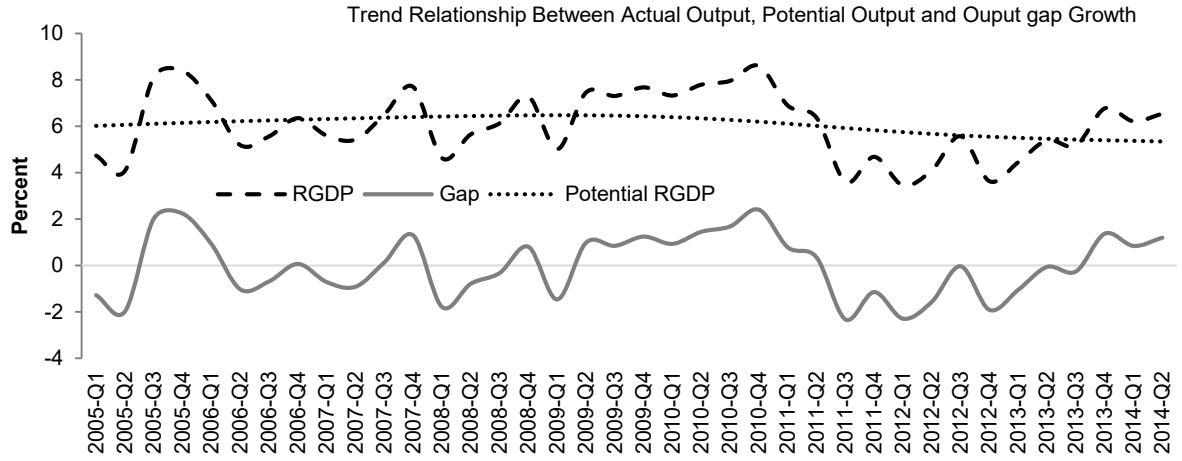
Figure 1, shows trend relationship between Real GDP growth rates, monetary policy rates, prime lending rates and inflation. The pattern shows real GDP growth rate is negatively correlated with inflation and positively correlated with prime lending rates and monetary policy rates. However, output gap in figure 2 suggest that more monetary stimulus is needed to drive economic growth in the positive direction

Figure 1: Trend Relationship between Macroeconomic Aggregates in Nigeria



This figure shows the trend in monetary policy from 2005-2014. The sample include monetary policy rate (MPR), real GDP growth rate (RGDP), prime lending rate (PLR) and inflation. The trend shows all the variables moving along the same path tending downwards since Q1: 2000.

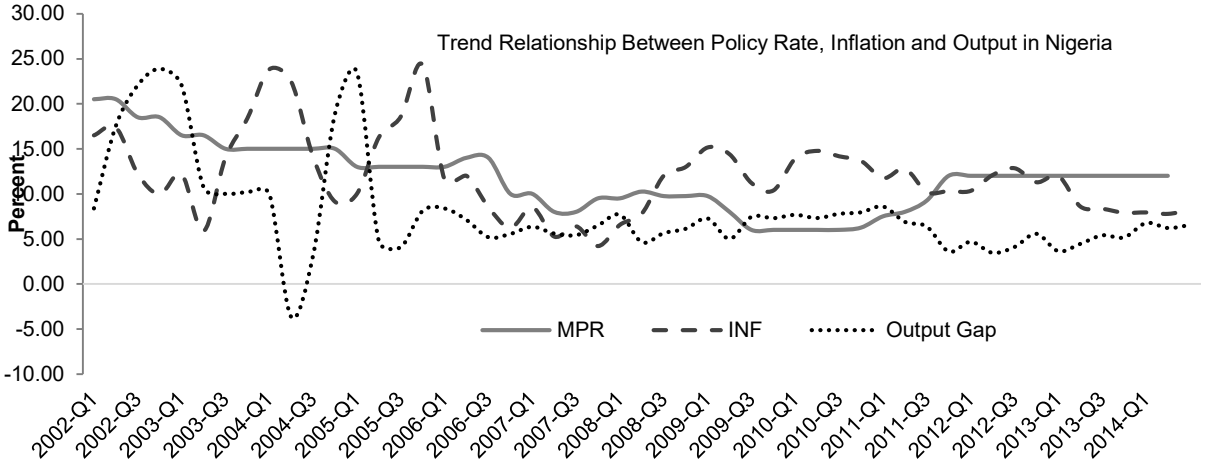
Figure 2: Trend Relationship in Nigeria



This figure shows the trend relationship between actual output, potential output and the output gap from 2005-2014. The trend shows a wide gap potential output and the output gap.

In the conventional Taylor's rule, with the equation-$(r^* + \pi^* + \beta(\pi_t - \pi^*) + \gamma(y_t - y_N))$, the beta ($\beta$) and gamma ($\gamma$) values are estimated at 1.5 and 0.5 respectively. This suggests how Central Bank should set short-term interest rates to achieve both its short-run goal for economic stability and long-run goal for price stability. This rule further suggest that real Fed funds rate (MPR in the case of Nigeria) should be raised 1.5 percentage points for every percentage point increase in inflation above target values, and should also be raised 0.5 percentage points for every percentage point increase in actual output above potential output. Figure 3 shows the trend relationship between policy rate, inflation and output gap. The trend shows a negative relationship between the real policy rate, inflation and output gap. The nominal policy rate is significantly above inflation rate and actual output growth which goes contrary to the specification in Taylor's rule.

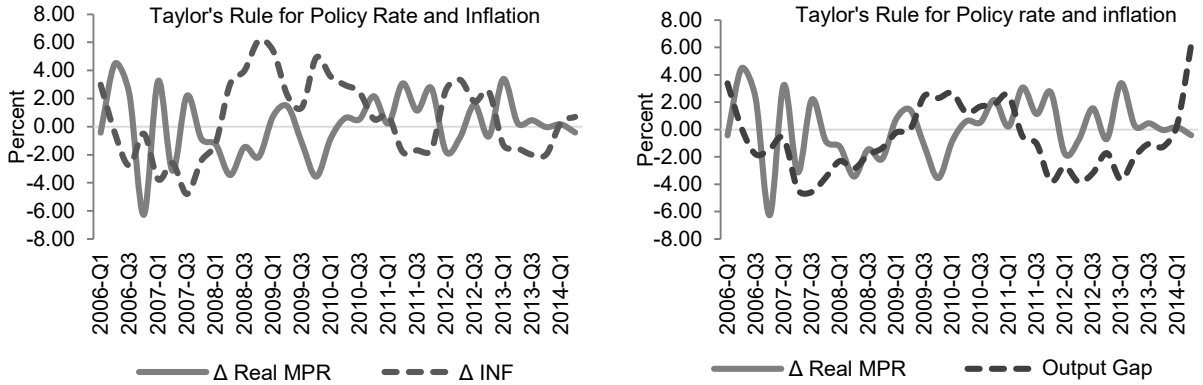
Figure 3: Trend Relationship between Monetary Policy Rate, Inflation and Output Gap in Nigeria



This figure shows the trend relationship between Monetary Policy Rate (MPR), Inflation and Output Gap in Nigeria. The trend shows significant volatility in the variables between 2002-2006 with inflation trending higher over Monetary Policy Rate and Output Gap. Between the periods 2011-2014, Monetary Policy rate variable trended higher than inflation and Output Gap variable.

Figure 4 shows trend analysis of the Taylor's rule estimate for Nigeria. The result shows real policy rate rise by more than 0.5% for every percentage point increase in inflation above target or output gap. This result gives credence to the fact that the Taylor estimate differ significantly with economic structure.

Figure 4: Analysis of Taylor Estimate and Rule in Nigeria



This figure shows the trend analysis of Taylor's rule estimate for Nigeria. The trend shows the relationship between change in real monetary policy rate and change in inflation as well as the relationship between change in real monetary policy rate and output gap.

The theoretical foundation of the monetary policy reaction function is derived from three structural equation, namely the Phillips curve relationship, the aggregate demand model (IS equation) and the uncovered interest rate parity model which formed the bedrock Taylor (1993) monetary policy reaction function. The derivation of the MPRF begins with the first equation-the Phillips curve relationship. The Phillips curve emphasizes a trade-off between inflation and unemployment by relating inflation directly to output gap. This relationship is expressed in equation (1) as follows;

$$\pi_t = \alpha + \beta\pi_{t-1} + \theta Y_t + \varepsilon_t \quad (1)$$

Where π is inflation, π_{t-1} is inflation lagged by one period and Y is the output gap. α, β and θ are the unknown parameters while ε_t is the error term.

The aggregate demand model (the IS equation) relates output gap to interest rate and inflation and the model is expressed as follows in equation (2);

$$Y_t = \alpha + \beta i + \gamma\pi_t + \varphi R_t + \varepsilon_t \quad (2)$$

Where Y is the output gap, ί is the policy anchor rate, π is inflation and R is the nominal interest rate.
The third model-the uncovered interest rate parity model emphasizes exchange rate premium and interest rate differential between domestic and foreign interest rate. The model is expressed in equation (3) as follows;

$$R_t = \alpha + \beta R_t^* + \gamma(\chi_t - \chi_{t-1}) + u_t \quad (3)$$

Where R is the nominal interest rate, R^* is anticipated interest rate, χ is exchange rate and $(\chi_t - \chi_{t-1})$ is exchange rate premium. The original version of Taylor's rule however, relates nominal interest rate to assumed equilibrium real interest rate and the divergence between actual inflation rate and target inflation

rate as well as the divergence between actual output and potential output. The equation in its original version is expressed in equation (4) as follows;

$$i_t = \alpha + r_t^* + \beta(\pi_t - \pi^*) + \gamma(Y_t - Y_N) \quad (4)$$

The calibration of the three structural equation above yield the simple model for the MPRF which relates policy to output gap and the deviation of inflation from target as shown by the equation below

$$i_t = \alpha + \delta(r^* + \pi^*) + \beta(\pi_t - \pi^*) + \gamma(Y_t - Y_N) + \mu_t \quad (5)$$

Where r* is the average (long-run) real interest rate, $(r^*+\pi^*)$ is the nominal interest rate, $(Y_t - Y_N)$ is the output gap. Thus the model can be expressed in a simplified form as;

$$i_t = \alpha + \delta R_t^* + \beta\pi_t + \gamma Y_t + \mu_t \quad (6)$$

The model links the policy instrument (short-term interest rate) and the nexus of output, inflation, and the exchange rate in a small-open economy. Following the basic structure of the Taylor's rule (1993) and Doguwa and Essien (2013), we estimate the model for tracking the performance of CBN monetary policy response function as expressed in equation

$$i_t = \alpha + \delta(r^* + \pi^*) + \beta(\pi_t - \pi^*) + \gamma(Y_t - Y_N) + \theta X_t + \mu_t \quad (7)$$

Where i_t represents monetary policy instrument (MPR), $(r^* + \pi^*)$ is the nominal interest rate proxy by the Prime Lending Rate (PLR), $\pi_t - \pi^*$ is the divergence between actual inflation rate and target inflation while $Y_t - Y_N$ is the divergence between actual output and potential output. X_t represents other control variables of each model to be estimated, especially the Naira- Dollar exchange rate premium between interbank rate and the official exchange. We introduce the control variable to capture business transactions which are usually carried out using the interbank rate. Specifically, the model formulated to access and track the CBN monetary policy reaction function is specified as follows;

$$MPR_t = f(R, \pi^*, Y^*, \chi^*) \quad (8)$$

Where MPR is the target short term nominal interest rate (monetary policy rate), R is prime Lending rate, π^* is the divergence between actual inflation rate measured by GDP deflator and the desired inflation rate, Y* is the divergence between the log of real GDP and the log of potential output while χ^* is the exchange rate premium between bureau de Change and official exchange rate. The model is expressed in linear estimation form as;

$$MPR_t = \alpha + \beta R_t + \theta\pi_t^* + \delta Y_t^* + \gamma\chi_t + \mu_t \quad (9)$$

Where on a *priori*, $\beta, \delta, \gamma < 0, \theta > 0$,

The Auto-Regressive Distributed Lag (ARDL) Bound Testing Methodology

Several methods have been applied in the empirical literature to conduct cointegration test and estimate the short run and long run relationships between macroeconomic variables. These methods ranges from the residual based Engle-Granger (1987), the maximum likelihood based Johansen (1991; 1995) test, the Johansen-Juslius (1990) test and the ARDL testing methodology of Pesaran, Shin and Smith (2001). Of the

several methods used in conducting cointegration test, the ARDL testing methodology stands out because of its simplicity and use in situations where variables in the model exhibits a mixture of I(0) and I(1) data series. The uniqueness of the ARDL modeling technique motivates the preference for the ARDL (p,q) modeling technique in place of other cointegration testing procedures to examine the CBN monetary policy reaction function for Nigeria. Drawing from equation (9), the ARDL (p, q) model is defined as follows;

$$\begin{aligned} MPR_t = {} & \phi_1 MPR_{t-1} + ... + \phi_p MPR_{t-p} + \beta_0 R_t + \theta_0 \pi^* + \delta_0 Y^* + \gamma_0 \chi_t + \beta_1 R_{t-1} \\ & + ... + \beta_q R_{t-p} + \theta_1 \pi^*_{t-1} + ... + \theta_q \pi^*_{t-p} + \delta_1 Y^*_{t-1} + ... + \delta_q Y^*_{t-p} \\ & + \gamma_1 \chi_{t-1} + ... + \gamma_q \chi_{t-p} + \mu_t \end{aligned} \tag{10}$$

Where, $\mu_t \sim iid\ (0, \tilde{O}^2)$

Equation (10) is the unrestricted ECM model. From this model, we obtain the ECM regression of the model as follows;

$$\begin{aligned} \Delta MPR_t = {} & \alpha \widehat{\in}_{t-1} + \sum_{j=1}^{p-1} \phi_j \Delta MPR_{t-1} + \sum_{j=0}^{q-1} \beta_j \Delta R_{t-j} + \sum_{j=0}^{q-1} \theta_j \Delta \Pi^*_{t-j} + \sum_{j=0}^{q-1} \delta_j \Delta Y^*_{t-j} + \sum_{j=0}^{q-1} \gamma_j \Delta \chi_{t-j} \\ & + \psi_1 MPR_{t-1} + \psi_2 R_{t-1} + \psi_3 \Pi^*_{t-1} + \psi_4 Y^*_{t-1} + \psi_5 \chi_{t-1} + u_t \end{aligned} \tag{11}$$

Equation (11) is the ARDL cointegration model. In the model, the symbol Δ represents the first difference operator. The summation signs in the equation represent the error correction dynamics while the variable with the coefficients $\psi' s$ corresponds to the long run relationship. To obtain the optimal lag length of the model, we make use of the Schwartz-Bayesian Criteria (SBC) and the Akaike Information Criteria (AIC). To ascertain the appropriateness of the ARDL model, the residual diagnostics, serial correlation LM test is applied for the study.

EMPIRICAL ANALYSIS

Data and Method

The data used to fit the model consists of quarterly time series data with sample period covering 1998:Q1-2014:Q2. All date were sourced from the Central bank of Nigeria Statistical bulletin and the National Bureau of Statistics, Nigeria. Specific data used include changes in real GDP, changes in monetary aggregate (Monetary Policy Rate inflation rate measured by real GDP deflator, real interest rate proxy by the summation of nominal interest rate and inflation and exchange rate premium measured as the difference between interbank rate and the Wholesale Dutch Auction sales. rest rates (Prime lending rate, interbank and Treasury bill rate). With the exception of monetary policy rate, real interest rate and exchange rates, all the other variables are analyzed in quarterly changes of their logarithms.

The uniqueness of the ARDL modeling approach makes it easy for estimation of models with a mix of I(0) and I(1) series but not in the presence of I(2) series. Other co integration test method such as Johansen-Juselius (1990) and Johansen (1991;1995) requires that all the variables used in testing for short run and long run relationship among the variables in a model must be integrated of order one or an I(1) series. Given the limitation of the ARDL modeling approach which is that the model collapses in the presence of I(2) series, we proceeded to testing for the unit root properties of the variables at their levels and first difference with the aid of the Augmented Dickey Fuller (ADF) unit root testing procedure. The result of the unit root test reported in Table 2 shows that we have no concern for I (2) variables in the model. All the

variables were either stationary at levels or at their respective first difference. This presupposes that the ARDL Bound Testing procedure can be carried out by first testing the existence of cointegrating relationship among the variables in the model.

Table 2: Augmented Dickey Fuller Unit Root Test

Variables:	In Levels	Order of Integration	In First Difference	Order of Integration
MPR (r)	1.90	I (0)	-6.37***	I (1)
Real Interest Rate (Re)	-1.98	I (0)	-6.38***	I (1)
Price Gap (INFGAP)	-3.40	I (0)	-9.00***	I (1)
Output Gap (RYGAP)	-2.95	I (0)	-5.99***	I (1)
Exchange Rate Premium (XD)	-8.33***	I (1)	-9.64***	I (1)

Note: The table is the result of the Augmented Dickey-Fuller (ADF). The model includes an intercept and a linear trend. The null hypothesis (t-statistics values) states that the variables have a unit root and the notation (*) suggest a 1 percent level of significance. The test shows that none of the variables are I (2) series.

After ascertaining the order of integration of the variables, we proceed to testing the existence of long run cointegration relationship between the dependent variables (MPR) and the regressors-output gap, price gap real interest rate and the exchange rate variable. This is done with the aid of the Wald (F-Statistic). The test for the long run cointegrating relationship is carried out by imposing restrictions on the estimated long run coefficients of the nominal interest rate variable (MPR). The imposition of restriction in the long run coefficients is made possible by first determining the lag length of the model through the Akaike criteria and the Schwarz Bayesian criteria. The calculated F-statistics for the cointegration test is reported in Table 3. The null and alternative hypotheses are as follows;

$H_0 = \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = 0$ / There exists no long run cointegrating relationship among the variables in the model.

$H_0 \neq \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq 0$ /There exists a long run cointegrating relationship among the variables in the model.

The computed F-value from the Wald statistic will be evaluated based on the critical values of tabulated in Table CI of Pesaran et al (2001).

Table 3: F-Statistic of Co Integrating Relationship among the Variables

Test Statistic	Value	Significance Level	Bound Criteria Values	
F-Statistic	4.61	5%	I (0)	I (1)
			3.18	4.32

Note: The table is the result of the cointegrating relationship among the variables in the model. The null hypothesis states that there is no long run cointegrating relationship among the variables in the model.

The value of our F-Statistics is 4.621 and we have (k + 1) = 6 variables in our model. From the critical values of the Bound test reported in Table 3 as provided in Table Ci (iii) of Pesaran et al (2001), the lower and upper bounds for the F-test statistic at 5% level of significance is 3.189 and 4.329 respectively. Given that the F-statistic value of 4.6129 > the upper bound at 5% level, we reject the null hypothesis of no cointegrating relationship among the time series variables. Having established the existence of long run relationship, between the variables in the model, we used the Schwarz Bayesian criteria to select the appropriate ARDL specification. The result of the Long run persimmons ARDL specification is reported in Table 4.

Table 4: Long Run Parsimonious ARDL Regression Estimate: Dependent Variable Is ΔMPR

Variables	Coefficients	Standard Error	T-Values
MPR(-1)	-0.29***	0.08	-3.72
INFGAP (-1)	13.13***	4.66	2.81
EXRD (-1)	0.03***	0.01	3.18
D(MPR (-1))	-1,155.68***	350.89	-3.29
D(MPR(-2))	1,064.96***	334.12	3.18
D(MPR(-4))	5.73**	2.26	2.53
D(RINT (-1))	1,155.90***	350.90	3.29
D(RINT(-2))	-1,064.69***	334.10	-3.18
D(RINT(-4))	-5.65***	2.23	-2.52
D(INFGAP (-1))	-1,168.81*	353.59	-3.30
D(INFGAP(-2))	1,052.20*	332.27	3.16
D(INFGAP(-3))	-8.49***	2.71	-3.13
D(EXRD(-1))	-0.01***	0.01	0.01
Constant	1.98***	0.51	3.83

R2 = 0.46; R-Bar Squared=0.31; F-statistic =3.11****Note: The table shows the result of the long run ARDL model of monetary policy reaction function for Nigeria. The dependent variable is ΔMPR while the explanatory variables are Price GAP variable (INFGAP), Exchange rate premium (EXRD) and real interest rate variable. (RINT). The lag length are selected based on SIC criteria which ranges from lag zero to lag four. The symbol *** and ** indicates significant at 1% level and at 5% levels respectively.*

The empirical result reported in Table 4, is obtained by simply normalizing the result of the ARDL model. The optimal model was selected using the Hendry "General to Specific Approach" and the SBC lag length selection criteria. This approach necessitated the dropping off of the variables that were not statistically significant on the basis of the individual test of significance-the student t-test.

From the result, the F-statistic value of (3.11) easily passed the test of significance at the 1% level of significance which shows the overall model had a good fit. The R^2 value of 0.46 and $\overline{R}^2$ value of 0.31 are all indicative that the models have a fairly good fit. On the basis of the individual significance of the parameter estimates all the variables and their lag specifications passed the test of significance at the 1% and 5% level of significance respectively. From the ARDL specification reported in Table 3, the short run and long run effects of the model was obtained by normalized the equation with the coefficient of MPR(-1) which was well signed and significant at the 1% level of significance.

The normalization process generated the short run and elasticities which are reported in Table 5. The result produced interesting findings for monetary policy reaction function for Nigeria. The output gap variable proved to have no long term relationship with the CBN monetary policy rate hence the variable was dropped. Only two variables the exchange rate variable and the price gap variable appear to have a significant long run effect on monetary policy rate. The result showed that a 1% increase in Price GAP variable elicited an increase in monetary policy rate by over 44% while a 1% increase in the exchange rate variable raises monetary policy rate by 0.1%. These findings follow earlier conclusion by Agu (2007), Iklaga (2009) and Apanisile and Ajilore (2013). All these studies concluded that the price GAP (inflation targeting) plays a significant role in the Central Bank monetary policy reaction function.

In the short run, the coefficients of the explanatory variables shows that real interest rate and the price gap variable are the major variables that determines the monetary policy reaction function for Nigeria One interesting findings of this study is that the two most important variables that tracks monetary policy reaction function for Nigeria is exchange rate and the price Gap variable. This is quite reviling given the fact that the Taylor rule recommends MPR should be raised 1.5 percentage points for every percentage point increase in inflation above targeted inflation and a raise of MPR by 0.5% for every percentage point increase in actual output above potential output.

Table 5: Long Run Elasticity and Short Run Elasticity of the ARDL Model

Variables	Long Run Coefficients	Short Run Effects	Long Run Effects
MPR(-1)	-0.29		
INFGAP (-1)	13.13		4.83
EXRD (-1)	0.03		0.10
D(MPR (-1))	-1,155.68	-3,857.97	
D(MPR(-2))	1,064.96	3,555.09	
D(MPR(-4))	5.73	19.15	
D(RINT (-1))	1,155.90	3,858.68	
D(RINT(-2))	-1,064.69	-3,554.21	
D(RINT(-4))	-5.65	-18.87	
D(INFGAP (-1))	-1,168.81	-3,901.80	
D(INFGAP(-2))	1,052.20	3,512.51	
D(INFGAP(-3))	-8.49	-28.36	
D(EXRD(-1))	-0.01	-0.49	
Constant	1.98	6.61	

Note: Table 5 shows the short run effects and long run effects of the ARDL model which is obtained directly from the long run coefficients of the result reported in Table 4. The output GAP variable was eliminated from the model because it had no short run or long run effect on nominal interest rate. The only variables that had long run effect on nominal interest rate are the price GAP variable and the exchange rate differential variable.

CONCLUSION

Several studies have attempted an explanation of the monetary policy reaction functions in both advanced economies and emerging economies drawing essentially from Taylor's rule. This article fills the existing gap in the literature by investigating the monetary policy reaction function for Nigeria and adding to the body of existing knowledge on monetary policy response function. We developed a monetary policy response function for Nigeria derived essentially from the basic structure of Taylor's rule and made use of secondary time series data sourced from the Central Bank of Nigeria Statistical Bulletin covering the periods 1998:Q1-2014:Q2. . The method used for this study is the autoregressive distributed lag framework and the frequency of the data used is quarterly time series data. The result provide a strong evidence that monetary policy reaction function for Nigeria is influenced greatly by the price Gap in both the short run and the long run period. The output Gap variable was found to be statistically insignificant in influencing the Central Bank monetary policy decisions. Exchange rate variable and real interest rate variables were also found to be major determinants of monetary policy reaction function.

The policy implication to be drawn from this study, is that in pursuing the goal of price stability in Nigeria the monetary authorities should track the divergence between actual inflation and expected inflation as well as the divergence in exchange rate differentials between the official exchange rate, bureau de change (BDC) and the interbank rates. This is important given that Nigeria is a major oil exporting country and volatility in the international oil price is transmitted directly to the economy through its impact on exchange rates. In drawing the conclusion for this study, we used the autoregressive distributed lag modeling technique (ARDL). Further studies might consider using the vector autoregressive model (VAR) to track the reaction time of the Central bank monetary policy to changes in macroeconomic variables.

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UNDERPRICING OF SEASONED EQUITY OFFERINGS BY CANADIAN CROSS-LISTED FIRMS IN THE PRE- AND POST-SARBANES-OXLEY PERIODS

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ABSTRACT

This paper examines the impact of the Sarbanes-Oxley Act of 2002 on underpricing of seasoned equity offerings by Canadian cross-listed firms and its determinants. It finds underpricing is not significantly different between the pre- and post-Sarbanes-Oxley periods. When distinguishing underpricing by two methods of choice for underwriting seasoned equity offerings -bought deals vs. firm commitment-, underpricing is higher for firm commitment than for bought deals during the overall period 1995-2008 and the post-Sarbanes period, after controlling for offer and firm characteristics. In addition, underpricing of bought deals and firm commitment are subject to different determinants for the pre- and post-Sarbanes periods, respectively. The main reason underpricing is high on firm commitment, after the passage of the Act, is for global offers. This suggests issuing equity globally has been unfavorable for firm commitment after the passage of the Act.

JEL: G24, G32

KEYWORDS: Sarbanes-Oxley Act, Seasoned Equity Offerings, Cross-listed, Underpricing, Bought Deals, Firm Commitment

INTRODUCTION

In July 2002, the U.S. Congress passed the Sarbanes-Oxley Act (SOX) to renew investors' confidence in U.S. capital markets damaged by major corporate wrongdoing. The goals of the Act are increasing transparency, improving quality of financial statements and effective internal corporate controls of publicly traded companies in the U.S., including foreign companies. Eckbo, Masulis and Norly (2007) propose the importance of studying the effects of laws such as SOX on securities issuance costs.

As suggested by Eckbo, Masulis and Norly (2007), this research study examines the impact of SOX on underpricing seasoned equity offerings by Canadian firms cross-listed on the NYSE, AMEX and NASDAQ. Seasoned equity offerings are firm's public equity offers after an initial public offering. Firms issue equity shares usually helped by investment banks (underwriters). Underpricing occurs when the offer price of the equity issue sold to investors is lower than the market value of firm's shares. It is an important issuance cost for firms and is not trivial. For example, the average gross proceeds of offers by Canadian cross-listed firms during the period 1995-2008 is $163.3 million. During that period the average underpricing was 4.08%, this results in $6.67 million issuers forgo by pricing the offer below the market price. By distinguishing two methods of equity underwriting - bought deals versus firm commitment -, this paper finds underpricing is higher for firm commitment than bought deals for the post-SOX period only (2.39% vs. 9.67%). The main reason underpricing is higher for firm commitment is for seasoned equity offerings issued globally -mostly in the U.S. This reveals underwriting global equity offerings through firm commitment has been unfavorable after the passage of the Act.

The reminder of the paper is organised as follows. Next section provides background and review of the literature. The following section examines the data and methods. Next section reports the empirical results. The last section reports the conclusions.

LITERATURE REVIEW

This section includes a review of bought deals and firm commitment as methods of choice for underwriting seasoned security offerings, including advantages and disadvantages. It also discusses relevant research studies on underpricing. Finally, it documents the literature on the effects of the Sarbanes-Oxley Act on publicly traded firms subject to the Act in the U.S.; including its impact on issuance costs for Canadian firms cross-listed on the NYSE, AMEX and NASDAQ.

Bought deals (similar to accelerated offers in the U.S.) and firm commitment (called marketed offers) are underwriting methods for seasoned equity offerings. The choice method in an equity offer may be negotiated between the issuer firm and the underwriter (usually an investment bank). In both cases, the underwriter buys the shares of common stock from the issuing company and resells them to investors at a predetermined offer price. The underwriting fee - which is a percent of the offer gross revenues - compensates the investment bank for helping the company in the equity offering. Other important services of underwriters to issuers include analyst coverage, information production, marketing and certification (Corwin and Schultz, 2005) and price stabilization after the issue (Cotter, Chen and Kao, 2004). Some significant differences between bought deals and firm commitment underwriting as documented by Pandes (2010) and Bortolotti, Megginson and Smart (2008) are as follows. The registration requisites with regulators and exchanges are fewer for bought deals than for firm commitment. The underwriting agreement, issue price, and offers size is determined around the announcement date in bought deals unlike firm commitment which is several days after the announcement. The issue date is usually the same as the announcement date for bought deals and several days after the announcement in firm commitment. In bought deals, the underwriter can cancel the offer if market conditions decline (no *market-out* clause) unlike firm commitment, which cannot. Firm commitment includes *road shows* and bought deals do not. *Road shows* refer to the procedure to gauge the demand for the equity offering among potential clients, mostly institutional investors. It also includes information to help decide the proper offer size and price. Gunay and Ursel (2015) report bought deals are the major underwriting method by seasoned equity offerings in the U.S. Europe, and Canada - 80% of all SEOs in 2013.

Bought deals and firm commitment offerings have advantages and disadvantages. The main advantage for bought deals is faster completion and reduced distribution costs. The disadvantage is that bought deals involve higher price risk, that is, the underwriting absorbs the price decline if market conditions are unfavorable. On the other hand, firm commitment underwriting involves lower price risk. That is, the underwriter can cancel the equity offer if market conditions are adverse. The major disadvantage in firm commitment offers involves longer completion and higher distribution costs.

There is vast amount of research on underpricing of seasoned equity offerings. Eckbo, Masulis and Norly (2007) provide an excellent review on the theoretical and empirical studies on issuance costs of seasoned equity offerings including underpricing. The influential study on underpricing of seasoned equity offerings by Smith (1977) originated new research on the determinants of underpricing. Most underpricing includes determinants that account for uncertainty on firm value due information asymmetry between issuers and investors (Smith, 1986). To compensate for the information disadvantage facing uninformed investors about the value of the firm, investment banks offer a share price below the market value (Rock, 1986; Altinkilic and Hansen, 2003). The following is a non-exhaustive list of reasons that may affect underpricing. It includes measures of firm-specific risk and systematic risk, price pressure, underwriter reputation, exchange listing location (for example, NYSE, NASDAQ), industry, offer size, gross proceeds, underwriting fees, liquidity risk (bid-ask spreads), underwriting method, firm size, underwriter certification,

order imbalance, institutional demand, insider ownership, and purpose of seasoned equity offering. (See for example, Bhagat, Marr and Thomson, 1985; Safieddine and Wilhelm, 1996; Corwin, 2003; Altinkilic and Hansen, 2003; Kim and Shin, 2004; Mola and Loughran, 2004; Bortolotti, Megginson and Smart, 2008; Kim, Palia and Saunders, 2010; Gao and Ritter, 2010; Intintoli and Kahle, 2010, 2014; Pandes, 2010; Autore, 2011; Kim and Masulis, 2012; Dempere, 2012; and Gustafson, 2014).

The evidence on which of the two underwriting methods for seasoned equity offerings -bought deals and firm commitment- show lower underpricing is inconclusive. For example, Bortolotti, Megginson and Smart (2008) report lower underpricing for bought deals in a sample that includes seasoned offers of firms from different countries. Gustafson (2014) argues that accelerated U.S. offers reduce the negative returns immediately before issuance that may occur in firm commitment offers, resulting in a higher market price on the issue day. In other words, firm commitment offers have higher underpricing because of negative price pressure pre-issue date, resulting in a lower market price on the issue day unlike accelerated offers. On the other hand, Autore (2011) report that overnight offers (similar to bought deals) by U.S. companies show higher underpricing compared with firm commitment offers. Huang and Zhang (2011) show underwriters' marketing efforts on firm commitment offerings can decrease underpricing by shifting up the demand curve to make it less inelastic, similar to the findings of Gao and Ritter (2010).

An important amount of literature also explores the effects of the Sarbanes-Oxley Act on publicly traded firm in the U.S. stock markets. The evidence shows the net benefits from firms subject to the Act from developed capital markets are unfavorable (Amaoko-Adu and Baulkaran, 2008; Bris, Cantale and Nishiotis, 2007; Li, 2011, 2014; Litvak, 2007, 2008). On the other hand, research on the impact of the Act on issuance costs of equity offerings by publicly traded firm in the U.S. is scarce. To my knowledge, the only study that documents the impact of SOX on the underpicing of equity offerings is by Kaserer, Mettler and Obernberger (2011) and relates to initial public offerings of U.S. companies. They find the cost of going public and underpricing increases and decreases, respectively, after the passage of the Act.

Eckbo, Masulis and Norly (2007) suggest that it would be relevant to explore the effects on issuing costs of important regulatory changes such as SOX. In agreement with Eckbo, Masulis and Norly (2007), Rubalcava (2012a, 2013) examines the impact of SOX on the market reaction and underwriting fees of seasoned equity offerings by Canadian firms cross-listed on major U.S. exchanges. Similarly, Rubalcava (2015) explores the effect on the market reaction and underwriting fees by distinguishing two underwriting methods: bought deals and firm commitments. Rubalcava (2012a) shows the market reaction to overall SEO announcements is more negative in the post-SOX period only. On the other hand, Rubalcava (2013) finds the SEO underwriting fees are non-significantly different for the pre- and post-SOX periods. When distinguished by the underwriting method of choice between bought deals vs. firm commitment, Rubalcava (2015) finds the market reaction and underwriting fees for bought deals are favorable for the pre-SOX period only. The three studies condition for firm and offer characteristics.

This paper complements other studies on the impact of the Act on seasoned equity offerings of Canadian cross-listed firms. Specifically, by examining the effects of the Act on the underpricing on seasoned equity offerings by Canadian cross-listed firms under two underwriting methods: bought deals and firm commitment.

DATA AND METHODOLOGY

The sample consists of 220 seasoned equity offerings (SEOs) by Canadian cross-listed firms, from May 1995 to July 2008. The pre-SOX period (May 1995-July 2002) includes 129 SEOs, 87 bought deals and 42 firm commitment. The post-SOX period (August 2002-July 2008) includes 91 SEOs, 57 bought deals and 34 firm commitment. The FP Advisor database is the source for the seasoned equity offerings and the determinants of underpricing. This includes SEO announcements, underwriting method (firm commitment,

bought deals), offer price, offer size, equity proceeds, offer purpose, offer type (primary, secondary), offer location (domestic, global), cross-listing exchange (NYSE, AMEX, NASDAQ), and book runners. The seasoned equity offerings include shares of common stock only. Statistics Canada (CANSIM) and the Canadian Financial Markets Research Centre (CFMRC) are sources of relevant market data such as daily foreign exchange rates (CAD/USD), daily stock prices, daily trades, daily volumes and monthly number of shares outstanding. All the figures are in Canadian dollars (CAD).

The cross-sectional OLS regression model that examines the relation between underpricing and the expected determinants takes the form of equations (1) and (2) as follows:

$$UnderP_i = a_0 + a_1 DumPerSOX + a_2 DumBD_i + a_3 SecOffer_i + a_4 StdRet_i + \cdots + a_n DumGlobal_i + a_{n+1} Dum1 + \cdots + a_{n+4} Dum4 + \varepsilon_i \quad (1)$$

$$UnderP_i = a_0 + a_1 DumPerSOX + (a_2 + \delta_{DumBD} DumPerSOX) DumBD_i + \left(a_3 + \delta_{SecOffer} DumPerSOX\right) SecOffer_i + (a_4 + \delta_{StdRet} DumPerSOX) StdRet_i + \cdots + (a_n + \delta_{DumGlobal} DumPerSOX) DumGlobal_i + a_{n+1} Dum1 \ldots + a_{n+4} Dum4 + \varepsilon_i \quad (2)$$

Equation (1) estimates the coefficients of the determinants for the full sample period, and the pre-SOX and post-SOX periods, respectively - undistinguished by underwriting method. Equation (1) can also estimate the coefficients for the full period, the pre-SOX period and the post-SOX period, separately for bought deals and firm commitment, respectively. On the other hand, equation (2) has the advantage that it can estimate the same coefficients of equation (1) but also simultaneously for the pre- and post-SOX periods for firm commitment and bought deals, respectively. The following section, which describes underpricing and its determinants explain the use of equations (1) and (2).

The model includes determinants of underpricing documented in the seasoned equity offering literature. The variables in equations (1) and (2) are as follows. $UnderP_i$ is the price discount for the SEO in percent and equals $(P_b\text{-}P_o/P_b)$x100, where P_b is the share price of the SEO on the previous trading day's close and P_o is the offer price. This measure is for firm commitment offers only. Underpricing occurs when the offer price is lower than the closing market price on the day before the issue day. Investment banks usually assign the SEOs at a favorable offer price below the market price to preferred customers as reward for information on issue demand. This paper uses a corrected discount measure for bought deals. The 'corrected' measure is the discount of the offer price from the closing price on the *offer date* as in Narayann, Rangan and Rangan (2004) and Autore (2011). That is, $UnderP_i$ equals $(P_{o*}\text{-}P_o/P_{o*})$x100, where P_{o*} is the share price on the offer date and P_o is the offering price. The corrected discount is net of the offer announcement effect. At the offer announcement date, a negative market reaction usually occurs, which for bought deals includes also the price discount. Determination of the offer price in bought deals is at the offering announcement date (Pandes, 2010). That is, the resulting decrease in price on the announcement date includes the information effect (market reaction) and discount effect. The 'corrected' discount adjusts for the information effect. Firm commitment offers do not need this correction because the offer price is several days after the announcement date. In other words, the information effect of firm commitment offers has vanished at the offer date. All underpricing data includes daily prices around the underpricing dates.

The description of the determinants of underpricing is as follows. *DumBD* is a dummy variable that equals one if the SEO's method of choice is a bought deal and zero if it is firm commitment. *DumPerSOX* is a dummy variable that equals one for the post-SOX period (*DumPostSOX*) and zero otherwise (*DumPreSOX*). An illustration of the use of *DumPerSOX* for the post-SOX period, (that is, *DumPostSOX)* in equations (1) and (2) is as follows. The expression $(a_2+\delta_{DumBD}DumPostSOX)DumBD_i$ in equation (2) equals $a_2DumBD_i + (\delta_{DumBD}DumPostSOX)DumBD_i$. This expression estimates the coefficients of *DumBD* for the full period, the pre-SOX period and the post-SOX period, respectively. The coefficient estimate of

DumBD for the full period -when the post-SOX period is *not* considered, i.e., *DumPostSOX* is zero- is a_2, as in equation (1). Similarly, the coefficient of *DumBD* for the pre-SOX period is a_2 in the expression $a_2 DumBD_i + (\delta_{DumBD} DumPostSOX) DumBD_i$ - when the post-SOX period *is* considered -, as in equation (2); and the coefficient estimate of *DumBD* for the post-SOX period is $a_2+\delta_{DumBD}$. To find whether the coefficient of *DumBD* is statistically significant for the post-SOX period, *DumPostSOX* changes to *DumPreSOX* in equation (2) as follows: $a'_2 DumBD_i + (\delta'_{DumBD} DumPreSOX) DumBD_i$ in which a'_2 is the coefficient of *DumBD* for the post-SOX period. Standard regression software shows the p-value of this coefficient. The empirical results section reports regression estimates using equations (1) and (2) as needed.

Other determinants of $UnderP_i$ include *SecOffer,* which is the ratio of number of shares sold by current shareholders to the total number of shares offered as in Lee and Masulis (2009). *StdRet* is the standard deviation of daily stock returns for the shares of the issuer of issue *i* during the three months before the SEO announcement. The volatility of stock returns is a measure of price uncertainty or price risk (Bae and Levy, 1990). *GProceeds* is the ratio of gross proceeds in Canadian dollars scaled by the market capitalization two days before the SEO announcement (Pandes, 2010). *RelOffer* is the ratio of the size of the offering to the total number of shares outstanding two days before the offer announcement (Loderer, Cooney and Van Drunen, 1991). *DumGlobal* is a dummy variable that equals one if the SEO is issued simultaneously in other countries (mostly U.S.) and Canada, and zero in Canada only. The model include dummy variables that classify the purpose of the offer as follows: *Dum0* (unknown), *Dum1* (working capital), *Dum2* (capital investment), *Dum3* (general corporate) and *Dum4* (debt reduction). ε_i is the error term that is assumed to be independently and normally distributed; that is, $\varepsilon_i \sim N(0,\sigma^2)$.

EMPIRICAL RESULTS

Underpricing of Seasoned Equity Offerings for Bought Deals and Firm Commitment

Table 1 reports the mean (median) underpricing (*UnderP*) values for seasoned equity offerings (SEOs) by Canadian cross-listed issuers. It consists of the overall sample period, and pre and post-SOX periods, respectively. It includes the number of SEOs in brackets, the mean (median) underpricing values in those periods, for bought deals and firm commitment, respectively. Column (1) of Table 1 shows the mean (median) underpricing value of 4.08% (2.68%) for the overall sample of SEOs. It also shows the mean *UnderP* is not significant different between the pre- and post-SOX periods (3.36% vs. 5.11%) for the all SEO sample (p-value of 0.1223). Similarly, column (2) shows the mean values of *UnderP* for bought deals are not significantly different between pre- and post-SOX periods (p-value of 0.5522). In contrast, column (3) shows the mean value of *UnderP* for firm commitment offers increased significantly from the pre- to the post-SOX period, from 3.70% to 9.67%. In addition, based on columns (2), (3) and (4), the mean *UnderP* of firm commitment is higher than bought deals for the overall period (p-value of 0.0027) and for the post-SOX period (p-value of 0.0000). These preliminary results show significant price discount for firm commitment offers after the passage of SOX, unlike bought deals, which did not show much change.

This section examines determinants of underpricing of SEOs for the overall sample period and the pre- and post-SOX periods, respectively. In addition, it examines whether bought deals show lower underpricing (or higher cost advantage) on firm commitment after controlling for offer and firm characteristics. Table 2 reports regressions of underpricing values (*UnderP*) of seasoned equity offerings on expected determinants using equation (1). This equation examines determinants of underpricing for the overall, and the pre- and post-SOX periods –undistinguished by underwriting method. Regression (1) reports the coefficient estimate of *DumBD* is negative and significant at the five percent level (-0.0313, p-value of 0.0209 unreported), after controlling for other determinants. It shows bought deals have a lower price discount than firm commitment offers during the overall period, consistent with results reported in Table 1. On the other hand, the coefficient of *DumPostSOX* is not significant for the overall period (0.0172, p-value of

0.1361 unreported). This shows that undepricing is not significantly different between the pre and post-SOX periods, a result that is also consistent with Table 1.

Table 1: Mean (Median) Underpricing Values of Seasoned Equity Offerings

Period	(1) All SEOs	(2) Bought Deals	(3) Firm Commitment	(4) P-value Difference BD vs. FC Mean (Median)
1995-2008	[220]	[144]	[76]	
	4.08%	2.87%	6.37%	0.0027***
	(2.68%)	(2.20%)	(3.69%)	(0.0098)***
Pre-SOX	[129]	[87]	[42]	
	3.36%	3.19%	3.70%	0.7589
	(2.60%)	(2.60%)	(2.50%)	(0.9779)
Post-SOX	[91]	[57]	[34]	
	5.11%	2.39%	9.67%	0.0000***
	(3.03%)	(1.90%)	(6.78%)	(0.0001)***
P-value difference Pre-SOX	0.1223	0.5522	0.0023***	
vs. Post-SOX	(0.0824)*	(0.7192)	(0.0009)***	

*This table reports the mean (median) underpricing (UnderP) of seasoned equity offerings (SEOs) by Canadian firms cross-listed on the NYSE.AMEX and NASDAQ. It includes the overall, and pre and post-SOX periods for bought deals (BD) and firm commitment (FC), respectively. The number of SEOs is reported in brackets. ***, ** and *show significance at the 1, 5 and 10 percent levels.*

Regressions (2) and (3) report the coefficient of *DumBD* is negative and significant at the one percent level during the post-SOX period only (-0.0704, p-value of 0.0002 unreported). (Equation (2) produces similar unreported results). The results show bought deals have less underpricing than firm commitment offers during the post-SOX period only, after controlling for other determinants. This is also consistent with the results in Table 1 in which the mean undepricing value for bought deals is significantly lower than firm commitment (2.39% vs. 9.67%) for the post-SOX period only. The coefficient estimate of *GProceeds* is positive and significant for the overall, pre and post-SOX periods, respectively. This shows that underpricing is increasing with gross offer revenues. That is, larger offer revenues produce more liquidity uncertainty, and therefore higher offer discount (Mola and Loughran, 2004). On the other hand, the coefficient of *RelOffer* is negative and significant for the full, pre- and post-SOX periods, respectively. It shows that underpricing is decreasing with the offer size, a result that is contrary to expectations. Interestingly, the dummy variables that show the purpose of the seasoned offerings change of sign from positive to negative from the pre to the post-SOX period.

Table 3 reports the determinants of undepricing (*UnderP*) for bought deals and firm commitment offers for the pre- and post-SOX periods, respectively, using equation (2). The first column shows the interaction of each determinant with the dummy variable *DumPerSOX*. This is a dummy variable that equals one during the pre-SOX period (*DumPreSOX*) and zero otherwise (*DumPostSOX*). *DumPostSOX* replaces *DumPerSOX* in regressions (1) and (3) and *DumPreSOX* replaces *DumPerSOX* in regressions (2) and (4). Regressions (1) and (2) of Table 3 show the coefficient estimates of the determinants of *UnderP* for bought deals for the pre- and post-SOX periods, respectively. Regression (1) shows a positive relation between underpricing and determinants such as secondary offerings (*SecOffer*), volatility of stock returns (*StdRet*), gross proceeds (*GProceeds*) and the dummy variable for the purpose of the SEO (*Dum1* to *Dum4*) for the pre-SOX period only. The positive sign of the coefficient of *SecOffer* (0.0804, p-value of 0.0183 unreported) suggests outside investors demand a greater price discount for SEOs sold from existing (controlling) shareholders as compensation for potential unfavourable information on the value of the firm (Mikkelson and Partch, 1985). In addition, the positive sign of the coefficient of return volatility reveals high price risk and investor uncertainty. Similarly, the positive coefficient of *GProceeds* shows liquidity uncertainty (Mola and Loughran, 2004).

Table 2: Determinants of Underpricing for Seasoned Equity Offerings of Canadian Cross-Listed Firms for the Overall, and Pre- and Post-SOX Periods

	Regression		
	(1)	(2)	(3)
	Overall Period	Pre-SOX Period	Post-SOX Period
Variables	**[220]**	**[129]**	**[91]**
Constant	0.0239	-0.0583*	0.2227***
DumBD	-0.0313**	-0.0038	-0.0704***
SecOffer	0.0171	0.0516	-0.1128***
StdRet	0.3790	0.8982**	-0.1270
Gproceeds	0.4117***	0.8860**	0.2923**
RelOffer	-0.3642**	-0.7708*	-0.2944**
DumGlobal	-0.0079	-0.0074	0.0141
Dum1	0.0174	0.0702**	-0.1489***
Dum2	0.0085	0.0558*	-0.1298***
Dum3	0.0031	0.0472	-0.1284***
Dum4	0.0186	0.0647**	-0.1241***
DumPost-SOX	0.0172		
R^2 Adj	0.048	0.045	0.351

*This table reports the cross-sectional regression results between underpricing (UnderP) of seasoned equity offerings (SEOs) and expected determinants for the overall sample, and the pre- and post-SOX periods, respectively, by Canadian cross-listed issuers on major U.S. exchanges using equation (1). The table shows regressions of underpricing on determinants such as ratio of secondary offers to the number of shares offered (SecOffer), standard deviation of returns (StdRet), ratio of gross proceeds to market capitalization (Gproceeds), ratio of offer size to shares outstanding (RelOffer). It also includes the dummy variables DumBD (bought deals),DumFC (firm commitment, DumGlobal (global issuance), Dum1 (working capital), Dum2 (capital investment), Dum3 (general corporate), Dum4 (debt reduction) and DumPostSOX (for post-SOX period).The first row shows the number of SEOs in brackets. ***, ** and *denote significance at the 1, 5 and 10 percent levels.*

Table 3: Determinants of Underpricing for Seasoned Equity Offerings of Canadian Cross-listed Firms for the Pre- and Post-SOX Periods for Bought Deals and Firm Commitment, Pespectively

	Regression			
	Bought Deals		Firm Commitment	
	(1)	(2)	(3)	(4)
Variables	***DumPerSOX* is *DumPostSOX*** **[144]**	***DumPerSOX* is *DumPreSOX*** **[144]**	***DumPerSOX* is *DumPostSOX*** **[76]**	***DumPerSOX* is *DumPreSOX*** **[76]**
Constant	-0.1538***	0.0366	0.0935	0.0937
DumBD				
SecOffer	0.0804**	0.0027	-0.0654	-0.1393**
*SecOffer*DumPerSOX*	-0.0776	0.0776	-0.0738	0.0738
StdRet	1.2143***	0.9729	-0.3083	0.2606
*StdRet*DumPerSOX*	-0.2414	0.2414	0.5590	-0.5590
GProceeds	1.6938***	0.0196	-0.4217	0.0043
*GProceeds*DumPerSOX*	-1.6741***	1.6741**	0.4261	-0.4261
RelOffer	-1.3352***	-0.0936	0.4040	-0.0675
*RelOffer*DumPerSOX*	1.2415**	-1.2415	-0.4715	0.4715
DumGlobal	-0.0123	-0.0096	0.0045	0.1048***
*DumGlobal*DumPerSOX*	0.0027	-0.0027	0.1002**	-0.1002
Dum1	0.1386***	-0.0289	-0.0163	0.0034
*Dum1*DumPerSOX*	-0.1675***	0.1675**	0.0197	-0.0197
Dum2	0.1200***	-0.0469	-0.0471	-0.0745
*Dum2*DumPerSOX*	-0.1670***	0.1670***	-0.0273	0.0273
Dum3	0.0933***	-0.425	-0.0674	-0.0572
*Dum3*DumPerSOX*	-0.1359**	0.1359**	0.0102	-0.102
Dum4	0.1355***	-0.0328	-0.0642	-0.1174
*Dum4*DumPerSOX*	-0.1684	0.1684***	-0.0532	0.0532
R^2 Adj	0.211	0.211	0.211	0.211

*This table reports the cross-sectional regression results between underpricing (UnderP) of seasoned equity offerings and expected determinants for bought deals and firm commitment offers of Canadian cross-listed issuers on major U.S. exchanges for the pre- and post SOX periods, respectively, using equation (2). The table shows regressions of underpricing on determinants such as ratio of secondary offers to the number of shares offered (SecOffer), standard deviation of returns (StdRet), ratio of gross proceeds to market capitalization (Gproceeds), ratio of offer size to shares outstanding (RelOffer). It also includes the dummy variables DumBD (bought deals),DumFC (firm commitment, DumGlobal (global issuance), Dum1 (working capital), Dum2 (capital investment), Dum3 (general corporate), Dum4 (debt reduction) and DumPerSOX (DumPreSOX for pre-SOX period and DumPostSOX for post-SOX period).The first row shows the number of SEOs in brackets. ***, ** and *denote significance at the 1, 5 and 10 percent levels.*

On the other hand, the coefficient of *RelOffer* (offer size) is negative and significant also for the pre-SOX period, which is not expected. Note that in regression (2) the coefficients of secondary offerings, return volatility, gross proceeds and offer size are no longer significant for the post-SOX period. This also includes the dummies *Dum1* to *Dum4* that describe the purpose of the offer. In short, these results show the determinants of undepricing for bought deals - which measure information asymmetry, price risk and liquidity uncertainty on the pre-SOX period - disappear after the passage of the Act.

For firm commitment offers, regression (3) of Table (3) shows no coefficient is significant for each determinant during the pre-SOX period. On the other hand, the coefficient of *SecOffer* is negative and significant (-0.1393, p-value of 0.042 unreported) during the post-SOX period as shown in regression (4). This suggests that lower underpricing occurs for non-raising capital firm commitment offers, after the passage of the Act. The reason behind this result is that information asymmetry between outside investors and controlling shareholders does not occur after the passage of SOX. That is, because the equity offer occurs several days after the announcement for firm commitment, investors infer the value of the firm is favorable around the offer day and are willing to accept a lower price discount. Unlike bought deals in which the offer date is the same as the announcement date and the information asymmetry about the value of the firm is greater and so the underpricing. The other coefficient that is also significant to underpricing for firm commitment offers after SOX is for global seasoned equity offerings (*DumGlobal*). The coefficient is positive and significant at the one percent level (0.1048, p-value of 0.0023 unreported). This reveals underpricing increased for global offerings under firm commitment after the passage of SOX.

In summary, bought deals and firm commitment equity offerings show different determinants for the pre- and post-SOX periods, respectively. The main reason firm commitment involves higher underpricing than bought deals is for global equity offers. In other words, investors accept to buy global equity offerings under firm commitment conditioned on high price discount only. This suggests issuing equity globally has been unfavorable for firm commitment after the passage of the Act.

CONCLUSIONS

The goal of this paper is to explore the impact of Sarbanes-Oxley Act (SOX) on the underpricing or price discount of seasoned equity offerings by Canadian firms cross-listed on the NYSE, AMEX and NASDAQ. Specifically, it addresses the effect on two underwriting methods of seasoned equity offerings: bought deals and firm commitment. Underpricing or price discount is an important issuance cost for seasoned equity offerings.

The sample data includes 220 seasoned equity offerings by Canadian cross-listed firms, from 1995 to 2008. The pre-SOX period (Jan 1995-July 2002) consists of 129 offers and the post-SOX period (August 2002-May 2008) of 91 offers. A cross-sectional OLS regression model tests the relation between underpricing of the seasoned equity offering with the expected determinants for the overall sample period, the pre- and post-SOX periods, and for bought deals and firm commitment offers, respectively. The results show that, for the overall sample, underpricing is not significantly different between the pre- and post-SOX periods. However, when distinguishing by underwriting method, underpricing is more negative for firm commitment than bought deals for the overall and the post-SOX periods, after controlling for offer and firm characteristics. In addition, the determinants of offer underpricing are different for bought deals and firm commitment for the pre- and post-SOX periods, respectively. The main reason firm commitment underpricing increased significantly after the passage of SOX, is for seasoned equity offerings issued globally. This suggests that underwriting global equity offerings through firm commitment has been unfavorable for Canadian cross-listed firms after the passage of the Act.

Some limitations of this paper are as follows. It does not include determinants that also may explain the underpricing, for example, shares float, insider ownership of the firm, and financial institution

shareholdings. The sample did not include data beyond year 2008 to improve the robustness of the results. Future research includes examining whether the findings of this paper are generalizable for similar underwriting methods of seasoned equity offerings in U.S. exchanges by U.S. and non-Canadian cross-listed firms. Since legislations similar to the Sarbanes-Oxley Act have passed in Europe and other countries, it is also worth exploring the underpricing effects on their publicly traded corporations (Rubalcava, 2012b).

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STATES OF THE ECONOMY AND GEOGRAPHIC INVESTMENT DECISIONS

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ABSTRACT

We examine the impact of economic conditions on firm performance after geographic expansions and divestures. We conjecture that different economy conditions during which a firm expands in and out of geographic territories affect the firm's ability to transform its resources into competitive edges. The difference in the ability of a firm to convert resources to advantages, in turn, leads to variations in operating performance subsequent to geographic expansions and divestures. We conduct empirical tests of our hypotheses using corporation self-disclosed segment data from 1979 to 2008 from COMPUSTAT. We find that, during weak economic cycles, geographic expansions result in sustained long-term profitability. Specifically, firms' geographic expansion decisions contribute 5.4% and 3.9% per year to industry-adjusted annual return on assets (ROA) over 4- and 5-year periods, respectively. On the other hand, geographic divestures enacted during a weak economy do not help improve firm performance. Moreover, both strong and weak economic conditions enhance performance of geographic expansion over two years but have no long-term effects. Finally, the state of the economy during which time geographic divesture takes place does not affect subsequent operating performance.

JEL: F2, L1, L25

KEYWORDS: Geographic Diversification and Divesture, Operating Performance, Resource-Based View

INTRODUCTION

The conjecture that major corporate investment decisions are highly influenced by market cycles has been studied extensively in the business literature. For example, Baker, Stein and Wurgler (2003) show that stock price has a huge impact on equity-dependent firms' investment decisions. Similarly, it is found that mergers and acquisitions (M&A) are often affected by concurrent equity market movements. In general, when equity price is near its peak, more M&A activities take place. Shleifer and Vishny (2003) present evidence that M&A decisions are driven by the conditions in the equity market. In terms of real economy, during the "dot-com" bubble from 1998 to 2000, there were over $1.5 trillion worth of merger and acquisition announcements per year in the U.S. market; while in 2001, after the bubble burst, there were only half as much (Rhodes-Kropf and Viswanathan, 2004). Again, in 2006 and 2007 when stock indices hit new high in all major equity markets, a record number of mergers and acquisitions took place all over the world (finance.mapoftheworld.com). Interestingly, an adverse development in the stock market often triggers companies to scale down their operations as well. Such swamp into mergers and acquisitions in a good economy and the rush into divesture during economic downturn have been well documented in the business press. For instance, PWC' 2009 survey of US executives on divestiture activities revealed that 69% of the respondents planned similar or increased level of divestiture activity in 2010 after the market crash of 2008 and 2009. However, whether these investment decisions result in favorable financial returns has not been fully examined yet. The objective of the study is to empirically document the extent to which the economic cycle impacts firms' operating performance subsequent to an important corporate investment decision, *namely geographic diversification and divesture*.

To examine the impact of different economic states on firms' geographic diversification decisions, we first classify the U.S. economic condition into three categories, strong, stable, and weak, based on the U.S. annual Gross Domestic Product (GDP) growth rate. We define an economy as "strong" when the annual U.S. GDP growth rate is above 4%, and "stable" when the annual GDP grown rate is between 2.5% and 4%; A "weak" economy is reached when the U.S. annual GDP growth is less than 2.5%. We, then, measure each firm's operating performance subsequent to its geographic diversification or divesture using 2-year, 3-year, 4-year, and 5-year average return on assets (ROA) and net profit margin (also known as return on sale, or ROS). We obtained financial data from COMPUSTAT Business Information File to calculate ROA and ROS from 1979 to 2008. Our regression results show that, geographic expansions that are initiated during weak economic cycles lead to higher excess accounting returns in the medium term (4- and 5-year). On average, they increase industry-adjusted ROA by 5.4% and 3.9% per year over 4- and 5- year periods, respectively. Contrary to a popular belief, geographic divestures in response to adverse economic conditions do not result in better financial performance after controlling for firm size. On the other hand, we find that economic conditions can positively affect performance subsequent to geographic expansion in the intermediate term – two years, but not long term. Performance after divesture is not affected by any economic state.

In sum, we extend the literature by empirically documenting that the relationship between geographic diversification/divesture and profitability varies across different economic states. We show that geographic diversification decision made when the economy is in the upward trend does improve long-term performance. Moreover, economic conditions only show short term effects on diversification performance. Our evidence is consistent with our hypothesis that macroeconomic conditions could positively affect firms' ability to transfer their competitive advantages when they expand to new geographic territories. The remainder of the paper is organized as follows: in Section 2, we review the relevant literature and presents our hypotheses; in Section 3, we summarize our data and describe our research methodology; Section 4 reports empirical findings; and we discuss our conclusions in the final section.

LITERATURE REVIEW

Diversification decisions are among the most important decisions that firms make. Logically speaking, diversification allows firm to expand and grow into different product or geographic markets to seek better performance. In academic research, different hypotheses regarding the effect of diversification on firm performance have been developed in several disciplines. The strategic management literature posits that diversified firms achieve better performance due to the synergy effect or improved market power (Palich et al., 2000). Studies in the economics literature postulate that, diversification creates an economy of scale (Saunders, 1994), which reduces marginal cost; and in return it leads to better operating results. Stein (1997) proposes that diversified conglomerates can build an efficient internal capital market, which allows them to centralize capital resources and to allocate funds for capital expenditures without additional external scrutiny. Finally, research also shows that diversification can lower a firm's overall risks because the negative impact of one faltered operation could be offset by the stronger performance of other operations within the same enterprise. Taken together, a firm's performance is expected to improve as it diversifies.

However, the return on diversification is not unanimously positive in reality. For instance, from 1980s to 1990s, the business world actually witnessed a trend moving from diversification to specialization (Comment and Jarrell, 1995). Many diversifications were associated with disappointing results rather than superior performance. Two strands of research have tried to explain the discrepancy between the theory and the reality. In the economics and finance literatures, many researchers argue that the advantages of diversification are often driven away by the increased costs due to the managers' self-interests in empire-building (Roll, 1986) or more executive compensations (Yermack, 1996). Jensen and Meckling (1979) coin such value-destroying effect caused by managers' self-interests as "agency cost".

The management literature posits that the inconclusive relation between diversification and performance is associated with the degree of relatedness of business units when they are combined together. In his seminal study, Rumelt (1974) pioneers the idea that only related diversification can deliver better performance. Many subsequent studies find supportive evidence (e.g., Palepu, 1985, Simmonds, 1990; Singh and Montgomery, 1987). Theoretically, the resource-based view (RBV) also provides compelling explanations in support of Rumelt's hypothesis. RBV contends that only efficient or successful resource sharing will result in improved operating performance. Wan et al. (2011) find that some specialized resources owned by a firm may not be mobile or easily transferrable across unrelated product markets. When such resources are shared within related or similar business units, they help create the economy of scale and increase profits. On the other hand, if these resources are shared among unrelated business units, the costs associated with processing the immobility or untransferrability of resources will outweigh the intended benefits and eventually reduce the firm's profits. Palich et al. (2000) document that; a U-shaped relationship exists between diversification and performance depending upon the mobility of firm resources.

The literature on diversification generally distinguishes between product (both physical products and services) diversification and geographic diversification. Geographic diversification is defined as a firm chooses to expand into new geographic areas. Over the last two decades, as it becomes easier and less costly to transfer capital cross boarders, corporations have been aggressively entering into new territories, global markets in particular. As a result, geographic diversification also attracted a lot of academic research. The benefits and costs of geographic diversification have been analyzed from a variety of perspectives. Geographic diversification is often stimulated by a maturing home market (Wan, 2005), the desire to reduce overall risk exposure (Cotugno and Stefanelli, 2012), achieving synergy (Saunders, 1994) in order to reduce production costs, developing economy of scale and scope, increasing organizational learning, and taking advantage of the inter-relatedness among business segments and geographic areas (Chao, Seung, Zhao, and Hsu, 2012). Different hypotheses on the success or failure of diversification strategies within a country, a region (such as the European Union or North America), or international markets have also been developed. Common factors that affect the performance of geographic diversification are the culture similarities or distance, political and legal environment, and economic policies (see Chiang and Harris, 2013, for a review). Similar to the findings in product diversification research, empirical studies of geographic diversification showed mixed results in terms of firm performance (Gande, Schenzler, and Senbet, 2009; Ruigrok, Amann, and Wagner, 2007).

In many cases, multinational diversity is found to be more profitable than product diversity (Baele and Inghelbrecht, 2007; Freund, Trahan, and Vasudevan, 2007; Gande, Schenzler and Senbet, 2009; Kyaw, Manley, and Shetty, 2011). However, geographic diversification must be contained within limits, lest firms become stretched too far (Qian, Li, Li, and Qian, 2008; Wiersema and Bowen, 2008). Meanwhile, contingencies are often found to affect geographic diversification performance. For example, Kyaw and Zong (2011) show that, investing in developing countries create extra value for U.S.-based multi-national corporations, while investing in advanced countries has a negative impact on their performance. Diversification strategies are more likely to lead to superior performance in specific home country environments (Barnes and Hardie-Brown, 2006; Wan and Hoskisson, 2003). In extreme cases, geographic diversification may cause losses, due to the costs of learning to operate in a new environment, as well as those related to creating a more complex organization (Deng and Elyasiani, 2008). However, the extant literature has neither examined the return to firms' geographic divesture decisions, nor has any research looked into how firm performance may be affected by the macroeconomic conditions under which diversification or divesture decisions are made.

To address this void, we investigate the performance of firms' strategic decisions on geographic diversification and divesture across two different economic states in the present study. We first classify the economic status into three states: weak, strong, and uncertain, and then conduct our analysis on the former two states. We postulate that the macroeconomic climate affects the performance of geographic

diversification or divesture. Building upon the resource-based view (RBV) in product market diversification and performance research, we argue that the economic conditions under which a firm diversifies into (out) different geographic regions affect the firm's ability to transfer and share its key resources. Such ability will, in turn, affect the performance afterwards. In a weak and recessionary economy, stock price declines across board and market sentiment turns pessimistic. Under these conditions, companies face reduced future cash flows, fewer growth opportunities, and less certain investment environment. To compensate for such high-risk/low-return setting ex ante, companies demand more scrutiny when they adventure to new geographic territories. Moreover, due to depressed stock prices, investments are more likely to be made with cash, and companies will be motivated to take advantage of undervalued equity price when acquiring other companies (Kusewitt, 1985; Rhodes-Kropf and Viswanathan, 2004). Taken together, depressed economic conditions drive firms to be more selective, which improves firms' capability in successfully managing assets and enhancing their ability to transfer and share specialized resources when they diversify into different geographic regions. Divesture activities during economic downturn should also help firms consolidate their resources as less profitable or inefficient units are reduced. Performance is expected to improve accordingly as well. On the other hand, when the economy becomes stronger, equity price rises and more capital will be available. More importantly, affluent capital supply motivates firms to commit more capital investments, such as geographic expansions, with less contemplation.

For example, Kusewitt (1985) find that more expansionary strategies are enacted when stock markets are following an upward momentum, which often increases the likelihood to over-expand and to over-pay for acquisitions. Such optimism-induced business strategies could increase the likelihood of less prudent decisions and weakens firms' capability in successful resource transferring and sharing. Nevertheless, better economic condition is also associated with easier and cheaper capital. As the cost of capital decreases, firms become more profitable in general. Therefore, we argue that, in strong economic status, whether geographic diversification will lead to better performance depends on the relative strength of the two opposite effects. If the positive effect of easy capital outweighs (underweights) the negative effect of less prudent decisions, geographic diversification strategies taken in strong economy will lead to better (worse) performance. The case of divesture overwhelmingly occurs during economic downturn. Divesture during strong economic state does not appear to merit any specific examination. In addition, we are not certain how firms will perform when they diversify or divest within an uncertain economic status. Given the amount of confounding effects, it is beyond the scope of this paper. We summarize our hypotheses as the following: *Hypothesis 1: Ceteris paribus, geographic expansion or divesture in a weak economy will result in better performance. Hypothesis 2: Geographic expansion in a strong economy will result in better (worse) performance if easy capital outweighs (underweights) less prudent decisions.*

DATA AND METHODOLOGY

Data

Most researchers who include macroeconomic conditions in their studies of diversification have only used short-term metrics as reflected by stock prices. The time frame of these measures tends to only include the period of time during which the decision takes place. For example, Lubatkin and O'Neill (1987) use stock prices in the days preceding and following a merger to define the market state. In studying stock price response to diversification announcements, Lubatkin and Chatterjee (1991) define an economic cycle by the direction of Value Line's stock market composite. A bear cycle represents a general downward movement lasting at least six months, a bull cycle represents a general upward movement of the same duration, and a stable cycle represents at least a six-month period that shows no discernible movement. Within the same vein, Kusewitt (1985) uses the ratio of the average of S&P 500 index of the third month prior to the acquisition to the average of S&P 500 index of the transaction month in order to determine the market sentiment.

In this study, we first classify the economy into three states: weak, stable, and strong based on the annual U.S.

Gross Domestic Product (GDP) growth rate. The economy is classified as "weak" if the rate is less than 2.5%, "stable" if the rate falls between 2.5% and 4%, and "strong" if the rate is above 4%. We use the growth rate of GDP level to measure the state of economy for the following reasons: (1) We are primarily interested in the longer-term operating results of corporate geographic investment strategies. GDP captures economic status and sentiment and matches the long-term performance we intend to examine. (2) Many studies have shown that contemporaneous stock returns often correlate with subsequent operating performance due to the transaction costs associated with corporate investments (Bouwman, Fuller, and Nain, 2009; Rhodes-Kropf and Viswanathan, 2004; Wan and Hoskisson, 2003). GDP, on the other hand, is not directly related to the transaction cost of geographic investment decisions. Therefore, using GDP to measure macroeconomic states makes our test on subsequent firm performance more statistically powerful.

Despite the large body of research on geographic diversification and divesture, there is no consensus on how to measure the outcome of these strategies, which also explains some discrepancies in past findings. Approaches vary along several dimensions. Common metrics include both subjective and qualitative assessments and objective measurements, such as financial and accounting figures. Interestingly, researchers who have attempted both qualitative and quantitative measures often find no correlation between these performance criteria (Papadakis and Thanos, 2010). Moreover, the time frame of performance measure also differs greatly, from short-term horizons (e.g., a few days before and after the acquisition announcement) to long-term time ones (up to five years after the merger or acquisition is completed) (Zollo and Meier, 2008). Short-term windows are by far the most frequently used in evaluating acquisition performance (Zollo and Meier, 2008), but a longer time period is better suited to determine the sustained performance (Fang, Wade, Delios, and Beamish, 2007; Hyland, 2008). The most common performance measures include stock returns and accounting returns. In the present study, we choose to measure performance using accounting returns for the following reasons: (1) Stock prices are often affected by market-wide factors (Barnes and Hardie-Brown, 2006; Savor and Lu, 2009; Shahrur and Venkateswaran, 2009). Systematic risks play an important role in determining stock returns and they are not directly related to firm-specific investment decisions. (2) Stock price has been shown to be a better proxy of measuring market expectation rather than company performance itself (Zollo and Meier, 2008). (3) Equity price may be confounded by political and economic conditions beyond conventional geographic territory. For example, the stock price of a non-U.S. company is strongly influenced by the extent of the company's non-domestic activities (Lombard, Roulet, and Solnik, 1999) and capital flows within the U.S. (Kalemli-Ozcan, Reshef, Sørensen, and Yosha, 2010). Given these concerns, we choose accounting measures.

Our primary metric is return on assets (ROA). ROA shows how profitable a company is relative to its total assets, and it is calculated as earnings before interest and taxes scaled by total assets (also known as EBITOA). ROA allows us to avoid any potential taxation issues (Wan and Hoskisson, 2003). We employ longer-term measurement periods (i.e., 2- to 5-year average ROA) to overcome the potential issues of managerial manipulation of accounting earnings (Akbulut and Matsusaka, 2010). As well, we believe that the consequence of a corporate strategy often does not reveal itself immediately. Documenting the operating results up to a 5-year period facilitates a better understanding of the longer-term effects of different geographic investment strategies. Moreover, since raw ROA varies significantly across different industries, we use excess return on assets (XROA) to control for industry effects. XROA is calculated by subtracting the median ROA of each firm's 2-digit SIC industry from its raw ROA. We compute the average XROA over 2 to 5 years subsequent to geographic diversification or divesture decisions.

Our alternative measure is profit margin. Profit margin shows a company's profitability as a percentage of its total revenue. We calculate it as earnings before interests and taxes divided by revenue. Similar to XROA, to control for industry effects we employ abnormal profit margin (XPM), which is the firm's profit margin minus the median profit margin of its 2-digit SIC industry. The average abnormal profit margin is also measured over 2-5 years following geographic diversification or divesture. In addition, we include several variables that have been found to affect the results of diversification studies as controls. 1) Experience: A firm's previous experience with diversification may influence its success in later diversification decisions. However, the sign

of such effect is uncertain. On one hand, higher diversification rates may lead to greater success due to prior experiences. On the other hand, high diversification rates could lead to problems with absorbing too many new businesses (Kusewitt, 1985; Markides, 1995). The variable "Experience" in this study counts the number of times that the firm has expanded (divested) geographically before to control for firms' past experiences. 2) Size: larger firms consistently engage in a larger degree of diversification activities (Borghesi, 2008; Kyaw and Zong, 2011). In this study, the natural logarithm of the firm's total assets at the beginning of each year is employed to measure firm size. 3) Concentration: concentration represents the degree of business concentration in any geographic segment. It is computed as the sum of square of the percentage of each geographic segment's sales relative to total sales. We obtain financial data from Standard & Poor's COMPUSTAT Business Information File (BIF) for the period of 1979-2008, subject to the availability of variables used in the regression models. BIF contains company self-disclosed segment information, including each company's 4-digit Standard Industrial Classification (SIC) code, its number of geographic segments, total assets, the number of employees, net income, various expenses of each segment. Firms in the finance industry were excluded because their accounting information cannot be easily compared with those in other industries. Table 1 presents the summary statistics. Panel A shows the statistics for all cases during the sample period, while Panels B and C report descriptive statistics for diversification and divest subgroups respectively.

The median firm of all cases had $150.747 million in sales, $198.436 million in assets and employed 542 people. Firms had between 1 and 31 geographic segments during the sample period, with more than half of the observations having only one geographic segment as shown by the median of segments. While the median firm earned a 5% return on assets (ROA), the average ROA of all firms is negative 12.44 %. Of the total 24,108 firm-year observations, 6,154 (25.6%) observations experienced geographic expansions during 1979 and 2008, and 392 (1.6%) observations had geographic divestiture. The remaining cases (about 70% of 24,108 observations) observations showed no change in geographic composition. The following empirical analysis will *only* focus on diversification (6,154 cases) and divesture (392 cases) subgroups. The firms in the expansion subsample ranged from having no experience with geographic expansion to having expanded five times previously. More than half of the observations in this subgroup have no prior experience with such activity. The firms that divested geographic segments were larger in size in terms of sales, assets, and numbers of employees. The firms in the divestiture subgroup also ranged from the most experienced firm that has contracted six times previously to having no prior experience. At first glance, firms learn to enter and leave different markets as they become more experienced in geographic expansion.

Methodology

To test the effect of geographic diversification/divesture decision on subsequent performance, we run the following regression model, Model I, using panel data for strong and weak economic status respectively. Model I is specified as the following:

$$XROA_n = a_0 + a_1 Expansion + a_2 Divesture + a_3 Size + a_4 Experience + a_5 Concentration + \varepsilon$$

XROA denotes Excess Return on Assets. It is calculated as the return on assets for the firm-year observation less the median return on assets of the firm's industry with the same 2-digit SIC code. $XROA_n$ is the average annual Excess Return on Assets for the firm year observation over *n* years; Expansion is an indicator variable. It is equal to 1 if the firm has more geographic segments than the year before. Divesture is an indicator variable. It is equal to 1 if the firm has fewer geographic segments than the year before. The remaining variables are as defined earlier. In this model, the impact of a geographic expansion (divestiture) on performance alone is reflected in the coefficient a_1 (a_2). All other unaccounted factors are pooled in the intercept term, a_0. Total excess returns after geographic expansion (divestiture) will be reflected in a_0+a_1 (a_0+a_2). To show different effects of different economy status, we run the regression separately for strong and weak economy. In the weak economy, we expect both a_1 and a_2 to be positive as firms become selective and efficient (Hypothesis 1). Under strong economy, we expect a_2 to be positive and significant since geographic expansion is hypothesized to improve

firm performance if cheaper capital outweighs other concerns (Hypothesis 2). However, a_1 is unclear since limited evidences have been found under such condition.

Table 1: Summary Statistics of the Sample Firms

Panel A: All Firm-year Cases During 1979 – 2008						
	Mean	**Median**	**Min**	**Max**	**Std. Dev.**	**N**
Total sales (millions)	$1,938.86	150.75	0	374,526	10,085	24,108
Total assets (millions)	4,126.29	198.44	0	2,017,263	42,533	24,108
# Employees	6,511.46	542	0	905,766	28,383	24,108
# Geographic Segments	1.45	1	1	31	1.41	25,232
Return on Assets (%)	-12.44	5.21	-37,150	2,185	391	17,275
Panel B: Firms That Diversified Geographically (25.6% of all cases)						
	Mean	**Median**	**Min**	**Max**	**Std. Dev.**	**N**
Total sales (millions)	1,992.66	95.53	0	374,526	12,160	6,154
Total assets (millions)	4,656.10	133.79	0	1,916,658	52,852	6,154
# Employees	6,122.34	393	0	905,766	29,458	6,154
# Geographic Segments	1.78	1	1	31	1.82	6,750
Return on Assets (%)	3.25	4.77	-116.58	64.66	22.55	207
Experience	0.18	0	0	5	0.45	6,750
Panel C: Firms That Divested Geographic Segments (1.6% of all cases)						
	Mean	**Median**	**Min**	**Max**	**Std. Dev.**	**N**
Sales (millions)	8,423.56	610.85	0	184,632	21,175	392
Assets (millions)	25,406.43	840.99	0.079	2,017,263	146,379	392
# Employees	22,787	2,700	0	905,766	48,766	392
# Geographic Segments	1.45	1	1	31	1.41	372
Return on Assets (%)	-12.44	5.21	-37,150	2,185	391	156
Experience	0.19	0	0	6	0.50	6,824

Note: We obtain annual sales, total assets, the number of employees, and the number of geographic segments from COMPUSTAT Business Information File over the period of 1979-2008. "Experience" counts the number of times that the firm has expanded (divested) geographically before. Table I presents summary statistics for these variables for all cases, the diversification subgroup, and divesture subgroup.

To test the effect of economic condition on the operating results of geographic divestiture and divesture strategy, we run the following regression, Model II, using panel data approach. We separate diversification and divesture in two regressions as well. Model II is specified as the following:

$$XROA_n = b_0 + b_1 Weak + b_2 Strong + b_3 Size + b_4 Experience + b_5 Concentration + \varepsilon$$

"Weak" is an economic state indicator variable. It is equal to 1 if the firm expanded geographically in a year when the annual GDP growth rate is less than 2.5%; "Strong" is another economic state indicator variable. It is equal to 1 if the firm expanded geographically in a year when the annual GDP growth rate is more than 4%; other variables are as defined earlier. In this model, weak and strong are the dummy variable, which indicate the status of the economy in year *n*. Control variables are defined in the same way as in Model I. For the divesture subsample, we expect b_1 to be positive and significant for divesture (Hypothesis 1) but uncertain for expansion. The coefficient of 'strong' dummy, b_2, should be significant but sign is uncertain for expansion (Hypothesis 2) and insignificant for divesture.

We choose a panel data analysis approach because each firm may have multiple years of data, so throughout the sample period, a firm could experience geographic expansion and/or contraction multiple times. A panel data analysis is appropriate in this case as it takes into consideration the heterogeneity in both cross-sectional and time-series dimensions. Such application of regression models is more complex than those for simple cross-sectional data sets but can reveal the dynamics that are difficult to detect with cross-sectional data (Dougherty, 2007).

RESULTS

In the first pass, we examine the median $XROA_s$ with different economic status and geographic strategies. We summarize the results in Table 2. Based on these findings, geographic divestiture appears to be the one that resulted in a more consistently positive excess return on assets regardless of economic condition. Neither of these two specific geographic strategies seems to stand out as the "better one" in a strong economy. The better strategy in a weak economy would appear to be divesture, as it results in positive excess average returns on assets over 3-, 4-, and 5-year period.

Table 2: Median Excess Returns on Assets over 5-year Period

Panel A: Operating Performance Subsequent to Diversification or Divesture in a Weak Economy			
	Expansion	**No Change**	**Divestiture**
$XROA_2$ (%)	-1.105	-0.740	-0.431
$XROA_3$ (%)	-1.039	-0.655	0.116
$XROA_4$ (%)	-0.928	-0.559	1.403
$XROA_5$ (%)	-1.006	-0.620	0.596
Panel B: Operating Performance Subsequent to Diversification or Divesture in a Strong Economy			
$XROA_2$ (%)	-1.441	-1.104	-2.254
$XROA_3$ (%)	-1.394	-0.983	-2.399
$XROA_4$ (%)	-1.190	-0.912	-2.966
$XROA_5$ (%)	-1.025	-0.732	N/A

Note: "XROA" represents Excess Return on Assets. It is calculated as the return on assets for the firm-year observation less the median return on assets of the firm's industry with the same 2-digit SIC code."$XROA_n$" is the average annual Excess Return on Assets for the firm year observation over n years. Table 2 summarizes average $XROA_n$ subsequent to diversification or divesture under weak economy in Panel A and under strong economy in Panel B, respectively.

The analysis shown in Table 2, however, does not take into account the other factors that may have contributed to the variation in excess return on assets, such as firm size, past experience of a strategy, and the firm's degree of concentration in a geographic area. Therefore, a panel study analysis is conducted using regression Model I and II, which controls for these effects. Both models were specified in Section 3. We first jointly test the effects of different strategies under different economic conditions. Findings are shown in Tables 3 and 4. Table 3 reports the results of different geographic strategies taken in a weak economy. The coefficients for geographic expansion are statistically significantly positive in years 4 and 5, which implies that expanding geographically (as opposed to remaining unchanged) in a weak economy results in sustained higher excess return on assets as we predicted. Expansion in a weak economy contributes on average 5.4% and 3.9% per year to industry-adjusted ROA over 4- and 5-year periods, respectively. Consistent with our hypothesis, as firms become more selective, geographic diversification leads to improved performance. Divesture does not show any significance in helping boost performance during the weak economy. None of the variables are significant at the conventional levels. Consolidating resources in weak economy seems more complicated than it appears.

Table 3: Regression Results for Geographic Decisions Made in Weak Economy

	Intercept	Expansion	Divestiture	Firm Size	Experience	Concentration	N
$XROA_2$	-3.32***	0.068	0.048	0.472***	-0.006	0.123	7,154
$XROA_3$	-0.47*	-0.007	0.020	0.103***	0.016**	-0.219	5,860
$XROA_4$	-0.55	0.054*	-0.018	0.116***	0.015	-0.235	5,012
$XROA_5$	-0.45	0.039**	-0.005	0.099***	-0.004	-0.214	4,285

*Note: "XROA" represents Excess Return on Assets. It is calculated as the return on assets for the firm-year observation less the median return on assets of the firm's industry with the same 2-digit SIC code."$XROA_n$" is the average annual Excess Return on Assets for the firm year observation over n years. "Expansion" is an indicator variable. It is equal to 1 if the firm has more geographic segments than the year before. "Divestiture" is an indicator variable. It is equal to 1 if the firm has fewer geographic segments than the year before. "Firm Size" is calculated as natural log of the firm's total assets at the beginning of the year. "Experience" indicates the number of times the firm diversified (divested) prior to the firm-year observation when the "Diversification" ("Divestiture") indicator variable is 1. "Concentration" represents the degree of business concentration. It is calculated as the sum of square of the percentage of each geographic segment sales. *: significant at 10% level, ** significant at 5% level, ***: significant at 1% level.*

Table 4 presents the results of different geographic strategies taken in a strong economy. None of these coefficients are significant at the conventional level, which indicates that no specific strategy alone appears to yield any additional return on assets when economy is in an upward trend. According to our hypothesis II, it appears that less prudent decisions compromise cheaper financing resources to some extent. Interestingly, intercepts are significant in all four different measuring periods. We contend that, even though diversification or divesture alone does not necessarily produce any noticeable effect, they might interact with other unidentified factors and actually reduce firm profitability.

Table 4: Regression Results for Geographic Decisions Made in Strong Economy

	Intercept	Expansion	Divestiture	Firm Size	Experience	Concentration	N
$XROA_2$	-0.68***	0.018	-0.029	0.102***	-0.005	0.031	4613
$XROA_3$	-0.65***	0.002	-0.006	0.092***	-0.006	0.091	3736
$XROA_4$	-0.50***	0.017	0.009	0.072***	0.002	0.039	3136
$XROA_5$	-0.76**	0.023	0.023	0.092***	0.001	0.191	2682

*Note: "XROA" represents Excess Return on Assets. It is calculated as the return on assets for the firm-year observation less the median return on assets of the firm's industry with the same 2-digit SIC code. "$XROA_n$" is the average annual Excess Return on Assets for the firm year observation over n years. "Expansion" is an indicator variable. It is equal to 1 if the firm has more geographic segments than the year before. "Divestiture" is an indicator variable. It is equal to 1 if the firm has fewer geographic segments than the year before. "Firm Size" is calculated as natural log of the firm's total assets at the beginning of the year. "Experience" indicates the number of times the firm diversified (divested) prior to the firm-year observation when the "Diversification" ("Divestiture") indicator variable is 1. "Concentration" represents the degree of business concentration. It is calculated as the sum of square of the percentage of each geographic segment sales. *: significant at 10% level, ** significant at 5% level, ***: significant at 1% level.*

To isolate each strategy and test the effect of economic condition, Model II regress both economic indicators onto performance for divesture and diversification subsamples respectively. We present the findings in Tables 5 and 6. Table 5 reveals the results of geographic expansion made in different economic states, while Table 6 presents the results of geographic divesture subsample. In both tables, intercepts are negative, which is consistent with the findings in Table 3 and Table 4. Looking across Tables 5 and 6, the intercept terms are more negative in the earlier years than in later years for the geographic expansion group (Table 5) and the geographic divesture group (Table 6). These findings are consistent with the fact that immediate expense incurs in early years of expansion and contraction, thereby reducing immediate-term returns.

In Table 5, the coefficients for both economic indicators in row 1 are statistically positive, implying that economic conditions affect the performance after geographic expansion in a positive fashion, but such advantage can only sustain for a short period of time. We argue that these advantages are attained either by having cheaper and more readily available capital during a strong economy or by more prudent contemplation

during weak economy contributes, both of which offset the immediate expenses after expansion. And more importantly, these benefits appear to be short-lived. Coefficients are much smaller in the 3-year, 4-year and 5-year regressions and become insignificant. With regard to geographic divesture, the results reported in Table 6 suggest that the state of the economy under which a firm reduces its geographic spread does not seem to affect firm performance. There are several reasons why the results are not in line with our predictions. It is possible that firms' performance after divesture is also related to other structural changes, such as layoff and reduction in R&D, which requires more detailed information that is not contained in our current data source. Future research on these topics will help discern what specific factors contribute to the success or failure of geographic divestures.

Table 5: Regression Result for Firms That Expanded Geographically

	Intercept	Weak Economy	Strong Economy	Firm Size	Experience	Concentration	N
$XROA_2$	-2.63***	0.282***	0.316***	0.357***	-.0126	0.013	4607
$XROA_3$	-0.90***	-0.089	0.123	0.122***	-0.017	0.166	3494
$XROA_4$	-0.78***	0.057	0.045	0.100***	0.026	0.115	2767
$XROA_5$	-0.89***	0.066	0.038	0.103***	0.006	0.200	2213

*Note: "XROA" represents Excess Return on Assets. It is calculated as the return on assets for the firm-year observation less the median return on assets of the firm's industry with the same 2-digit SIC code. "$XROA_n$" is the average annual Excess Return on Assets for the firm year observation over n years. "Weak Economy" is an indicator variable. It is equal to 1 if diversification took place when the annual GDP growth rate is less than 2.5%. "Strong Economy" is an indicator variable. It is equal to 1 if diversification took place when the annual GDP growth rate is more than 4%. "Firm Size" measures the size of the firm. It is calculated as natural log of the firm's total assets at the beginning of the year. "Experience" indicates the number of times the firm expanded geographically prior to the firm-year observation. "Concentration" represents the degree of business concentration. It is calculated as the sum of square of the percentage of each geographic segment sales. *: significant at 10% level, ** significant at 5% level, ***: significant at 1% level.*

Table 6: Regression Result for Firms That Divested Geographically

	Intercept	Weak Economy	Strong Economy	Firm Size	Experience	Concentration	N
$XROA_2$	-0.52***	-0.081	-0.048	0.065***	0.078	0.135	193
$XROA_3$	-0.47***	-0.049	0.004	0.056***	0.094	0.125	145
$XROA_4$	-0.11	-0.019	-0.053*	0.029	0.007	0.093	89
$XROA_5$	n/a	n/a	n/a	n/a	n/a	n/a	

*Note: "XROA" represents Excess Return on Assets. It is calculated as the return on assets for the firm-year observation less the median return on assets of the firm's industry with the same 2-digit SIC code. "$XROA_n$" is the average annual Excess Return on Assets for the firm year observation over n years. "Weak Economy" is an indicator variable. It is equal to 1 if divesture took place in a year when the annual GDP growth rate is less than 2.5%. "Strong Economy" is an indicator variable. It is equal to 1 if divesture took place in a year when the annual GDP growth rate is more than 4%. "Firm Size" is calculated as natural log of the firm's total assets at the beginning of the year. "Experience" indicates the number of times the firm divested prior to the firm-year observation. "Concentration" represents the degree of business concentration. It is calculated as the sum of square of the percentage of each geographic segment sales. *: significant at 10% level, ** significant at 5% level, ***: significant at 1% level.*

To test the robustness of our tests against different variable measurement, we conduct the same statistical analysis using abnormal profit margin (XPM) as the measure of firm performance. Although the results are not reported here, they are qualitatively similar to the findings using excess return on assets. Additionally, we run our regression analyses using both Maximum Likelihood (ML) and Residual Maximum Likelihood (REML) estimators. The results are not reported here, but they are qualitatively similar as well.

CONCLUDING COMMENTS

Corporate strategic decisions have substantial impact on their performance in the future. These decisions are constantly affected by concurrent economic status. The goal of this study is to explore the performance of geographic diversification and divesture decisions made during positive and negative economic environments. Prior empirical studies have not provided consistent findings, thus the present study is designed to shed some

light on such discrepancy. Specifically, we examine the effect of different economic status on the performance subsequent to geographic divesture and expansion strategies.

Our results show that, expansion during weak economic conditions lead to better long-term performance. Expansion contributes to industry-adjusted return on assets by 5.4% and 3.9% per year over 4- and 5-year periods, respectively. Contrary to the conventional view, divesture during economic downturn does not directly provide any positive financial outcome. We also test how different economic conditions affect both strategies. Our results also suggest that both strong and weak economic conditions help yield higher excess returns over a two-year period for corporations that expanded geographically. However, no long-time effect is statistically significant in our findings. Taken together, we argue that during weak economy, firms are more selective and more cautious about their investment, expansion in particular. Such prudence makes firms more successful in sharing their competitive edges and become more competitive, which eventually lead to better than average performance. Divesture during economic down time does not appear to be a quick fix as many have expected.

Finally, our results need to be interpreted with some cautions. Our sample is biased toward expansion subgroup, which may partially explain why such strategy presents more statistically significant results. As well, we have not included the interaction between economic status and diversification/divesture decisions. Future research can shed more light by addressing these issues.

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PERFORMANCE OF CHILEAN PENSION FUNDS INVESTMENTS ABROAD 2010-2014

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ABSTRACT

Considering the high volatility generated from the financial crisis of 2008 and low returns in the years 2011, 2013 and 2014, we analyzed the performance of the Chilean Pension Funds. We use Jensen, Sharpe and Treynor indices to evaluate the funds. The comparison is made on a monthly basis for the period 2010 - 2014. We conclude that diversification of pension funds in foreign equities generated a performance similar to global Morgan Stanley All Country World Index*, but failed to deliver a return per unit of risk above the average yield on US Treasury bonds. When total risk is segregated into systematic and idiosyncratic components, the difficulty to eliminate unsystematic risk is confirmed. Conclusions suggest that restrictions imposed by the regulations in Chile allow them to achieve a return similar to a passive portfolio, but with a substantial increase in overall risk.*

JEL: C01, C12, C20, G15, G23, G32

KEYWORDS: Diversification, Return, Volatility, Risk, Systematic, Idiosyncratic

INTRODUCTION

This paper investigates the efficiency level reached by Chilean Pension Funds based on the portion of equity assets invested in foreign markets. We measure efficiency by Jensen, Sharpe and Treynor indices. Also we examine the systematic and idiosyncratic risk components of these portfolios, to verify the hypothesis that diversification of pension funds in global markets has been achieved with a risk level similar to a benchmark of selected foreign mutual funds. We examine monthly data for the period 2010 – 2014.

The total assets managed by pension funds in Chile has steadily increased from 118 billion dollars at the end of 2009 to 165 billion dollars in December 2014. This amount represents approximately sixty percent of the country gross domestic product. The importance of overseas equity allocation is reflected by the high proportion of total funds invested internationally. Overseas equity amounts to 38,270 million dollars in December 2009 and 49,250 million dollars in late 2014. It is significant to mention that about 30 percent of the total funds are invested in foreign equities.

Efficiency in an active asset allocation strategy means achieving higher yields than those obtained with a passive strategy. Passive strategies involve investing in a well diversified stock index or alternatively, generating a per risk unit return in excess of a fixed rate reference yield. To perform this analysis we examine the following hypotheses of study: First, performance of pension funds abroad over the last five years has been similar to a global index, such as the Morgan Stanley All Country World Index (MSCI- ACWI). Second, pension funds average yield per unit of risk has not been lower than that reached by US Long Term Treasury Bonds. Third, diversification of pension funds in global markets has been achieved with a risk level similar to a representative sample of mutual funds that channeled a proportion of its investment abroad.

In connection with the third hypothesis we note that most Chilean Pension Funds foreign investment is diversified through stock mutual funds operating in the capital markets of North America, Europe and Asia. For this reason it seems relevant to measure and compare the performance of both types of funds. In this context, the period of high volatility in global capital markets generated by the financial crisis of 2008 and alternate cycles of high and low returns have deteriorated the performance of international mutual funds, in turn affecting a sizable portion of Chilean Pension Funds. The literature reports several studies on the performance of the pension funds as a whole, but none focuses on a particular type of financial instrument. Our purpose is to assess how Chilean Pension Funds' return depends on the performance of its overseas variable income instruments.

This document consists of a Literature Review containing an overview of the 2008 Financial Crisis, a summary on pension funds in Chile, recent studies on pension funds performance and advances on empirical analysis in measurement of systematic risk and idiosyncratic risk. Next is a description of the methodology applied and identification of data source used to measure the efficiency achieved by foreign pension fund investements. Finally we present results and conclusions of this research.

LITERATURE REVIEW

The 2008 Financial Crisis

The 2008 crisis, triggered by the collapse of US subprime mortgages, threatened the viability of many financial institutions and eroded the stability of the global financial system. In the peak of the crisis, right after the September 2008 bankruptcy of Lehman Brothers, the US Federal Reserve Bank intervened, by means of "liquidity injections", which ultimately resolved the panic created worldwide.

Mendoza and Quadrini (2010) point out that this crisis was preceded by 20 years of sustained indebtedness growth in the US economy, as result of low interest rates. They suggest that increasing integration of capital markets, including emerging economies, caused their transmission via contagion. Didier et al. (2010) analyzed transmission channels of the crisis and concluded that countries with liquidity and greater financial integration with the United States experienced greater joint volatility. They recommend that risk derived from this integration should be managed through appropriate regulation and supervision.

Raddatz and Schmukler (2012) studied the role of institutional investors and global mutual funds managers. They pointed out that, as global savings are largely administered through these institutions, their managers are subjected in times of crisis, to pressures that force them to act pro-cycle whereby they sell when markets are down, thus exacerbating the crisis. In particular, they state that institutional investor roles did not contribute to stabilize the markets at the peak of this crisis.

Pension Funds in Chile

The current pension fund system history in Chile began in the 1970s. Piñera (1991) points out that falling birth rates and the gradual increase in life expectancy, were fostering an imbalance between the proportion of active workers and pensioners, so that continuing with the Defined Benefit Pension System (Pay As You Go), prevailing at that time, would end up in a budget crisis.

The private Chilean Pension Funds System, which corresponds to a Defined Contribution Pension System, began in 1981 and is based on a compulsory 10% monthly contribution, payable during the entire working life. Funds are capitalized in individual accounts and managed by private companies, called Administrators of Pension Funds (AFP), solely devoted to this purpose. Initially each AFP managed a single fund, invested only in fixed income instruments issued in Chile. In 1985 they were allowed to diversify with domestic equity instruments. In the nineties, further diversification was permitted, including investment in foreign

fixed and variable income instruments. Since its inception the industry has been ruled under strict supervision of a government agency called the Superintendence of Pension Funds.

Corbo and Schmidt-Hebbel (2003) emphasize the private pension system has contributed significantly to greater financial depth in the Chilean capital market, noting that in the 1981-2001 period, pension funds accounted for 31% to 46% of monetary aggregates growth in relation to GDP. In late August 2002 it began to operate a new pension savings mode. From that date on the AFP offered five types of funds ("A", B", "C", "D", "E") in which to invest their affiliates' savings. The funds differ in the proportion of variable income and fixed income securities that managers should invest. All affiliates must choose a type of pension fund (or a combination of types) according to their willingness to take risk; age and the time horizon that they intend to maintain the funds until retirement.

According to information provided by the Superintendence of Pension Funds, each fund type is characterized as follows: "A", the riskiest type fund, diversifies its portfolio into equities, according to current regulations, in a range between 40% and 80%. This type of fund has earned in the last 12 years, since its operations began, an industry real annual average rate of return of 6.91% measured in Chilean pesos. The real annual average return is reduced to 4.11% over the five year period analyzed in this research which was affected by high volatility and low returns.

The Type "B" fund, with a range of diversification in equities between 25% and 60%, earned a real annual average return of 5.82% over the last 12 years. This return is reduced to 4.06% when considering only the last five years. Type "C" fund, which accounts for the highest proportion of administered resources, invests in equities in the range of 15% to 40%. It earned a real annual average return of 5.38% over the last 12 years, which falls to 4.66% when considering only the years associated with this research. Type "D" and type "E" funds were the least affected by low returns and high volatility in the last five years, with returns of 4.77% and 5.20% respectively. These funds are less risky, support up a maximum equity of 20% and 5% respectively. They have obtained a real annual average return of 4.91% and 4.19% respectively since the multi system began, in September 2002.

In December 2014 the Chilean industry is composed of six AFP which manage a total fund amounting to USD 165,432 million and belonging to 9,737,853 private pension savings affiliates (Data released by the Superintendence of Pensions (http://www.safp.cl/portal/informes/581/articles-10679_recurso_1.pdf)

Performance of Pension Funds

Recent studies on pension fund performance have been carried out in collaboration between the Organization for Economic Cooperation and Development (OECD) and the World Bank. Antolin (2008) summarizes the results of comparative performance analysis made of private pension funds operating in Latin America and Europe and highlights the need to develop a future international standard, to effectively compare results across countries. He specifically refers to Walker and Iglesias (2007), who analyze the performance of pension funds based on the Sharpe Ratio, following Lo (2002). They conclude that in general, pension funds in several countries have had good performance when compared to a risk-free short term asset, but this situation does not occur when the benchmark used is a risk-free long term bond. Antolin also refers to Tapia (2008), study which concludes that Latin American pension funds have underperformed when comparing their actual returns with a hypothetical portfolio, tailored ex-post to optimize the risk-return relationship. It is suggested that investment restrictions imposed by the regulations of different countries have had a negative impact on the performance of pension funds.

When measuring efficiency indices, it must be kept in mind various restrictions imposed by pension funds regulations, which limit diversification by the issuer to a maximum, as a percentage of the issuer's total equity as well as of the total fund value. In the particular case of Chile, Bernstein and Chumacero (2003)

argue that the restrictions imposed by pension legislation represented a significant loss in wealth to contributors to these funds (10% at the time of the study).

Systematic Risk vs. Idiosyncratic Risk

According to financial theory, a well diversified investment portfolio should have an idiosyncratic risk near zero —Ross, Westerfield and Jaffe (2010). The CAPM assumes that investors can eliminate all risks, except those associated with the covariance of its returns with a return index representing the market, which is non diversifiable - Copeland and Weston (1979).

If σ_C^2 represents the overall risk of the portfolio C, it can be decomposed into its systematic risk $\beta_C^2\sigma_M^2$ and its idiosyncratic risk σ_ϵ^2 as expressed in the following equation:

$$\sigma_C^2 = \beta_C^2 \cdot \sigma_M^2 + \sigma_\varepsilon^2 \quad (1)$$

We propose that σ_ϵ^2 be expressed as the fraction $(1 - [\rho_{CM}]^2)$ of the total risk σ_C^2, where ρ_{CM} represents the correlation coefficient between the returns of the C portfolio and a market index, then concluding that a ρ_{CM} greater than 0.995 it is achieved with σ_ϵ^2 representing less than 1% of σ_C^2.

Many studies have been conducted related to this issue. Campbell et al. (2000) highlight the increased volatility at the level of individual assets compared to the level of market volatility. This caused a decrease in the explanatory power of the market to the degree of correlation between assets. This study also notes that it has increased the number of shares required to achieve a well-diversified portfolio. Bennett and Sias (2010) highlight the current empirical difficulties of build portfolios with diversifiable risk next to zero and suggest that the reason for this anomaly would be price bubbles that arbitrators have not been able to eliminate.

Of interest in our analysis is to measure how well diversified the portion of the Chilean pension funds invested abroad is, and how it compares its idiosyncratic risk with the risk associated to portfolios of mutual funds channeling part of its investments.

METHODOLOGY AND DATA SOURCE

A common practices in countries with developed capital markets is the measurement of financial performance in companies that manage third party funds. To rank the performance of capital markets it is not sufficient to measure the rate of return. Indeed, the assessment should also consider the level of risk embodied in the investment portfolio.

On the other hand, we must keep in mind the restrictions on diversification and portfolio construction imposed by the regulatory framework. In this case, the pension fund legislation. One way to measure financial performance is to compare similar risk investment funds through indices that are indicative of the level of efficiency obtained. Along with the development of modern finance various indices have emerged. Those used in our research are: Jensen index, the index of Sharpe and Treynor, which are explained below.

Jensen Index

This index, known as "Jensen's alpha" Jensen (1968, 1969), is an absolute measure of portfolio performance based on the CAPM (Sharpe, 1964, Lintner, 1965, Mossin 1966). It emanates out of an analysis of linear regression between the excess return of a portfolio over the return of a risk free debt instrument (R_{Ct} - R_{Lt}) and the excess return of a market index over the risk free asset (R_{Mt} - R_{Lt}), in a given period of time.

The following regression equation was estimated to identify determinants of R_{Ct} - R_{Lt}:

$$R_{Ct} - R_{Lt} = \alpha_C + \beta_C \cdot (R_{Mt} - R_{Lt}) + \varepsilon_{Ct} \quad (2)$$

Where R_{Ct} represents the C portfolio return in the period (month) t. R_{Lt} represents the return of the risk free debt instrument for the period (month) t. R_{Mt} represents the return of an index associated with the average market behavior in period (month) t. ε_{Ct} represents the error in measuring the return of the C portfolio, obtained in the period (month) t when performing the linear regression. Finally α_C and β_C represent the intercept and slope of the regression respectively.

In the CAPM, β_C is interpreted as the covariance between the returns of C portfolio and market returns divided by the variance of market returns, a measure related to the risk of the C portfolio. α_C should not be significantly different from zero, provided that the C portfolio is efficient. Were α_C significantly greater than zero, it follows that the portfolio was managed so that an above than average market return was achieved. On the other hand if α_C significantly less than zero indicates that portfolio management was not efficient in the period analyzed.

Sharpe Index

This index (S_C) is constructed based on the capital market line and is calculated by dividing the expected excess return of a portfolio C over the expected value of risk-free return for a number of periods (N), by the amount of risk assumed for such return. Risk is represented by the standard deviation of the C portfolio returns (Sharpe, 1966).

$$S_C = \frac{[E(R_C - R_L)]}{\sigma_{R_C}} \quad (3)$$

This index measures relative efficiency in the administration of a portfolio C, by correcting the excess return per unit of total risk of the portfolio. This indicator is widely used to compare relative efficiencies between portfolios and to make comparisons against a representative portfolio of market behavior in a number of periods (e.g.: S_C vs. S_M). Alternatively, the risk-free return variability in time could be considered in constructing this index:

$$S_{(C-L)} = \frac{[E(R_C - R_L)]}{\sigma_{(R_C - R_L)}} \quad (4)$$

Lo (2002) develops a methodology to determine whether this index is significantly different from zero and explains that if it is not, it would mean the portfolio returns analyzed are equivalent to the risk-free asset. As a result, he developed a method used to check whether the C portfolio has an associated reward per unit of risk above the debt instrument reference yield. Assuming the excess return of the C portfolio over the risk free asset is independent and identically distributed (i.i.d.), then the standard error (SE) of the estimator of the Sharpe index is determined by:

$$SE\left(\widehat{S_{(C-L)}}\right) = \sqrt{\frac{\left[1 + S^2{}_{(C-L)}/2\right]}{N}} \quad (5)$$

Treynor Index

This performance indicator (T_C) is similar to the Sharpe ratio. The difference lies in the denominator. Treynor corrects the excess return on the C portfolio over the risk free asset by dividing by the beta portfolio

parameter, obtained from the CAPM model (Treynor, 1965). The efficiency level is then determined by comparing T_C between different portfolios.

$$T_C = \frac{[E(R_C - R_L)]}{\beta_C} \quad (6)$$

This index normalizes returns by considering only the systematic risk component of risk (β_C). Therefore it is more appropriate to use when portfolios are well diversified (eliminated idiosyncratic risk).

Source of Data and Preliminary Analysis

The data for this research was built from nominal dollar returns on a monthly basis, for each fund type, obtained from the Report of Investment and Profitability (http://www.safp.cl /portal/informes/581/w3-propertyvalue-5975.html). Data were created according to the following procedure. First, the contribution of foreign equity instruments to the monthly real return (paragraph 2.1 of the Report of Investment and Profitability) was divided by the fraction invested in foreign variable rate securities (item 4 of the Report of Investment and Profitability). The result corresponds to the monthly real return of foreign equity instruments, expressed in Chilean pesos.

Second, the monthly real return of foreign equity instruments expressed in Chilean pesos was transformed into nominal Chilean pesos by multiplying by the correction factor based on the consumer price index, lagged by one month UF index (www.bcentral.cl/estadisticas-economicas/series-indicadores/index.htm). The result corresponds to the nominal return in Chilean pesos. Third, the nominal return in Chilean pesos was transformed into dollars by dividing by the observed Exchange rate factor according to: (http://www.bcentral.cl/estadisticas-economicas/series-indicadores/index.htm).

It is noteworthy that in recent years the upper percentage limit of funds allowed to be invested abroad has expanded. This information is detailed in Appendix 2. Appendix 3 breaks down the data by geographical area. Table 1 shows the evolution of diversification, at the aggregate level, in foreign equities for different types of funds. Starting December 2009, all funds follow a gradual reduction of diversification, reaching a minimum diversification in 2011 which is the year with the lowest yield on equities for all series analyzed. From 2012 until December 2014 there were increases in diversification of equities abroad in all types of funds.

Table 1: Foreign Equity Diversification in Percentage

Month	Type A Fund	Type B Fund	Type C Fund	Type D Fund
dec-09	61.5	41.1	22.6	10.5
dec -10	57.5	37.2	19.2	8.8
dec -11	56.0	34.8	17.3	6.7
dec -12	58.4	38.1	21.8	10.4
dec -13	63.9	42.5	25.3	13.6
dec -14	64.5	43.3	26.6	14.5
Average	60.3	39.5	22.1	10.8

This table does not include type E Fund due to its low weight. Total foreign equity investment as of December 2009 amounted USD 38,270 million, as of December 2014 it amounted USD 49,795 million. Source: Superintendence of Pensions.

Table 2 shows annualized monthly returns expressed in a nominal dollar basis. Note that returns from investments in foreign equities were strongly affected by political and economic conflicts associated with Europe.

Table 2: Foreign Equity Arithmetic Average Return, Annualized, in Percentage

Year	Type A Fund	Type B Fund	Type C Fund	Type D Fund	*20 Year US Treasury bonds*
2010	22.0	26.5	24.9	21.5	3.3
2011	-16.6	-17.7	-20.1	-18.9	2.5
2012	23.9	22.2	21.9	19.2	2.9
2013	7.4	6.5	8.4	10.5	3.1
2014	1.5	2.1	-1.8	0.0	3.0
Average	6.6	6.8	5.4	5.4	3.0

Returns are nominal and expressed in percentage form. Independent of the type of fund, we verified a strong swing in returns. For comparison purposes the last column includes the average return of US Treasury bonds. Source: Superintendence of Pensions, Central Bank of Chile and Treasury.gov/resource-center USA.

Indeed, the financial crisis in the Eurozone during the years 2010-2011 negatively impacted the overall returns in equities in 2011. Funds recovered in 2012, but in late 2013 the Ukrainian conflict, compounded with the slowdown in the Chinese economy, and the slow sub-prime post crisis recovery in America have resulted in diminishing returns for the 2013-2014 period.

Equity mutual funds are the main vehicles for investment abroad used by Chilean AFP. At the aggregate level during the last five years between 65% and 80% was channeled through more than 400 mutual funds, authorized by a local Risk Rating Agency. As an additional performance analysis we include a comparison of the pension funds with samples of 10, 20 and 40 mutual funds. Appendix 4 contains a list of selected foreign mutual funds.

The sample of mutual funds used corresponds to the sample used by (Balbontín, 2014) covering the years 2007-2012. The criteria for selecting these 40 funds was basically to identify those funds that are most traded by pension funds. The selected portfolio with 10 and 20 mutual funds correspond to subsets of the previous selection; as a profitability ranking based on monthly average return obtained in the last five years, (https://www.spensiones.cl/safpstats/stats/inf_estadistica/cinvAFP/2014/09/cinv201409.html)

Table 3 includes the nominal yearly return for different selections of mutual funds, expressed dollars. For the portfolios of 10 and 20 selected mutual funds we observed, in general, a higher annual average return than that associated with pension funds. On the other hand, mutual funds also show a smaller swing in their returns.

Table 3: Foreign Mutual Funds Arithmetic Average Return, Annualized, in Percentage

Year	40 Selected MF	20 Selected MF	10 Selected MF	MSCI – ACWI	*20 Year US Treasury bonds*
2010	22.4	25.0	26.1	12.6	3.3
2011	-14.2	-9.4	-3.9	-8.0	2.5
2012	16.4	18.2	13.6	14.4	2.9
2013	2.0	8.9	16.7	20.7	3.1
2014	-4.7	4.8	8.9	2.4	3.0
Average	3.6	8.9	11.9	8.0	3.0

In addition to 40, 20 and 10 selected foreign mutual funds, this table includes the average returns of global MSCI-ACWI and 20 Year US Treasury bonds. When comparing pension funds and the selection of foreign mutual funds against the returns of the overall index (MSCI-ACWI) we conclude that only the selection of 10 mutual funds had a significantly higher performance. Source: Bloomberg and Treasury.gov/resource-center USA.

The other variable whose evolution must be carefully analyzed is volatility. Table 4 and Table 5 show the evolution of this variable, as measured by the standard deviation of returns for pension funds, selected mutual funds and the global Morgan Stanley All Country World Index (MSCI-ACWI). Increasing volatility of Chilean pension funds is confirmed when comparing these figures. A pattern of similar behavior in the

evolution of volatility in future years is highlighted. All funds analyzed reach top volatilities in 2011, except for the choice of 10 MF who managed to minimize losses in return that year, with lower volatility than the associated for 2010.

Number of Observations and Frequency Used

This research was conducted using data collected on a monthly basis, for the period 2010-2014, thus totaling sixty observations associated with the monthly returns of each of the four Pension Fund types (A, B, C and D) and three selected Mutual Funds (10 MF, 20 MF and 40 MF). Also in this analysis we include sixty figures associated with monthly returns of the MSCI global index-ACWI and US long term Treasury bonds. We used a data base consisting of 540 return percentages in total, to perform linear regressions, as detailed later.

Table 4: Pension Funds Volatility Index, Monthly Base, in Percentage

Year	Type A Fund	Type B Fund	Type C Fund	Type D Fund
2010	6.6	6.6	6.6	7.0
2011	8.1	8.2	8.3	8.5
2012	6.1	6.1	5.9	5.9
2013	3.8	3.8	3.6	3.7
2014	2.8	2.7	2.6	2.4
Average	5.7	5.8	5.8	5.9

This table shows the average volatility of pension fund as measured by the standard deviation of monthly returns. To be highlighted the high level of volatility during 2011, congruent with a period of negative returns. A downward trend in volatilities is observed from 2011 hereon, despite the significant fluctuation in returns that has occurred in recent years. Source: Authors´own calculations.

Table 5: Mutual Funds and MSCI-ACWI Volatility Index, Monthly Base, in Percentage

Year	40 Selected MF	20 Selected MF	10 Selected MF	MSCI - ACWI
2010	5.5	5.3	5.3	5.9
2011	6.5	6.0	5,7	5.3
2012	4.8	3.8	3.4	4.0
2013	3.5	3.0	2.9	2.7
2014	3.8	2.7	2.4	2.5
Average	4.9	4.3	4.1	4.2

This table shows the average volatility of 40, 20 and 10 selected foreign mutual fund and the MSCI-ACWI index, all measured by the standard deviation of monthly returns. On average, volatilities of lesser magnitude are observed when compared with those for the Chilean pension funds. Source: Authors´own calculations.

Linear Regressions

Seven linear regressions were performed for the period 2010-2014, to calculate the performance indices, as stated in equation (2). The regressions were designed based on nominal returns in dollars, four pertaining to pension funds type A, B, C, D, and three associated with foreign mutual fund portfolios (40, 20 and 10 selected mutual funds). The independent variable was represented by the excess market return over the risk free asset $(R_{Mt} - R_{Lt})$; where R_{Mt} corresponds to the monthly nominal returns based on the global equity index MSCI-ACWI, Bloomberg (code MXWD: IND) and R_{Lt} corresponding to the returns on the 20-year US Treasury bond benchmark, see: http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=longtermrateYear&year=2015
The dependent variable in each of the seven regressions was represented by the excess return of each of the portfolios analyzed over the risk-free asset $(R_{Ct} - R_{Lt})$.

Testing for heteroskedasticity and autocorrelation of the residuals were performed. No problems in the pension funds and the selection of portfolios of mutual funds analyzed were found. From each regression, an unbiased estimate for Jensen's alpha, the intercept of the fitted line and the beta of each portfolio (slope of the line) were obtained.

RESULTS

Table 6 shows the values associated with Jensen alpha parameter according to Equation 2. It follows that all portfolios of pension funds underperformed the market average. In any case yields were not significantly different from that associated with the global index MSCI-ACWI.

Table 6: Pension Funds Regression - Descriptive Statistics

	Type A Fund	Type B Fund	Type C Fund	Type D Fund
Jensen's alpha	-0.0020	-0.0018	-0.0029	-0.0030
Alpha std. dev.	0.0032	0.0034	0.0034	0.0034
Beta	1.2288***	1.2132***	1.2218***	1.2446***
Beta std. dev.	0.0750	0.0811	0.0795	0.0810
R square	0.819	0.791	0.799	0.799

****, ** and * significant at 1%, 5% and 10% respectively. Descriptive statistics of alpha and beta are for the lines associated with the regressions for each pension fund. We conclude that for all funds, it was not possible to reject the null hypothesis of Jensen's alpha equal zero, i.e. pension funds had a similar passive portfolio represented by the MSCI ACWI-rate performance. Given the higher betas than 1.0 it follows that all funds analyzed have an above average market risk. Source: Authors´own calculations.*

Table 7 with the values associated with Jensen´s alpha parameter for foreign mutual funds, shows that only the 10 selected mutual funds portfolio outperformed the MSCI-ACWI index, with a level of significance of 10%.

Table 7: 40, 20 and 10 Selected Mutual Funds Regression - Descriptive Statistics

	40 Selected MF	20 Selected MF	10 Selected MF
Jensen's alpha	-0.0037	0.0009	0.0033*
Alpha std. dev.	0.0025	0.0021	0.0018
Beta	1.0671***	0.9497***	0.9077***
Beta std. dev.	0.0587	0.0485	0.0429
R square	0.848	0.866	0.883

****, ** and * significant at 1%, 5% and 10% respectively. Descriptive statistics of alpha and beta of the lines associated with the regressions for each mutual fund. We conclude that it is not possible to reject the null hypothesis of Jensen's alpha equal zero, the exception is the selection of 10 mutual funds whose return has been higher than a passive portfolio represented by the MSCI ACWI-index with a significance level 10%. To be highlighted the high level of representativeness of the regressions associated with their respective R square. Values lower than than 1.0 beta, for the selection of 10 and 20 mutual funds, are indicative of slightly less than the average market risk. Source: Authors´own calculations.*

For both pension funds and mutual funds, it is noteworthy the high level of representativeness of the regressions associated with their respective R square. Given the lower betas than 1.0 in the case of the 10 and 20 selected mutual funds portfolios, it is concluded that these have an associated risk slightly below the market average.

From Table 8 and Table 9, the values associated with the Sharpe index, according to Equation 4 for pension funds and mutual funds analyzed; do not reveal a higher return per unit of risk as compared to the performance of the long term American Treasury bond. Positive signs exist in the Sharpe and Treynor ratios, for all pension funds and also for all selected mutual funds. Only the 10 and 20 selected mutual funds portfolios outperformed the MSCI- ACWI index.

Table 8: Pension Funds Descriptive Statistics for Sharpe and Treynor Indices

	Type A Fund	Type B Fund	Type C Fund	Type D Fund	MSCI-ACWI
E (R_C - R_L)	0.0029	0.0031	0.0020	0.0020	0.0040
Standard Deviation (R_C - R_L)	0.0574	0.0576	0.0577	0.0588	0.0423
Sharpe Index	0.051	0.053	0.034	0.034	0.094
Sharpe Index Standard Deviation	0.1292	0.1292	0.1291	0.1291	0.1294
Treynor Index	0.002	0.003	0.002	0.002	0.004

****, ** and * significant at 1%, 5% and 10% respectively. The values associated with Sharpe and Treynor indices are positive in all pension funds analyzed. Similarly, the MSCI ACWI-index is also positive but in greater magnitude. Given the level of significance in each of the cases analyzed, a per unit of risk prize significantly higher than the average yield of US Treasury bonds long term is not achieved. Source: Authors´own calculations.*

Table 9: Descriptive Statistics of Sharpe and Treynor Indices for Mutual Funds

	40 Selected MF	20 Selected MF	10 Selected MF	MSCI-ACWI
E (R_C - R_L)	0.0005	0.0047	0.0070	0.0040
Standard Deviation (R_C - R_L)	0.0490	0.0431	0.0408	0.0423
Sharpe Index	0.010	0.108	0.170	0.094
Sharpe Index Standard Deviation	0.1291	0.1295	0.1300	0.1294
Treynor Index	0.000	0.005	0.008	0.004

****, ** and * indicate significance at 1%, 5% and 10% respectively. Balues associated with Sharpe and Treynor ratios indicate that the selection of foreign mutual funds analyzed are all positive, but failed to deliver a per unit of risk return significantly higher than the average yield of the long term US Treasury bonds. The 10 and 20 selected mutual funds outperformed the MSCI ACWI Index Values. Source: Authors´own calculations.*

Systematic Analysis of Risk vs. Diversifiable Risk (Third Hypothesis under Study)

Table 10 compares the diversifiable or idiosyncratic risk associated with pension funds with those of selected mutual funds and shows that the latter can reduce an average level of approximately 50% of that achieved by the former, thus concluding that the selected mutual funds are better diversified. Nevertheless, this analysis confirms recent studies regarding the difficulty of achieving well-diversified portfolios eliminating the idiosyncratic risk.

Table 10: Breakdown of Total Risk between Systematic Risk and Idiosyncratic Risk

	Total Risk	Systematic Risk	Idiosyncratic Risk	Systematic Risk (%)	Idiosyncratic Risk (%)
Type A Fund	0.0033	0.0027	0.0006	82.2	17.8
Type B Fund	0.0033	0.0026	0.0007	79.4	20.6
Type C Fund	0.0033	0.0027	0.0007	80.3	19.7
Type D Fund	0.0035	0.0028	0.0007	80.3	19.7
40 Selected MF	0.0024	0.0020	0.0004	85.0	15.0
20 Selected MF	0.0019	0.0016	0.0002	86.8	13.2
10 Selected MF	0.0017	0.0015	0.0002	88.5	11.5

According to Equation 1, a well-diversified portfolio should have an idiosyncratic risk close to zero. The values obtained are indicative that pension funds entail a higher level of idiosyncratic risk, about 50% greater than that associated with 40, 20 and 10 selected foreign mutual funds. Source: Authors´own calculations.

CONCLUSIONS

The goal of this research is to investigate the efficiency level reached during recent years by the portion of the equity assets invested in foreign markets by Chilean Pension Funds. We also verify the hypothesis that the idiosyncratic risk is eliminated in a well diversify portfolio. Three hypotheses were formulated in the introduction of this investigation. The first and second hypotheses relate to performance evaluation of the proportion invested abroad by Chilean pension funds. The third hypothesis relates to the current level of systematic risk in these funds, when compared with the risk associated with samples of foreign mutual

funds. These mutual funds are the main AFP vehicles for investing abroad. The evaluation took place in a market environment characterized by low returns and high volatility.

To test these hypotheses we conducted various statistical analysis considering a collection of sixty monthly observations, for the period 2010-2014, namely the real monthly return for the four types of Pension Funds (A, B, C and D), the three selected Mutual Funds return (10 MF, 20 MF and 40 MF), the monthly return of the MSCI global index-ACWI and the US long term Treasury bonds return. The data is composed of 540 percentage returns in total.

The first hypothesis referred to performance evaluation. We conduct a linear regression between the excess return of a portfolio over the return of a risk free debt instrument and the excess return of a market index over the risk free asset. It was not possible to reject the first hypothesis. It was confirmed that pension funds returns behave similarly to the overall index MSCI ACWI. This was validated through absolute rates (Jensen's alpha) that were not significantly different from zero for all pension funds.

We used the Sharpe and Treynor indices as methodological tools to test the second hypothesis. This hypothesis must be confirmed, since booth indices were positive for all types of funds. The standard deviation associated with the Sharpe ratio were in all cases indicative of a, per unit of risk prize, no greater to the performance of US Treasury bonds. It proved to be more appropriate to apply the Sharpe ratio, standardized by dividing the return of each fund by the total portfolio risk. For all funds analyzed, only if the idiosyncratic risk would have been close to zero, the Treynor index would have gained prominence.

The third hypothesis is rejected, since the level of idiosyncratic risk associated with pension fund foreign investments as stated in Equation 1, has been achieved with a risk level much higher (in fact 50% higher) than associated with selected foreign mutual funds. Additionally, none of the analized portfolios achieves an idiosyncratic risk close to zero. One might suggest this conclusion is related to restrictions imposed by the Chilean pension legislation, thus confirming the empirical evidence in relation to current difficulties concerning elimination of unsystematic risk through diversification.

In the future, if there is availability of overseas returns for each of the six AFP, we recommended performing this type of analysis for the six administrators in the pension fund industry in Chile. The present investigation was carried out in a period of abnormal returns characterized by high volatility. Future research, might rethink this study and perform the comparative analysis once returns stabilize in global capital markets, for foreign equity instruments and all categories of instruments, domestic and foreign.

ANNEXES

Appendix 1: Pension Funds Real Yearly Return, Geometric Mean Calculation, Based in Chilean Pesos (Figures in Percentage)

Year	Type A Fund	Type B Fund	Type C Fund	Type D Fund
2010	11.64	11.38	9.34	7.08
2011	-11.13	-7.52	-3.79	0.06
2012	6.06	4.88	4.61	3.81
2013	6.79	4.33	4.68	5.42
2014	8.86	8.27	9.00	7.68
Average	4.11	4.06	4.66	4.77

This table shows the negative impact of 2011 on the average return of the 2010-2014 years, considering reinvestment pertaining to geometric calculations. The Type D Fund, with its smaller proportion invested in equity, achieved the highest return in the period. Source: Authors´own calculations, based on data provided by Superintendence of Pensions.

Appendix 2: Evolution of Maximum Foreign Investment Allowed, as a Percentage of the Total Value of Each Fund

Fund Type	dic-09	dic-10	dic-11	dic-12	dic-13	dic-14
Type A	75	80	100	100	100	100
Type B	60	70	90	90	90	90
Type C	50	60	75	75	75	75
Type D	30	30	45	45	45	45
Type E	20	25	35	35	35	35

Global Maximum: Fixed Income plus Equities. Percentage figures. Source: Superintendence of Pensions.
Available in p. 39 Cuadro A a.2 Website: http://www.spensiones.cl/portal/regulacion/582/articles-10257_recurso_1

Appendix 3: Diversification of Equity Foreign Investment, by Geographical Area, in Percent

Zone	Month	Type A fund	Type B fund	Type C fund	Type D fund
North America	dic-09	20.4	23.7	25.1	29.6
	dic-14	38.8	36.0	33.9	35.1
Europe	dic-09	9.3	8.6	11.7	14.5
	dic-14	10.8	10.5	12.6	15.8
Asia Pacífic	dic-09	10.7	9.8	8.5	5.7
	dic-14	16.8	17.0	15.9	13.9
Emerging Asia	dic-09	24.3	23.1	21.7	16.3
	dic-14	19.7	21.3	19.4	12.2
Latin America	dic-09	22.5	22.6	19.6	20.3
	dic-14	7.7	8.1	8.3	11.7
Emerging Europe	dic-09	7.4	6.8	7.6	6.9
	dic-14	1.8	1.7	3.0	3.7
Others	dic-09	5.4	5.4	5.8	6.7
	dic-14	4.4	5.4	6.9	7.6

Asia Pacific include: Australia, Japan, Hong Kong and Singapore. Emerging Asia includes China, Korea, India, Indonesia, Malaysia, Thailand and Taiwan. Latin America including Brazil and Mexico. Emerging Europe includes Hungary, Poland, Russia and Turkey.
Figures in percentage. Source: Superintendence of Pensions, available in http://www.safp.cl/portal/informes/581/articles-10662_recurso_1.pdf

Appendix 4: Selected Foreign Mutual Funds and their Respective Bloomberg Codes (1): 10 Selected Foreign Mutual Funds; (2): 20 Selected Foreign Mutual Funds

Foreign Mutual Fund Name	Bloomberg Code
Aberdeen Global - Asia Pacific Equity Fund - A2 (2)	ABEAPIA:LX
Baring International Umbrella Asia Growth Fund (2)	BRGOCPI:ID
BlackRock Global Funds - Latin America Fund	MERLTAI:LX
BNP Paribas Equity Russia	FORERIC:LX
BNY Mellon Investments Funds - Newton Oriental Fund - Institutional GBP (2)	NEORINA:LN
Capital International Emerging Markets Fund	CAPAUSD:LX
Deka Convergenceaktien	DED2:GR
Dfa Emerging Markets Small Cap Portfolio (2)	DEMSX :US
Dfa Emerging Markets Portfolio Institutional	DFEMX:US
Dfa Emerging Markets Value Portfolio	DFEVX:US
Dfa Investment Dimension Group Inc. US. Large Cap Value Portfolio (1)	DFLVX:US
Dfa Investment Dimension Group Inc. US. Small Cap Value Portfolio (1)	DFSVX:US
Dfa Investment Dimension Group Inc. US. Targeted Value Portfolio (1)	DFFVX:US
Dws Invest - Dws Invest Chinese Equities	DWSCEFC:LX
Dws Osteuropa	DWSPSEU:LX
Fidelity Funds - Asean Fund (1)	FIDLAEI:LX
Fidelity Funds - Asian Special Situations Fund - A$ (2)	FIDASSI:LX
Fidelity Funds - China Focus Fund (2)	FIDFDFO:LX
Fidelity Funds - Indonesia Fund (1)	FIDINDI:LX
Fidelity Funds - Korea Fund – A	FIDFKLI:LX
Fidelity Funds - Latin America Fund – A	FIDLLAI:LX
Fidelity Funds - South East Asia Fund (2)	FIDLSEI:LX
Franklin Templeton Investment Funds Templeton China Fund	TEMCHIA:LX
Franklin Templeton Investment Funds Templeton Asian Growth Fund – A (2)	TEMFAIA:LX
Franklin Templeton Investment Funds-Templeton Latin America Fund – A	TEMLAIA:LX
Henderson Gartmore Fund - Latin America Fund - REUR ACC	GALATDD:LX
Investec Global Strategy Fund Asian Equity Fund (1)	GUIASIA:LX
JP Morgan Funds - Russia Fund	JPMRUSI:LX
Mellon GLO F PLC-M Asian Equity Portfolio (2)	NEWANNA:LN
Morgan Stanley Investment Funds - Asian Property Fund (2)	MOPLU:LX
Parvest Equity Latin America	PARLAIN:LX
Parvest Equity Brazil	PARBRIC:LX
Pioneer Funds - Global High Yield - A Non – Distributing (1)	PIGHYLI:LX
Pioneer Funds Emerging Markets Equity A$ distributing	PIOEMAD:LX
Robeco Capital Growth - Emerging Markets Equities - I	ROEMMKE:LX
Schroder Int Sel F-Pacific Equity (1)	SCHPFCA:LX
Schroder International Selection Fund - BRIC – A	SCHBRAC:LX
Schroder International Selection Fund - Latin American - A1	SCHLACA:LX
The Growth Fund Of America (1)	AGRBX:US
Vanguard Institutional Index Fund – Institutional (1)	VINIX:US

Chilean Pension Funds can not hold more than 5% of a certain Foreign Mutual Fund. Source: Bloomberg and Superintendence of Pensions.

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BANK ACQUISITIONS AND LOAN OFFICER AUTHORITY: EVIDENCE FROM FRENCH BANKS

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ABSTRACT

The purpose of this article is to study how the delegation of decision-making rights towards Small and medium-sized enterprises loan officers evolves as a result of bank mergers and acquisitions. Using the framework of organizational architecture theory as our starting point, we examine here one of its three components: the decentralization of decision-making rights. Our survey of Small and medium-sized enterprises loan officers in two recently acquired French banks shows that these officers are often allowed to use their initiative. However, bank consolidation operations do not increase the decentralization of authorization rights. We even observe in such circumstances an increase in hierarchical control. Ultimately, we cannot conclude that in consolidated banks small and medium-sized enterprises loan officers enjoy greater autonomy.

JEL: G21, G34

KEYWORDS: Bank Mergers and Acquisitions, Decentralization of Decision-Making Rights, Theory of Organizational Architecture, *Soft* Information, Bank-SME Relations

INTRODUCTION

The literature highlights different effects on the volume of loans granted (Berger et *al.*, 1998; 1999) and on the nature of relationships between banks and *small and medium-sized enterprises* (SMEs) arising from the organizational characteristics of banks investigated (Stein, 2002; Cole et *al.*, 2004; Berger et *al.*, 2005a et 2005b; Mian, 2006). Previous work has made it clear that small business lending needs to be relationship lending. This facilitates the collection of soft information that is required for efficient decision making (Berger and Udell, 2002) and reduces the problem of informational opacity which is a feature of this kind of firm. Prior studies have also shown that small banks with flexible structures, are well adapted to collecting soft information and have an advantage in this compared with large, organisationally complex banks (Stein, 2002). There is then a significant link between the organisational characteristics of a bank and the way it finances SMEs (Berger et *al.*, 2005b; De Haas et *al.*, 2010; Beck et *al.*, 2011; Ongena and Sendinez-Yüncü, 2011). Several studies, the majority of which were carried out in the United States (Carter et *al.*, 2004; Cole et *al.*, 2004; Berger et *al.*, 2005b) but also in Europe (Degryse et *al.*, 2011) and in Japan (Ogura & Uchida, 2008), have analyzed the effects of bank reorganization, following a merger or acquisition, on the conditions for granting loans to SMEs. The results of these previous studies vary greatly depending on the type of acquisition, the size of the organizations concerned, the organizational complexity of the consolidated banks, the size of the sample studied and the econometric tool chosen. These studies show negative, positive or insignificant results. However, most of this work offers no convincing explanations and concentrates exclusively on the volume of loans granted by the consolidated banks.

Berger and Udell (2002; 2006) consider that the decision to grant loans to SMEs results from the interaction between several actors at different hierarchical levels. Any change in the organizational structure of the bank is liable to affect the nature of the bank-SME relationship. In this sense, banking acquisitions, by

causing organizational changes, can have a significant impact on the volume of SME lending and condition the nature of the relationship. A study of these consequences must necessarily be based on an analysis of the organizational mechanisms that regulate small business lending decisions. Despite the large amount of research dealing with the primordial role of relationship lending for opaque SMEs as opposed to standard financing, very little of it looks at the bank-SME relationship from an organizational point of view.

Unlike previous research, our work analyses changes in the organizational mechanisms that regulate lending decisions. When banks join together, they undergo important organizational changes. These transform not only bank-borrower relationships, but also the relationships between the different actors in the decision making process. An intra-organizational analysis can help to find an answer to the question of the impact of changes in the bank's organization on small business lending. The lending decision is analyzed in this article as a decisional choice on the part of the acquired bank. In our analysis, we take into account human and organizational aspects. We pay particular attention to agency theory, which attempts to explain decisional choice through the behavior of individuals and their ability to produce and exchange the information necessary to make good decisions.

Our organizational approach highlights the role of the mechanisms that make up the organizational architecture as determining small business lending policy. In this context, the theory of organizational architecture, which explains the decisional choice of organizations, provides a theoretical framework that clarifies our research question (Jensen and Meckling, 1992). Indeed, the organizational mechanisms that regulate lending decisions, in other words the attribution of decision-making rights and control systems (evaluation and incentive mechanisms), are liable to evolve in a situation of bank consolidation. This evolution can have consequences on SME lending processes. The objective of our article is to explain how one of the key components of organizational architecture evolves in the context of bank acquisitions: the distribution of decision-making rights. Our analysis will concentrate in particular on this component of organisational architecture that frames the decision-making process at junior level, especially loan officers. These staff members are in direct contact with SME clients and only they have the soft information necessary for good decision-making. They are also best placed to observe organisational changes that affect SME lending processes. Our survey of loan officers in two French banks soon after these had been taken over shows that the right to use their initiative is often granted at this hierarchical level, but that these operations have no significant effect on the decentralization of authorizing rights. The level of control we observed does not allow us to conclude that the autonomy of SME loan officers increases in acquired banks. The second section of this article presents our theoretical framework and the hypotheses developed for this research. The third section describes our research design, including our empirical methods and the measurement of our variables. We analyze the findings of our field study in the fourth section, before concluding in the final section.

LITERATURE REVIEW

The decision to grant a loan to an SME is ruled by a complex organizational process. To analyze the consequences of bank acquisitions on this process it is necessary to examine how the organizational mechanisms that regulate this decision evolve. Our approach is to highlight the roles of the different components of the decision-making process, within the overall framework of agency theory.

Theory of Organizational Architecture

An analysis of the decision-making process cannot be dissociated from the organizational framework. The theory of organizational architecture, by underlining the crucial role of specific knowledge within an organization, makes it possible to analyze decision making on the basis of the capacity individuals have to produce and exchange the necessary information (Jensen and Meckling, 1992). Noda and Bower (1996) describe this process within the organization in which different hierarchical levels can come into conflict

and where control of the decision depends on the effectiveness of the organizational architecture. This architecture includes the sharing of decision-making rights within the organization, together with a system of incentives and control. Organizational efficiency depends therefore on the coherence and complementarity of these features. As one of the keys to organizational performance lies in the capacity of a firm to collocate decision-making rights and specific knowledge, this co-location raises the issue of the centralization or decentralization of decision-making rights. Whilst for Jensen and Meckling (1992) and for Christie et *al.* (2003), this choice is a result of an arbitrage between the costs and benefits that each of these options would imply, Berger and Udell (2002) suggest that the organization should be adapted to the funding of opaque firms. Banks should thus adopt a decentralized organizational structure that gives maximum autonomy to those in possession of specific knowledge (Stein, 2002).

Hypotheses

In the theory of organizational architecture, organizational efficiency is generated by co-locating decision-making rights and specific knowledge, as long as the advantages of such an organization exceed the total costs of control and of information transfer. Nagar (2002), Christie et *al.*, (2003) and Demers et *al.*, (2004), demonstrate nonetheless that increasing the degree of specific information held by lower hierarchical levels increased the cost of information transfer and thus affects the choice to delegate decision-making rights. Shen et *al*. (2009) find that in their sample of Chinese banks there is a positive link between the use of soft information, the amount of SME lending and the decentralization of decision-making rights in favor of loan officers. The research carried out by Benvenuti et *al*. (2010) on a sample of Italian banks also confirms a positive link between an increase in loan officers' authority and SME lending. Overall, decentralization results in increased motivation and effort on the part of loan officers and this leads to greater use of soft information. Bank acquisitions engender changes in size, organizational complexity and diversification strategy, and these changes can in turn lead to an increase in the cost of transferring the specific information held by SME loan officers. Since organizational efficiency in the newly-consolidated bank requires a reduction in the cost of transferring specific knowledge, the acquisition must be accompanied by the co-location of decision-making rights and of specific knowledge (Berger and Udell, 2002). This leads us to propose a first hypothesis

Hypothesis 1: The nature of the information held by SME loan officers has a positive effect on the decentralization of decision-making rights.

The reasons behind bank mergers and acquisitions should have some effects on the allocation of decision-making rights. The reasons studied here are of three types: to counteract an uncertain business environment, to obtain critical mass, and to develop new activities and locations. According to Jensen and Meckling (1992), the allocation of decision-making rights varies along with changes in the firm's internal and external environment. Such changes result in the decentralization of decision-making rights towards hierarchical levels that hold specific information (Noda and Bower, 1996; Brickley et *al*., 1997). Nagar's research (2002) on American retail banks shows that environmental instability has a positive effect on the decentralization of decision-making rights towards branch managers. Demers et *al*. (2004) obtain the same result in the e-commerce sector. Canales and Nanda (2012), using a sample of Mexican SME loans, found that branch managers in decentralized banks are more sensitive to the local environment than branch managers in centralized banks. They give more attractive terms to firms in competitive banking markets, but are more likely to cherry-pick firms and restrict credit in areas where they have market power. Thus, the extent to which decentralized banks alleviate credit constraints depends critically on the competitive environment for banks. Finally, according to Berger and Udell (2002), the granting of loans to SMEs is strongly influenced by the bank's external environment. These contributions lead us to propose a second hypothesis:

Hypothesis 2: The degree of uncertainty in the consolidated bank's external environment has a positive effect on the decentralization of decision-making rights.

The number of products or services offered by a firm and the geographical size of its market define its diversification strategy. According to Brickley et *al*. (1997), the firm's geographical diversification and differentiation strategy have a positive effect on the decentralization of decision-making results. Christie et *al*. (2003) demonstrate that the diversification strategy of large firms has a positive effect on the decentralization of decision-making rights towards Middle management levels. Nagar (2002) finds the same result for the banking sector. The diversification strategy is also one of the reasons behind bank mergers and acquisitions. Indeed, according to Akhavein et *al*. (1997), the majority of the growth in profitability of consolidated banks does not derive from market power or from attaining critical mass but rather from diversifying the portfolio of activities. However, in consolidated banks, specific information concerning SMEs is in the possession of the intermediate, operational levels, which implies that decision-making rights have to be delegated to these levels. We therefore hypothesize as follows:

Hypothesis 3: the level of diversification of the consolidated bank's portfolio of activities has a positive effect on the decentralization of decision-making rights.

Geographical diversification makes it possible to respond better to the regulatory requirements in terms of risk. However, it increases the distance separating senior management from lower levels of staff. As it is less costly to control loan officers in large urban areas than in rural areas, and easier to post the former to different hierarchical levels, there is a greater degree of decentralization of decision-making rights towards loan officers in rural or small urban areas (Brickley et *al*., 1997). It is moreover more costly to transfer knowledge towards higher hierarchical levels, which implies that loan officers in rural areas will specialize less in particular tasks, and which will consequently result in greater decentralization of decision-making rights. All of this leads us to propose two hypotheses

Hypothesis 4: (a) The geographic distance that separates loan officers from their hierarchical decision centers and (b) their geographical location have positive effects on the decentralization of decision-making rights.

According to Jensen and Meckling (1992), the cost of knowledge transfer increases with the size of the firm. Agency costs are higher in a large firm where specific knowledge is widely spread. Brickley et *al*. (1997) add that the level of decentralization increases with the size of the organization. According to Milgrom and Roberts (1992), the principal problem that accompanies the growth of an organization's size is the weakening of its decision-making process and in particular the coordination between agents. The growth of an organization is often accompanied by a growth in the number and/or size of its operational units that affects the quantity of information transferred from these operational units to higher levels. Demers et *al*. (2004) also show that the size of a division affects the degree of delegation. With a growth in managerial responsibilities, senior managers thus tend to delegate more.

Given this context, Berger et *al*. (1999) highlight the fact that diseconomies of scale resulting from a bank's involvement in two different credit activities prevents large establishments from managing relational and standard financing efficiently in parallel. According to Stein (2002), decentralized organizations are better able to deal with *soft* information, whereas centralized organizations have more capacity to deal with *hard* information. Liberti (2003) analyzes the effect of a change in hierarchical structure on the motivation of loan officers in a large international bank in Argentina and compares the decentralization of decision-making rights with more traditional, centralized control. He finds that hierarchical change gives more autonomy to subordinates who use *soft* information more efficiently. According to Liberti and Mian (2009), bank organizational complexity, measured by the hierarchical distance, is an obstacle to the processing of soft information. Cotugno et *al*. (2013) examine firms' credit availability during the recent financial crisis

using a dataset of 5331 bank-firm relationships provided by the borrowers' credit folders of three Italian banks. The results of this study confirm that an increase in hierarchical distance, which is used as a proxy to measure the organizational complexity of banks, negatively influences credit availability more than an increase in organizational distance. Indeed, a financial crisis can impact the loan assessment behavior of loan officers (Nilsson and Öhman, 2012). Takats (2004) also shows that the problem of internal information asymmetry can be solved if the bank adopts a decentralized organization and reinforces control. On the other hand, a centralized structure proves to be more profitable but disadvantageous for financing opaque SMEs. Efficient, profitable SME credit activities depend then on the degree to which authority is delegated to SME loan officers. These different contributions lead us to propose the following two hypotheses:

Hypothesis 5a: The size and organizational complexity of consolidated banks have a positive effect on the decentralization of decision-making rights.

Hypothesis 5b: The growth in size and organizational complexity of acquired banks has a positive effect on the decentralization of decision-making rights.

According to Stein (2002), Degryse and Ongena (2007), the link between a bank's organizational form and the nature of bank-firm relations can be applied to operational units within a single bank. The organizational complexity of the operational units of a bank, as well as their evolution after acquisition, can have implications on the degree of motivation loan officers have to collect process and transfer *soft* information. To maintain a policy of offering credit to SMEs, a consolidated bank must therefore delegate more decision-making rights to SME loan officers in operational units. In view of these contributions, we propose four hypotheses:

Hypothesis 6a: The degree of organizational complexity of operational units has a positive effect on the decentralization of decision-making rights.

Hypothesis 6b: The growth of size and organizational complexity of operational units after a merger has a positive effect on the decentralization of decision-making rights.

Hypothesis 7a: The size of operational units has a positive effect on the decentralization of decision-making rights.

Hypothesis 7b: The growth of size of operational units after a merger has a positive effect on the decentralization of decision-making rights.

Decentralization can lead to agency problems. Jensen and Meckling (1992) recommend the implementation of a system of control, including incentives and appraisal mechanisms. According to Brickley et *al*. (1997), efficient organizational architecture is the result of the firm's ability on one hand to implement a system to transfer knowledge from operational to higher levels and, on the other hand, mechanisms encouraging agents to pass on the information that is required for efficient decision-making. As organizational efficiency looks to minimize knowledge transfer and delegation costs, in particular control costs, the features of the performance measures, together with their degree of precision, determine the cost of decentralization (Moers, 2006). The characteristics of performance measures and in particular their degree of precision, affect the choice of the incentive measures that represent delegation costs. We pose the following hypothesis**:**

Hypothesis 8: The degree of precision of loan officer appraisal systems in consolidated banks has a positive effect on the decentralization of decision-making rights.

According to agency theory, incentives systems for lower hierarchical levels represent a delegation cost for a firm. This cost is linked to the implementation of incentive measures refereed by the higher hierarchical level responsible for delegation. The accounting literature describes the importance of the link between remuneration and delegation (Melmud and Reichelsetin, 1987; Melmud et *al*., 1992; Milgrom et Roberts 1992; Baiman et Rajan, 1995; Bushman et *al*. 2000). In line with Nagar's work (2002) and that of Demers et *al*. (2004), high levels of incentive bonuses result in lower levels of delegation. These elements enable us to formulate the following hypothesis:

Hypothesis 9: The use of a system of incentive payments for loan officers in consolidated banks has a negative effect on the decentralization of decision-making rights.

DATA AND METHODOLOGY

Sample

Our quantitative study concerns a sample of loan officers working in two recently acquired French banks that grant loans to SMEs. The names of the banks studied cannot be disclosed. We then used aliases. The takeovers of the Bank Alpha by Bank Bravo and of Bank Charlie by Bank Delta fulfill these conditions. This choice enables us to avoid the bias resulting from differences at the level of economic, regulatory and technological circumstances. It also gives us easier access to the data and avoids any risk of cultural bias that can appear in transnational operations. We only analyze the consequences of these acquisitions for the target banks. Since the two operations we studied were of different scales, we are able to compare their consequences empirically by taking into account the effect of the size and organizational complexity of the banks under study. Our analysis of how the decentralization of decision-making rights evolves is in line with the procedure used in previous studies (Catelin, 2001; Nagar, 2002; Demers et *al*., 2004; Moers, 2006). The aim of this is not to test our theoretical model on several acquired banks but on several individuals who have the same position in acquired banks. According to Chenhall (2003) and Demers et al. (2004), an analysis of a single post or activity is enough to apprehend the complementarity of the components of the organization's architecture. According to Ittner and Larker (2001), an analysis of the components of the organizational architecture in a single sector of activity presents several advantages. Respondents are likely to interpret the survey questions similarly, thus increasing the validity of comparing the replies. These firms also face the same external environment, which reduces a number of possible biases. We administered our questionnaire internally or by email to all of the loan officers representing the different units between October 2006 and February 2007. Out of 200 questionnaires (140 at Bank Alpha and 60 at Bank Charlie), 61 were usable (33 from the Bank Alpha and 28 from the Bank Charlie).

Variable Computation and Description

The measures used for our variables come from research analyzing the components of organizational architecture and that dealing with the consequences of mergers and acquisitions on SME-bank relationships, but they also include indicators encountered at the pretesting stage. The majority of the variables in our model are represented by at least one question and measured on a 5-point Likert scale. In order to structure the information obtained on these different scales, we carried out a series of principal component analyses (PCA). The factors emerging from the PCA represent the measures of our variables. Each of the five dimensions of the dependent variable, the decentralization of decision-making rights, is examined by a different question and measured on a 5-point Likert scale. In all, this dependent variable is measured by nine factors extracted from the PCA (see Table 1).

Table 1: Dependent Variable Definitions

Variables	Factor Type	Extracted Factors	Variable Name	% σ	α
Degree of autonomy granted to the loan officer	Metric : 2 factors extracted from PCA	In terms of the sum or the number of loans	NBR_AUTO	47.881	0.8272
		In terms of fees charged	FIN_AUTO	16.302	0.5616
Vertical decentralization of right to use initiative granted to the loan officer	Metric : 1 factor extracted from PCA	Vertical decentralization of right to use initiative granted to the loan officer	INITIATI	57.160	0.8072
Vertical decentralization of approval rights	Metric : 2 factors extracted from PCA	In terms of characteristics of the loan	APPR_CARACT	60.807	0.8634
		In terms of cost of the loan	APPRRAT_COST	18.421	0.8079
Vertical decentralization of control rights to the immediate superiors of loan officers	Metric : 2 factors extracted from PCA	In terms of leadership and advice	SUP_ANIM	51.040	0.8022
		In terms of control	SUP_CONT	33.568	_
Horizontal decentralization of control rights	Metric : 2 factors extracted from PCA	Extent of team work: cooperation and communication	TEAM_COM	61.830	0.9092
		Extent of team work: frequency of meetings	TEAM_MEET	18.343	0.7160

This table shows the various dependent variables. The σ measures the percentage of variance dependent while α is Cronbach's alpha, which reflects the level of internal validity of factors. For this factor we used the criteria of Nunnally (1967), which emphasizes that α is acceptable when it is greater than 0.6 for a confirmatory study and more favorable when it is greater than 0.8 for exploratory study.

The items used to measure the right to use initiative and the vertical decentralization of control rights are inspired by Catelin's (2001) study. Those related to horizontal decentralization are measured by the frequency of meetings and the nature of cooperation and communication between the members of a single team. These items make it possible to measure the level of mutual control within a single operational unit (Demers et *al.*, 2004). Finally, the items used to capture authorization rights and the degree of autonomy enjoyed by loan officers were developed from Zardkoohi and Kolari's (2001) study and from various suggestions made by loan officers during the pretest. The independent variables used in our model are divided into two groups. The first consists of variables measured on a 5-point Likert scale. As for the questions measuring our independent variable, we carried out a series of principal component analyses (PCA) in order to structure this information. The factors emerging from these PCA represent the measures of this first group of dependent variables (see table 2).

Table 2: Independent Variable Definitions and PCA Results

Variables	Factor Type	Extracted Factors	Variable Name	% σ	α
The nature of the information held by SME loan officer	Metric : 2 factors extracted from PCA	Specific information (soft)	CRITVA1	64.353	0.9592
		Standard information (hard)	CRITVA2	8.159	0.6811
Loan officers' assessment system	Metric : 2 factors extracted from PCA	Multidimensional performance measures	MESPERF1	63.554	0.9456
		Financial performance measures	MESPERF2	12.130	0.8298
Incentives system	Metric : 2 factors extracted from PCA	Plans and other awards and bonuses	INCITSY1	57.699	0.9146
		Incentive schemes and profit-sharing agreements	INCITSY2	19.358	0.8022
Environmental instability	Metric : 1 factors extracted from PCA	Environmental instability	ENTINSTA	50.856	0.6708
The activity diversification strategy	Metric : 2 factors extracted from PCA	The number of services and tasks managed	DIV_SER	51.179	0.7480
		The number of clients managed	DIV_CLT	23.082	0.7407

This table shows the first group of independent variables. Each variable is measured by factors extracted from PCA made from items used in the different questions of our survey. The σ measures the percentage of variance dependent while α is Cronbach's alpha, which reflects the level of internal validity of factors. For this factor we used the criteria of Nunnally (1967), which emphasizes that α is acceptable when it is greater than 0.6 for a confirmatory study and more favorable when it is greater than 0.8 for exploratory study.

In their relations with SMEs, banks use two types of information: *soft* and *hard* information (Petersen, 2004). The items used to capture these two types of information were inspired by the work of Zradkoohi and Kolari (2001), Liberti (2003) and Scott (2006) and completed at the time of the survey. The PCAs we carried out give us two extracted factors: specific assessment criteria and standard assessment criteria. On the basis of various former studies (Catelin, 2001; Hoque, 2004 and 2005; Moers, 2006), we captured the degree of environmental uncertainty using four items: instability of the competitive environment (supply), changes in demand, the technological environment and the regulatory and legislative environment. Concerning the activity diversification strategy, the PCAs we carried out gave us two distinct factors. The first of these measures the number of services and tasks managed, whilst the second measures the number of clients managed. The geographical diversification strategy is measured by the number of new units set up. The items used to measure incentives schemes use the work carried out by Catelin (2001) and Chatelin (2001) and are divided into two categories, financial and non-financial incentives mechanisms. The PCAs we carried out on these items enabled us to extract two factors (Table 3). SME loan officer assessment systems include three categories of measures: formal (financial criteria), informal (non-financial measures) and mixed (multidimensional) measures. Each category can be linked to an individual, collective or divisional appraisal system. The PCAs we carried out on these items gave us three extracted factors, multidimensional mechanisms and appraisal mechanisms consisting entirely of financial measures. The second group of independent variables in our model do not refer to items. Some of these variables are latent and are measured by 5-point Likert scales (change of size and organizational complexity of the branch, change of size of the acquired bank, distance between the loan officer and his/her hierarchical decision center). Others are dichotomous variables, such as the size and organizational complexity of the acquired bank or the geographic location of the branch. Finally, some of the variables are quantitative, such as the size and organizational complexity of the branch. Table 3 summarizes the definitions of these independent variables.

Table 3: Independent Variable Definitions

Variables	Factor Type	Extracted Factors	Variable Name
Changing the size of the branch	Nonmetric : A five-point Likert scale	The number of people employed : 1= significantly reduced; 2= reduced; 3 = unchanged; 4 = increased;5 = significantly increased	CHSIZE
Changing the organizational complexity of the branch	Nonmetric : A five-point Likert scale	The number of hierarchical levels: 1= significantly reduced; 2= reduced; 3 = unchanged; 4 = increased;5 = significantly increased	CHCOMPLE
Geographical location of the branch	Nonmetric : dichotomous variable	0 = located in a rural area 1 = located in a urban area	GEOIMPL
Geographical distance between the loan officers and immediate superiors	Nonmetric : categorical dependent variable	= 0 in the same branch; 1 = less than 10 min; 2 = less than 30 minutes; 3 = less than 60 min; 4 = less than 120 min; 5 = more than 120 min	DISTANCE
Changing the size of the acquired bank	Nonmetric : A five-point Likert scale	The number of new branches has increased : 1 = hardly or not at all; 2 = slightly; 3 = averagely; 4 = highly; 5= very highly	DIVGEOGR
Branch's organizational complexity	Metric : quantitative variable	The organizational complexity of operational units (measured by the number of hierarchical levels	COMPLEXI
The size of the operational unit in consolidated banks	Metric : quantitative variable	The size of the operational unit (measured by the number of employees)	BRCHSIZE
Acquired bank's size and organizational complexity	Nonmetric : dichotomous variable	0 = Bank Charlie : Small size ; 1 = Bank Alpha : large size	BANK

This table shows the second group of independent variables.

Model Specifications

Because of the structure of the questionnaire and the nature of the dependent variables we carried out a variance analysis, and more precisely one of its principal extensions, the MANCOVA (*multiple analyses of covariance*). In cases where there are several qualitative dependent variables, two variance analysis models are possible, depending on whether the dependent variables are independent (*additive model*) or linked (*model with interaction*). We opted for an additive model in order to avoid the problems caused by

interactions between qualitative variables. Indeed, our equation includes six qualitative variables, which increases the number of dependent variables (principal effects plus interaction effects) and raises the problem of degree of liberty. Furthermore, the model we are testing contains several quantitative dependent variables. In this case we apply the multivariate analysis of variance model (MANOVA). In this analysis, the dependent variables are quantitative. They must fulfill statistical conditions that are generalizations of the univriate case. Moreover, our econometric model contains both qualitative and quantitative dependent variables. Here we adopt multivariate analyses of covariance (MANCOVA) which are a generalization of the multivariate analysis of variance. The purpose of this is to study the relationships between several quantitative dependent variables and a series of dependent variables made up of qualitative and quantitative variables. The following model of the multivariate analysis of covariance (MANCOVA) was estimated:

$$Decentralization_i = \beta_0 + \beta_1 CHTAILLE_i + \beta_2 CHCOMPLE_i + \beta_3 IMPLGEO_i + \beta_4 DISTANCE_i + \beta_5 DIVGEOGR_i + \beta_6 BANQUE_i + \beta_7 CRITVA1_i + \beta_8 CRITVA2_i + \beta_9 MESPERF1i + \beta_{10} MESPERF2_i + \beta_{11} SYINCIT1_i + \beta_{12} SYINCIT2_i + \beta_{13} TAILLE_i + \beta_{14} COMPLEXI_i + \beta_{15} INCERTI_i + \beta_{16} DIV\_SER_i + \beta_{17} DIV\_CLTi + \varepsilon_i$$

The dependent variable "decentralization" is measured by nine factors extracted from the PCA (see Table 1). Therefore, we tested this equation for the nine factors that measure our independent variable.

RESULTS AND DISCUSSION

We interpret here the results of the MANCOVA analysis for each of the dependent variables, except for the degree of autonomy granted to the loan officer. The acquisitions studied do not have a significant effect on the degree of autonomy enjoyed by SME loan officers, either in terms of the sum or the number of loans or the fees charged. Tables 4 and 5 summarize the results of the multivariate analysis of variance.

Our results do not support hypothesis H7a: the size of the operational unit in consolidated banks has a negative effect on the decentralization of decision-making rights. In other words, the larger the size of the branch, the more the right to take initiative is centralized. However, when a change of size in operational unit, takes the form of a significant reduction in the number of people affected, this does have a positive effect on the decentralization of initiative rights. We observe that the lower the number of staff working in a branch, the greater the decentralization of initiative rights. The organizational complexity of operational units, measured by the number of hierarchical levels, has a negative effect on the decentralization of initiative rights. Our hypothesis H6a is thus not validated. The larger the number of hierarchical levels, the lower the degree of delegation of initiative rights towards SME loans officers. An increase – even slight – in organizational complexity has a negative effect on the decentralization of initiative rights, and the greater the degree of organizational complexity the lower the degree of decentralization of initiative rights.

We also observe that the greater the number of hierarchical levels in a branch, the more the nature of loans managed and the type of clientele targeted by SME loan officers are decided in teams or at higher hierarchical levels. The non-validation of hypotheses H6 and H7 shows that agency costs and transfer costs for specific information in operational units do not justify the centralization that is supposed to minimize these costs. The reasoning of Degryse and Ongena (2007) and Stein's (2002) model do not appear to be confirmed here for operational units. The geographical distance between a loan officer and his/her hierarchical superior has a positive effect on the delegation of initiative rights. This finding is particularly significant for distance of less than 10 minutes and for loan officers working at the same location as their superior. This result refutes our hypothesis H4a by which the greater the geographical distance between two hierarchical levels the greater the vertical delegation of initiative rights.

Table 4: Results of the Multivariate Analysis of Variance (1/2)

Dependent Variables		Vertical Decentralization of Right to Use Initiative Granted to the Loan Officer		Vertical Decentralization of Approval Rights "In Terms of Cost of the Loan"	
Independent Variables		**Coef**	**t-std**	**Coef**	**t-std**
Constant		-2.029	(-1.917)*	0.252	(0.133)
Changing the size of the branch	CHSIZE=1	1.586	(2.676)**	0.572	0.541)
	CHSIZE=2	0.499	(1.007)	-1.603	(-1.814)*
	CHSIZE=3	-0.00855	(-0.019)	0.358	(0.438)
Changing the organizational complexity of the branch	CHCOMPLE=1	-0.26	(-0.592)	-0.467	(-0.598)
	CHCOMPLE=2	-0.944	(-1.999)*	0.00756	(0.009)
Geographical location of the branch	IMPLGÉO=0	0.457	(0.777)	0.19	(0.181)
Geographical distance between the loan officers and immediate superiors	DISTANCE=0	1.204	(2.659)**	-0.807	(-1.000)
	DISTANCE=1	1.699	(3.461)***	-0.187	(-0.213)
	DISTANCE=2	-0.258	(-0.496)	-0.3	(-0.324)
	DISTANCE=3	-0.992	(-1.456)	0.0999	(0.082)
	DISTANCE=4	0.673	(1.711)	-0.51	(-0.727)
Changing the size of the acquired bank	DIVGEOGR=1	2.632	(2.889)**	-0.62	(-0.382)
	DIVGEOGR=2	2.872	(3.484)***	-0.746	(-0.507)
	DIVGEOGR=3	3.371	(4.067)***	-0.175	(-0.118)
	DIVGEOGR=4	3.255	(3.538)***	-1.224	(-0.746)
Acquired bank's size and organizational complexity	BANK=0	-0.0947	(-0.276)	0.0541	(0.088)
The nature of the information held by SME loan officer	CRITEVA1	-0.0284	(-0.134)	0.165	(0.436)
	CRITEVA2	0.107	(0.737)	0.039	(0.150)
Loan officers' assessment system	MESPERF1	0.350	(1.976)*	0.0814	(0.256
	MESPERF2	0.0115	(0.062)	0.345	(1.045)
Incentives systems for loan officers	INCITSY1	-0.103	(-0.608)	-0.106	(-0.349)
	INCITSY2	0.0743	(0.526)	(0.208)	0.0525
Bank's size	SIZE	-0.3209	(-2.575)**	0.0304	(1.368)
Branch's organizational complexity	ENTINSTA	-0.352	(-2.261)**	0.125	(0.451)
Environmental instability	INCERTI	0.106	(0.456)	-0.358	(-0.864)
The activity diversification strategy	DIV_SER	0.0296	(0.161)	0.144	(0.439)
	DIV_CLT	-0.235	(-1.614)	0.0706	(0.272)
R^2			**0.890**		**0.629**

This table shows the results of our MANCOVA for both dependent variables "Vertical decentralization of right to use initiative granted to the loan officer" and "Vertical decentralization of approval rights in terms of cost of the loan". (*) p< 10 %; (**) p< 5 % ; (***) p< 1 %.

To sum up, the vertical decentralization of initiative rights only takes effect in small-sized, organizationally uncomplex operational units where the geographical distance separating the loan officer from his direct superiors is low or non-existent. The growth in size of consolidated banks, measured by the number of new geographical locations, has a significant positive effect on the vertical decentralization of initiative rights to loan officers. This result confirms our hypothesis H5a. Thus, the greater the size of the bank, the greater is the vertical delegation of initiative rights. In this case, the decentralization of initiative rights results in a reduction of the specific information transfer costs and the agency costs that an increase in the number of hierarchical levels can lead to. Our findings also show that when multidimensional performance measures are used in the loan officers' assessment system, this has a positive effect on the vertical decentralization of initiative rights. This confirms our hypothesis H8, according to which the precision of officer assessment measures has a positive effect on the decentralization of decision-making rights and particularly on initiative rights (Moers, 2006). This hypothesis is not confirmed for financial performance measures, which is in theory more precise than multidimensional measures. Indeed, analysis of the frequency and number of interviews, carried out during the questionnaire pretest, shows that financial performance measures are

rarely used. The decentralization of approval rights is captured by two factors extracted from the ACP: approval in terms of characteristics and in terms of the cost of the loan. The MANCOVA shows that the dependent variables in our model have no significant effect on approval of the characteristics of the loan.

Table 5: Results of the Multivariate Analysis of Variance (2/2)

Independent Variables	Dependent Variables	Vertical Decentralization of Control Rights to the Immediate Superiors of Loan Officers : "Control"		Horizontal Decentralization of Control Rights: "Extent of Team Work: Cooperation and Communication"	
		Coef	t-std	Coef	t-std
Constant		0.805	(0.653)	-0.126	(-0.077)
Changing the size of the branch	CHSIZE=1	-0.281	(-0.407)	-1.938	(-2.107)*
	CHSIZE=2	-0.129	(-0.223)	-0.163	(-0.212)
	CHSIZE=3	-0.806	(-1.509)	0.305	(0.428)
Changing the organizational complexity of the branch	CHCOMPLE=1	-0.61	(-1.195)	0.296	(0.436)
	CHCOMPLE=2	-0.899	(-1.634)	0.0638	(0.087)
Geographical location of the branch	IMPLGÉO=0	0.732	(1.068)	-0.0502	(-0.055)
Geographical distance between the loan officers and immediate superiors	DISTANCE=0	-1.071	(-2.031)*	0.0233	(0.033)
	DISTANCE=1	-0.526	(-0.920)	1.048	(1.375)
	DISTANCE=2	-1.243	(-2.054)*	0.195	(0.241)
	DISTANCE=3	0.309	(0.390)	0.0848	(0.080)
	DISTANCE=4	-0.0896	(-0.195)	0.275	(0.450)
Changing the size of the acquired bank	DIVGEOGR=1	-0.6	(-0.565)	1.114	(0.788)
	DIVGEOGR=2	-1.085	(-1.130)	0.706	(0.522)
	DIVGEOGR=3	-0.763	(-0.790)	-0.236	(-0.184)
	DIVGEOGR=4	-1.717	(-1.602)	2.095	(1.467)
Acquired bank's size and organizational complexity	BANK=0	0.255	(0.637)	-0.319	(-0.599)
The nature of the information held by SME loan officer	CRITEVA1	-0.285	(-1.153)	0.223	(0.675)
	CRITEVA2	0.142	(0.839)	0.0525	(0.232)
Loan officers' assessment system	MESPERF1	0.333	(1.613)	0.177	(0.645)
	MESPERF2	0.0441	(0.205)	-0.155	(-0.541)
Incentives systems for loan officers	INCITSY1	-0.157	(-0.794)	0.557	(2.118)*
	INCITSY2	0.00802	(0.049)	-0.164	(-0.749)
Bank's size	SIZE	0.011	(0.756)	-0.0176	(-0.911)
Branch's organizational complexity	ENTINSTA	0.694	(3.825)***	-0.202	(-0.837)
Environmental instability	INCERTI	0.051	(0.188)	0.164	(0.456)
The activity diversification strategy	DIV_SER	0.172	(0.801)	0.555	(1.945)*
	DIV_CLT	0.267	(1.575)	-0.121	(-0.536)
R^2			**0.857**		**0.775**

This table shows the results of our MANCOVA for both dependent variables "Vertical decentralization of control rights to the immediate superiors of loan officers" and "Horizontal decentralization of control rights: "Extent of team work: cooperation and communication. (*) p< 10 %; (**) p< 5 % ; (***) p< 1 %.

However, beyond a threshold of ten, a reduction in the size of operational units has a negative effect on the decentralization of the right to approve the cost of the loan. In other words, a reduction in the size of the branch, measured by a reduction in staff levels, has a negative effect on the decentralization towards SME loan officers of the right to approve the cost of the loan. This result confirms our hypothesis H7a, which assumes that the size of operational units has a positive impact on the decentralization of decision-making rights. The decentralization of control rights towards middle management is measured here by two factors: changes in the role of the immediate superiors of loan officers, in terms of leadership and advice, and in terms of control. For the first factor, the multivariate analysis of covariance gives no significant result, whereas the second factor shows a relatively high R^2 coefficient (0,857). We also observe a positive and significant effect of the size of operational units of acquired banks on the decentralization of control rights

towards middle management. Hence, the larger the size of the branch, the higher is the degree of control exercised by the loan officer's immediate superior (hypothesis H7a). Nonetheless, the confirmation of our hypothesis H4a reveals that the smaller the distance separating loan officers from their hierarchical superior, the lower is the degree of control exercised by this hierarchical superior.

Two factors are extracted from the ACP to measure the horizontal decentralization of control rights variable, reflecting the degree to which specific information is shared between different officers and the degree to which they supervise each other. The multivariate analysis demonstrates that a reduction of staff numbers in the operational units of acquired banks affects cooperation and communication between the members of a team, and thus reduces the degree to which specific information is shared and transferred. Our findings show, however, that financial incentive schemes, in the form of bonuses, have a positive effect on the horizontal decentralization of control rights. Measured by the "extent of team work: communication and cooperation," this consequently disproves our hypothesis H9. This same positive effect can be observed when activities become more diverse, measured by the number of services managed by loan officers. This diversification increased the level of mutual supervision through an increase in communication and cooperation between the members of a single unit and increased sharing of specific information. This result confirms our hypothesis H3, which proposes that an increase in the range of products sold, measured by the number of new services managed by loan officers, and has a positive effect on the decentralization of decision-making rights.

CONCLUSION

The purpose of this article is to study how the delegation of decision-making rights towards Small and medium-sized enterprises loan officers evolves as a result of bank acquisitions. We collected data through a questionnaire administrated to all small business loan officers of two French acquired banks. To test our hypotheses, we carried out a *multiple analyses of covariance*. Our analysis produced several original results. The size of an acquired bank, or its growth post-acquisition, has a positive influence on the decentralization of initiative rights to loan officers. Nonetheless, growth in the size and organizational complexity of merged operational units results in a reduction in initiative rights at this level. Whilst we observe a vertical decentralization of initiative rights towards operational units, the number, volume and cost of loans granted, as well and the type of SME clientele targeted are fixed by the team or dictated by superiors.

The use of a system of multidimensional measures of performance in acquired banks made it possible to assess this for each team. Our findings are the same for the right to approve loan characteristics, which is not delegated to SME loan officers. We also observe that the size of operational units in consolidated banks affects the right to approve the cost of the loan. That is, the smaller the unit, the greater is the level of centralization of loan cost approval rights. Concerning the delegation of control rights to middle management and between the members of a single team, our analysis shows that the larger the units and the greater the distance separating SME loan officers from their immediate superiors, the greater is the level of control exercised by these superiors. Our findings thus show that a reduction in staff numbers in the operational units of the acquired banks reduces the level of cooperation and communication between its members. In this way it affects the sharing and transfer of specific information and limits the effectiveness of mutual supervision between individuals. An increase in the number of tasks allocated to loan officers and the use of a financial incentive scheme strengthens mutual control through a rise in communication and control between the members of each team.

Despite its contribution to understanding of the consequences of mergers and acquisitions on the granting of SME loans, our study has a number of limitations. Its context is exclusively French, and although this sector is strongly influenced by internationalization, the relative importance of certain national characteristics – historical, cultural and regulatory – might be highlighted by broadening the sample to include other French and European banks. We might also enrich our analysis by applying it to other

hierarchical levels in consolidated banks or comparing our results from acquired banks with those in acquiring banks. Indeed, according to Hattori et *al.* (2012), focusing on the loan officer as the only player in this process is insufficient to study the relationship lending process. It would be interesting to extend the analytical framework through organizational architecture to other participants in the SME lending process. Finally, in this study we have only analyzed one of the three components of organizational architecture. The study could be enhanced by investigating how other mechanisms evolve, such as incentive and appraisal systems for loan officers in the context of banking consolidation. SME financing remains nonetheless an important issue for growth and employment. Banks are extremely important players in this area, and the sector will doubtless undergo further consolidation in the future. Improving understanding of the consequences of these on the ground in operational terms should contribute to improve SME loan policies, and more widely the relations between such businesses and their banks.

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BANK COMPETITION AND RISK APPETITE: EVIDENCE FROM TUNISIA

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ABSTRACT

In this paper, we investigate whether bank competition increases risk taking for the case of the Tunisian banks. Our data set covers nine Tunisian banks observed during the period from1980 to 2009 and we conducted an econometric model based on panel data estimations. The econometric results reveal the presence of a positive relationship between competition and bank risk taking. This shows that the functions of Tunisian banks remain based on the basic traditional activities and banks need to diversify their activities in safe functions to keep the banking sector stable and avoid bank failure.

JEL CODES: G21, L11

KEY WORDS: Bank Competition, Tunisian Banks, Bank Risk Taking, Panel Data Analysis

INTRODUCTION

The relationship between competition and bank risk taking has been analyzed by numerous authors and their results have provided conflicting conclusions. In fact, while some studies found that higher competition decreases risk taking by banks (Schaeck and Cihak (2014), Kick and Prieto (2013), Boyd, De Nicolo, and Jalal (2007), Boyd and De Nicolo (2005),).some other studies affirm the existence of a positive relationship between competition and bank risk-taking .(Soedarmono, *et al* (2013), Repullo (2004), Caminal and Matutes (2002), Marquez (2002), Mishkin (1999), Besanko and Thakor (1992)). Furthermore, some other studies have found a nonlinear relationship between bank competition and the level of risk taking. For example, the studies of Jimenez and Saurina (2013), Tabak B. M., Fazio D., and Cajueiro D. O. (2012), Martinez-Miera and Repullo (2010), concluded that competition affects bank risk-taking in a non-linear way.

These different results show that the relationship between competition and bank risk taking has not been unanimous. Moreover, most of the available studies analyzed this relationship for developed countries only. Therefore, the motivation of our paper is to investigate whether bank competition increases bank risk taking for the case of the Tunisian banks. Tunisia is an interesting case study as it adopted various policy reforms since the eighties to improve the financial sector. Following the liberalization of finance and trade, Tunisia banking sector has become more attractive to foreign banks and the number of players increased drastically between 1985 and 1998. As a result, competition between banks increased and new financial institutions have been introduced into the market to provide financial, banking and insurance services to Tunisian households. While most of studies on Tunisia have been focused on the consequences of liberalization on the performance of banks, the current paper will focus on a new concern which is the possible relationship between bank competition and risk taking by Tunisian banks.

To this end, we collected a data from the nine most important banks operating in Tunisia and we conducted a panel data modelling to test for the validity of this relationship.

Our dataset covers the period from 1980 to 2009. Obviously, the empirical results confirm the positive liaison between competitions of risk taking. This could be explained by the fact that when competition increased, profit of banks decreased and these institutions have been forced to look for new activities to compensate the loss from the penetration of new competitors. It appears that the new activities are risky. The remainder of the paper is organized as follows. In Section 2 we present a literature review on the banking competition and risk taking. In Section 3, we describe our methodology and the model specification. Empirical results and discussion are given is section 4. Finally section 5concludes the results.

LITERATURE REVIEW

The debate on the relationship between competition and risk taking is not conclusive. The academic literature is abundant and the empirical evidence provides a series of contrasting results. Findings on this topic can be divided into three ranges. The first current of literature supports the negative correlation between the level of competition and the bank risk taking. On the contrary, the second current defends the positive association between the two variables while the third line of ideas has been based around the nonlinear relationship between competition and bank risk taking. The negative effect of bank competition on the level of risk taking has been analyzed by several studies. For example Keely (1990) shows that increasing competition erodes the bank charter values, resulting in a negative trade-off between competition and stability (Keeley, 1990). In another study, Boyd and De Nicolo (2005) show how higher competition among banks might lead to a reduction in the overall level of bank risk taking: Higher competition reduces interest rate costs at the level of the borrowing firm, leading the firm to choose a safer project which ultimately generates safer banks. In another study, Boyd *et al*. (2007), based on two different samples find that less-concentrated banking markets are characterized by lower z-scores, an inverse measure of bank risk.

Kick and Prieto (2013) have used a dataset provided by the Deutsche Bundesbank over the period 1994 to 2010 to test for the liaison between competition and risk taking. The authors have used the Lerner Index as a proxy for bank-specific market power. Their results support the view that market power tends to reduce the default probability and the riskiness of the banks. In contrast, by using the Boone Indicator they found strong support that increased competition lowers the riskiness of banks. More recently, Schaeck and Cihak (2014) have conducted a panel data analysis for some European banks during the period 1995 to 2005 using the Boone indicator to analyze the cost elasticity of performance by capturing the link between competition and efficiency. Their results show that in general, a negative effect of competition on bank risk for European countries.

In the other hand, the positive association between the level of competition and the bank risk taking constituted the major finding of several studies (Boyd and De Nicolo, 2005; Schaeck et al., 2009; Allen et al., 2011). The study of Besanko and Thakor (1993) shows that the more the number of players in the banking system increase the more the deposit rates increases and the more the lending rates decrease. When the lending prices are low; banks count on the quantities of credit. In this line of idea, banks can compensate the lower rate by the higher quantity distributed, which can lead to grant credit with insufficient guarantees. The study of Caminal and Matutes (2002) shows that strong competition reduces credit rationing and increase the distribution of credits. In this case, banks may be engaged in riskier operations which increase the level of risk taking. Another argument presented by Mishkin (1999) shows that a more concentrated banking structure is rewarded by government. This can create problems of moral hazard and encourage banks to take more risk, and consequently increasing bank fragility.

Another study conducted by Although, Marquez (2002) showed that an increase in the number of banks in a market disperses the borrower-specific information and results in both higher funding costs and greater access to credit for low-quality borrowers. For Repullo (2004) who made a dynamic model of imperfect banking competition to show that more competition leads to more risk-taking in the absence of regulation, risk-based capital requirements were found to effectively control the risk-shifting incentives in that model. Based on a sample of commercial banks in Asia during the period from 1994 to 2009, Soedarmono, *et al.(*2013) have found that a higher degree of market power in the banking market is associated with higher capital ratios, higher income volatility and higher insolvency risk of banks. In addition to the negative and positive relationship between competition and bank risk taking, a third association has been revealed in many researches. Using a sample of banks in 10 Latin American countries for the period from 2003 to 2008, Tabak, Fazio and Cajueiro (2012) have found that competition affects risk-taking behavior in a non-linear way as both high and low competition levels enhance financial stability.

They concluded that Banks facing both high and low competition are, on average, lower level risk-takers than banks experiencing average competition. Using data for the Spanish banking system over the period 1988 to 2003, Jimenez and Saurina (2013) concluded that reducing competition in banking markets had been seen as promoting banking stability. This finding supports a nonlinear relationship using standard measures of market concentration in both the loan and deposit markets and confirms the results of Tabak, Fazio and Cajueiro (2012) and Martinez-Miera and Repullo (2010). The depended variable which reflects the bank risk taking is the level of nonperforming loan for the study of Jimenez et al (2013). However many proxies are used to measure bank competition such as the concentration index, the Herfindahl-Hirschman index, the Lerner index, etc.

DATA AND MODEL SPECIFICATION

Our dataset covers the nine most important retail banks operating in Tunisia and they were observed during the period 1980–2009; hence we have a total of 270 observations. We use annual bank-level balance sheet and income statement data collected from the Tunisian professional association of banks (APTBEF, 2014). In this paper we use the following variables: The Z-Score; Net Interest Margin (NIM); the Herfindahl-Hirschman concentration index (HHI), market share of each bank (MS), Intermediation (ITR); the deposit specialization ratio (DEP); the bank size (SIZE), The credit risk (CR), the liquidity Risk (LR) , inflation (Inf) and GDP per capita. The definitions of these variables are displayed in Table 1 below.

Table1: Definition of the Variables

Z-Score	**Defined As the Ratio of the Return on Assets (ROA) Plus the Capital Ratio (CAR) Divided by the Standard Deviation of the Return on Assets (SDROA)**	**Source**
NIM	Interest Income/Total Assets	(APTBEF, 2014).
HHI	Measured by the Herfindahl-Hirschman concentration index.	(APTBEF, 2014).
MS	Is measured by total assets of the bank (i) to total bank assets of the sample.	(APTBEF, 2014).
DP	The deposit specialization ratio measures the weight of deposits of each bank in the total liabilities.	(APTBEF, 2014).
ITR	Is the ratio of interest expense to interest income	(APTBEF, 2014).
SIZE	Is the bank size measured by natural logarithm of total assets of each bank	(APTBEF, 2014).
CR	Is a measure of credit risk; it's measured by Total Loans/Total Assets.	(APTBEF, 2014).
LR	is a proxy of liquidity risk; it is equal to Total Loans/Total Deposits	(APTBEF, 2014).
INF	The inflation rate measured by the CPI	(APTBEF, 2014).
GDP	In the Gross domestic product per capita	(APTBEF, 2014).

Note. This table displays the definitions of the variables used in this study

Table 2 presents the descriptive statistics of the variables used. The average net interest margin (NIM) is 2.95% with a maximum of 11.25% and a minimum of 0.37%. The average Z-Score is 3.33% with a maximum value of 8.54% while its minimum value is -1.56%. Banking concentration (HHI) average is 12.80% with a minimum of 10.95% and a maximum of 16.18%. Despite the small number of institutions in the banking system, the sector has a low level of concentration.

The average level of credit risk (CR) of Tunisian banks is about 60.74% with a higher value equal to 90.36% and 30.29% for the minimum value. The mean value of the Liquidity risk (LIQR) is 100.09%, its minimum value is 48.04% and 259.70% as maximum value. The average market share of Tunisian banks (MS) is 10.41%; with a maximum value is 29.18% while its minimum value is 0.59%. The average value of bank intermediation (ITR) is 53.26%; its maximum value is 97.75% while its minimum value is 27.77%. For macroeconomic variables, the average growth rate of real GDP per capita is 7.58%; its minimum value is 7.30% and 8.03% as maximum value and the average inflation is 5.37% which is relatively high in Tunisia.

Table2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Zscore	270	3.336	1.213	-1.562	8.543
Nim	270	0.0295	0.0130	0.0037	0.112
Crisk	270	0.6070	0.1512	0.0302	0.903
Liqr	270	1.096	0.4019	0.4804	2.597
Size	270	14.634	0.5282	13.626	15.748
Hhi	270	0.1280	0.4256	0.1099	0.1618
Car	270	0.0737	0.0323	0.0109	0.1748
Itr	270	0.5206	0.1314	0.1447	0.9461
Ms	270	0.1041	0.0532	0.0059	0.2918
Dep	270	0.1269	0.1118	-.1540	0.6371
Inf	270	0.0323	0.0082	0.0216	0.0558
Gdp	270	0.0338	0.0168	.01658	0.0631

Note: This table shows the descriptive statistics of all the variables

In the estimation procedure, we apply the panel data analysis. The econometric model can be written as follows:

$$Z\text{-Score}_{i,t} = \beta_0 + \beta_1 \text{PERF}_{i,t} + \beta_2 \text{CR}_{i,t} + \beta_3 \text{LR}_{i,t} + \beta_4 \text{SIZE}_{i,t} + \beta_5 \text{CAR}_{i,t} + \beta_6 \text{ITR}_{i,t} + \beta_7 \text{HHI}_{i,t} + \beta_8 \text{MS}_{i,t} + \beta_9 \text{DP}_{i,t}, + \beta_{10}\text{GDP}_{i,t} + \beta_{11}\text{Inf}_{i,t} + \varepsilon_i \quad (1)$$

Following Laeven and Levine (2009); we use the Z-Score to measure the bank risk taking. We decompose the Z-Score in two components. The first component is the return on average (ROA) divided by the standard deviation of ROA as a measure of bank's portfolio risk. The second component is the ratio of total equity divided by total assets over the standard deviation of ROA as a measures leverage risk. Regarding the bank performance we use the Net Interest Margin (NIM). The later could be the best indicator of bank profitability in Tunisia as it reflects the magnitude of traditional activities in Tunisia during the past three decades and the volume of lending and deposit activities (Hakimi and Hamdi 2012).

EMPIRICAL RESULTS

The correlation matrix displayed in Table 3 gives information on the level and nature of linkage between the variables. The results reveal a weak correlation between the different variables, and this rejects the existence of multicolinearity problem. The correlation matrix shows that the Z-SCORE is positively linked to most of the variables except the liquidity risk (LR), the bank size (SIZE), the market deposit (DEP) and the inflation rate (INF).

Table 3: Correlation Matrix

	Z-SCORE	NIM	CR	LR	SIZE	CAR	ITR	IHH	MS	DEP	INF	GDP
Z-SCORE	1.0000											
NIM	0.0706	1.0000										
CR	0.1053	0.1157	1.0000									
LR	-0.0049	-0.2494	0.5999	1.0000								
SIZE	-0.0821	-0.1182	-0.0570	0.0905	1.0000							
CAR	0.1057	0.1340	0.2670	0.1865	-0.1552	1.0000						
ITR	0.1105	-0.7160	0.0177	0.1852	0.0756	-0.3604	1.0000					
HHI	0.1338	-0.1254	-0.7167	-0.3910	0.0060	-0.1887	0.1019	1.0000				
MS	0.2963	-0.3318	0.0340	0.2250	0.1876	0.0565	0.2024	0.0841	1.0000			
DEP	-0.0048	-0.1248	-0.2672	-0.2069	0.0743	-0.0098	-0.1729	0.2338	0.1060	1.0000		
INF	-0.0280	-0.0343	0.0560	0.0856	0.2855	-0.0221	0.0116	-0.0502	0.0052	-0.0269	1.0000	
GDP	0.0412	-0.0116	0.0091	0.0091	0.4073	-0.0357	-0.0417	-0.0289	-0.0084	-0.0343	0.3996	1.0000

Note. This table reveals the correlation matrix between all the variables.

Table 4 presents the estimation results for the random effect regression on the Tunisian banking sector. The net interest margin (NIM) acts positively on the bank risk taking (6.27) but the effect is not significant. As measured by the interest margin to total assets, this variable can increase the level of risk taking for the Tunisian banks since banks can grant loans to households with insufficient guarantees to search for high revenues. The credit risk (CR) seems to be positively and significantly correlated with the dependent variable. This association indicates that a higher level of credit risk is associated with a higher level of bank risk taking. On the other hand, liquidity risk (LR) is negatively and significantly correlated with the dependent variable. This shows that when the liquidity is available, the risk appetite decreases. The bank size, capital adequacy ratio and the market deposit ratio have no significant effect on the bank risk taking. In this research, bank size is negatively correlated with the bank risk taking. In fact, it was shown in literature that banks with big size take more risk than small-sized banks. However, as Tunisian banks are relatively small sized banks, so these small entities appear not being high risk takers.

Turning now to banking intermediation ratio (ITR); it was shown to be positively and significantly correlated with the dependent variable. Indeed, an increase on the received interests (lending interest rates) or a decrease in interest expenses (deposit rates) is likely to lead to more bank performance. It should be noted that the increase in deposit rates should be roughly proportional to the decrease in lending rates. To search for more profitability, banks may raise the lending interest rates or the amount of distributed credit which reflects a high level of bank risk taking. The index of concentration (HHI) acts positively but not significantly on the dependent variable while market shares (MS) acts positive and significant at the level of 1 %. This could be explained by the facts that when banks are searching for high market shares, based on the volume of distributed loans, banks may grant credits with insufficient guarantees. In this bank stability becomes a concern.

Faced with a higher number of heterogeneous clients, banks cannot collect the necessary information, so the problem of information asymmetry will increase and this can lead banks to pursue riskier projects. This result confirms the finding of Kick and Prieto (2013). The effect of the two macroeconomic variables is not significant. The growth rate of GDP per capita (GDP) acts positively on the bank risk taking however, the inflation rate affects negatively the level of risk taking. In an inflationary context, banks limit their risks by giving up commitment in medium and long-term contracts, because inflation causes a redistribution of income in favour of borrowers and the detriment of lenders. In the Tunisian case, the increase of the credits is not a fundamental origin of inflation, which is caused by other factors.

Therefore, we can conclude that inflation and GDP seem not to have a potential impact on the bank risk taking in the Tunisian context.

Table 4: Results of the Random Effect Model

Zscore	Coef.	Std. Err.	Z	P>|z|
NIM	6.274	13.142	0.4810	0.6332
CK	1.599	0.9182	1.7404	0.0825*
LR	-0.4493	0.2638	-1.7018	0.0894*
SIZE	-0.1969	0.1646	-1.2021	0.2323
CAR	4.139	2.622	1.581	0.1155
ITR	2.134	0.9949	2.152	0.0321**
IHH	2.442	6.729	0.3611	0.7174
MS	6.810	1.475	4.621	0.000***
DEP	-0.01024	0.8347	-0.0154	0.9904
INF	-2.851	9.333	-0.3186	0.7603
GDP	6.915	4.925	1.404	0.1601
CONS	3.466	2.853	1.215	0.2241

Hausman test Chi2 (10) =7.98 Prob > chi 2 = 0.6304 Breusch and Pagan test Chi2 (10) = 1.27
Prob > chi 2= 0.2599 Wald test Wald chi2 (11)= 47.44 Prob > chi2 = 0.0000 Number of observation= 270
Note: this table provides the results of the Random effect regression of the equation:

$$Z\text{-}Score_{i,t} = \beta_0 + \beta_1 PERF_{i,t} + \beta_2 CR_{i,t} + \beta_3 LR_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 CAR_{i,t} + \beta_6 ITR_{i,t} + \beta_7 HHI_{i,t} + \beta_8 MS_{i,t} + \beta_9 DP_{i,t}, + \beta_{10} GDP_{i,t} + \beta_{11} Inf_{i,t} + \varepsilon_i$$

****, ** and * significantly respectively at 1%, 5% and 10%.*

CONCLUSION

The purpose of in this paper is to investigate whether bank competition increases bank risk taking for the case of Tunisia. Our sample included the nine most important banks operating in the country since 1980 and we have performed a panel data regression with random effect specification. The main challenge of this research is the lack of the data for the other retail banks. Precisely, we were unable to get a long time series for most of the variables collected in this study. This issue forced us to limit our sample to 9 banks only. In the future, if the data will be released then we could update the current research using more banks in our sample. The Overall results of this paper confirm the idea that there is a positive relationship between competition and bank risk taking. This conclusion supports the findings of Soedarmono, W., Machrouh, F., and Tarazi, A. (2013), Repullo (2004), Caminal and Matutes (2002), Marquez (2002), Mishkin (1999), Besanko and Thakor (1992), etc.

In Tunisia, bank suffers from various types of competitions and from market pressure as well. This increased level competition pushes banks to develop risky activities to compensate the loss of revenues. This risk taking by Tunisian banks reveals the reality of the banking system and the nature of banking activities which remain based on the basic activities such as granting loans, collecting credits and managing the payment systems. In this case, revenue of banks is mostly interest revenues. Hence, an increase of the players would automatically affect the performance of the competitors and would particularly affect their margins. For the case of Tunisia, when the number of banks increase, the level completion increase as well and this will force banks to look for new sources of revenues. However, this policy could harm the stability of the Tunisian banking sector as a whole as it could generate bank failure. Therefore, we recommend Tunisian policy makers to improve the financial infrastructure and to encourage banks to diversify their activities in non-riskier activities that could bring high added value.

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A COMPARISON OF CREDIT RISK MANAGEMENT IN PRIVATE AND PUBLIC BANKS IN INDIA

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ABSTRACT

Like other corporations, banks want to create value and seek ways to control risk while aiming to enhance productivity and performance. This is achieved by granting credits to customers from the money deposited by the depositor, thus placing them at risk in the case of defaulting. Despite this risk, banks must continually issue credit since it is the key source of its profitability. This research study assesses the impact of credit risk management on Indian public and private banks during the 2009-2012 period. Using pooled OLS, fixed effects and random effects, the study examines credit risk management in seven private banks and seven public banks. The results show that private banks are more capitalized and more profitable than public banks. In addition, in both cases asset quality measured using non-performing assets with negative coefficients significantly influenced bank profitability. The study extrapolates the importance of regulatory capital and the importance of risk management in ensuring stability in the financial industry.

JEL: G02, G18

KEYWORDS: Capital Adequacy, Non-Performing Assets, Performance, Net Interest Margin

INTRODUCTION

During the last thirty years, the world has experienced a number of financial and banking crises. Most of these crises occurred in developing countries. The dominant crises corresponded to deregulatory processes that forced extension of credit in short timeframes. Continuous rises in asset prices in the long run precipitate bubbles. Ultimately, bankruptcies resulted from non-performing loans, leading to acute banking crises and credit losses. Over the last five years, the banking sector has undergone great metamorphosis as a result of the financial crisis of 2008. There is more emphasis on not only capital adequacy, but also on moral hazard. The global bailout of banks was a major paradigm shift, with taxpayers stepping in to rescue banks as a result of their short-term profits or bonuses. The argument for the bailout is that banks play a significant role of intermediation in the economy.

Significant reforms have been suggested in response to banking crises. For instance, Basel I, and Basel II and Basel III represent the banking supervision accords proposed by the Basel Committee (Felix and Claudine, 2008). The Basel Accord implemented a framework in 1988 by G-10 central banks focusing on credit risk and safe banking. The Reserve Bank of India (RBI) issued a guideline on credit risk management in 2002 per international law. Basel I played a critical role in strengthening the financial system, through several measures like weak incentives and deficiency of risk management. As a result, Basel II sought to reveal banks' fundamental risk exposure and response to financial innovation like securitization. Paradoxically, the incidence of crisis did not decline despite the introduction of succeeding development.

The recent international financial crisis signifies that risk management in banking sectors is significantly inadequate. The drive for globalization, innovation and financial deregulation has not eliminated credit risk even if the off-balance and market risk hold more interest in the wake of the disruption to the global financial markets (Paradi et al. 2012). Thus, credit risk is still the greatest concern to banking authorities

and regulators. There is huge economic impact that is linked with bank failure because of the ripple effects that spread from banking to other sectors of the economy. Therefore, credit risk management is an issue of great value given that the core function of every bank is credit granting. The character of the banking sector has been so perceptive since more than 85% of their liability is deposits (Saunders & Cornett, 2005), and banks mobilize these deposits to credit for borrowers, which in fact is an income-generating function of banks. Besides all other services, bank must generate credit for customers to make money, enhance growth and remain competitive in the market.

Multiple studies have already been carried out on the effects of bank credit risk management, such as Kithinji (2010) and Poudel (2012). However, all research focuses on the component of credit risk management in banks regarding credit risk measurement, provisioning, credit derivative and its influences on bank profitability. This work goes further by incorporating the capital adequacy, taking account of the recent revisions and guidelines of Basel III.

Research objective: The primary objective of this research is to elucidate how Indian banks practice and manage credit risk, and thus attention is tailored towards assessing the influence of credit risk management on profitability over four years (2009-2010). The ultimate objective of this study is to consider different parameters applicable to credit risk management and how they influence financial performance.

The rest of this paper is structured as follows: the next section examines the literature review. I then describe the data and the methodology and discuss the results. The final section concludes.

LITERATURE REVIEW

Commercial banks play leading roles in lending and intermediation between lenders and borrowers. A bank has several functions: mainly accepting deposits and granting credit facilities like loans and advances, which comprise its primary function. Regardless of the significant role that banks play in financial markets by linking lenders to borrowers, instability in the global economic environment, currency values and financial markets has impinged deleteriously on bank functionality and profitability.

Although the key causes of severe bank disruptions and failures continue to be inadequate credit risk management, credit granting remains the principal business of every bank in the world. Well, in reality, operating banks are considered a channel for economic prosperity and growth, whereas weakly functioning ones do not merely obstruct economic progress but also intensify poverty. However, banks are vulnerable to various risks such those from the market, interest, credit, and operational risk, which impact financial performance in various ways. The size and level of the loss caused by credit risk can be seen to be severe compared to other risk, as it directly threatens bank solvency (Frederick, 2012).

Credit Risk

The survival, performance and sustainability of banks are hugely reliant on correct measurement, effective and sound management of credit risk. As stated by the Basel Committee on Banking Supervision, or the BCBS (2006), "Credit risk is the potential risk of loss due to the failure payment by the obligators in the terms of loans or other types of credit". It implies that the risk emerges from the perspective that bank counterparties or borrowers are unwilling to perform or fulfill their obligations. Moreover, in other words, the value of the bank's assets, particularly its loans, will reduce worth and probably become valueless, thereby damaging the solvency state of banks. This is in line with Chen & Pan (2012), who termed credit risk as ''the extent of value fluctuation in the debt derivatives and instruments due to transform in the core credit quality of counterparties and borrowers". BCBS (2006) claimed that historical understanding and occurrence reveals that concentration of credit risk mostly in the asset portfolio is the foremost cause of bank dysfunction.

When credit risk increases, there is inadequate capital because the bank will search for different sources to meet and mitigate losses. In addition, this leads to a decline in its liquidity status. This will consequently lead to a decline in profitability. It is worth noting that credit risk and returns are interlinked such that the higher the credit risk, the less return and vice versa. The trade-off between the two illustrates that high-risk securities (higher yield loans) reward a risk premium (higher average return) because of greater insecurity of payment. Thus, the return / value and average revenue can be increased only by increasing risk. Greuning and Bratanovic (2003) stress that it is critical to understand that credit risk has always been the major hazard to any bank's performance and the major cause of bank collapse.

Credit Risk Management in Banks

Credit granting is the foremost source of revenue in banks. Credit risk management needs to be integrated into the decision making process before granting credit. Simply, this involves identifying, analyzing and assessing, monitoring and controlling credit. This has a direct impact on the level of non-performing loans as well as on the sum of loans and advances extended to customers (Kithinji, 2010). It should be the top priority of bank operations in order to enhance sustainability. Despite these facts, significant bank problems have increased considerably in both established and emerging economies (Fredrick, et al. 2012). Several studies and researchers have identified the causes of these disruptions as localized to the banking sector in addition to numerous other factors. The problem regarding the credit, especially weakness in credit risk management, has been recognized as the main reason for bank problems (Richard et al. 2008).

Over the years, despite the innovations in the financial services sector, Hennie (2003) stated that credit risk still remains the most prominent reason for bank failure. For this reason, "more than 80% of the bank's balance sheet commonly relates to this aspect of risk management." The major reason for serious banking problems directly relate to poor portfolio risk management, loose credit standards for counterparties and borrowers and lack of awareness of changes in economics. Collectively, these observations indicate the enormous critical role played by credit risk management in the entire bank risk management approach. The ultimate objective of credit risk management is to intensify the risk-adjusted rate of return by controlling and standardizing credit risk exposure.

Credit Risk and Bank Profitability

Empirical evidence suggests that credit risk management is a predictor of bank performance. For illustration, non-performing asset as a parameter of credit risk can reduce the worth and undermine credit structure. As posited by (Afriyie and Akotey, 2010) loan default shrink the resource support for further lending, affect the borrower's confident and deteriorate the staff morale.

Banks incur significant costs in controlling overdue loans and this can naturally affect profitability levels. The major source of credit risk emanates from inappropriate credit policies, volatile interest rate, low capital and liquidity, direct lending, poor loan underwriting, poor loan lending, government intervention and improper supervision from the central bank. When credit risk increases, it leads to bank solvency and liquidity problems. If the bank lends and the borrower for some reason defaults, i.e. repayment and interest are not forthcoming, the problems will be twofold. First, the bank has to cease interest accrual on the doubtful loan, so there is an immediate earnings loss. Secondly, the bank has to maintain provision for non-performing assets from the net interest income that implies the profit will be decreased. Therefore, increase in credit risk will cause loss and elevate the marginal expenditure of bank equity and debt to get funds from alternative sources to cover the losses (Sobhy, 2013).

Review of Related Empirical Literature

Several scholars like Kolapo, Ayeni and Ojo (2012), Kinthinji (2010) and Li Yugi (2007) carried out broad research studies on this topic and delivered mixed results. For example, Kolapo, Ayeni and Ojo (2012) noted that 100 percent increases in non-performing loan reduce profitability (ROA) by about 6.2 percent, although the study was characterized by serial correlation depicted by high Durbin-Watson. On the other hand, Kinthinji (2012) observed that there is no relationship between profits, amount of credit and the level of nonperforming loans. However, the study produced a moderate R squared of 39%, which computes to a negative adjusted R squared (-0.226).

Boahene, Dasah and Agyei (2012) adopted the regression analysis to evaluate the significant relationship between credit risk and Ghanaian bank profitability. Their research followed Manzura and Juanjuan (2009) by using the ratio of non-performing loans to total assets as an indicator for credit risk management and return on equity as a measure of bank profitability. They highlighted that credit risk management impinges dramatically on bank profitability. The study indicated that higher capital adequacy positively contributes to bank profitability.

Poudel (2012) assessed the effect of credit risk management in bank performance of Nepal during the 2001-2011 period using 31 banks. The capital adequacy ratio, cost per loan and default rates were used as credit parameters, whereas ROA was a performance indicator. The results showed that credit risk management has a strong impact on bank financial performance.

Li yuqi (2007) studied the determinants of bank profitability and its impact on risk management practices in the United Kingdom. The study utilized regression analysis between 1999 and 2006. Six measures of determinants of bank profitability were employed. He used capital, liquidity and credit as internal factors in bank performance. Inflation rate, interest rate and GDP growth rate were used as external determinants of bank profitability. Return on Asset (ROA) was used as a measure of a bank's performance. It was found that liquidity and credit risk have a negative impact on bank profitability.

Kolapo, Ayeni and Ojo (2012), while analyzing credit risk management efficiency from 2004-2009 in commercial banks of Nigeria, suggested some additional views into credit risk as profit-enhancing apparatus. Regression analysis was used for data analysis and revealed there is nominal causation between bank performance and deposit exposure. Kithinji (2010) determined the impact of credit risk management in Kenyan banks for the 2004-2008 period. He employed credit indicators as the ratio of non-performing loans and advances the ratio of loans and advances to total assets. The study revealed that the volume of profit of commercial banks is not determined by the level of non-performing loans and credit, as the implication recommends that other factors apart from non-performing loans and credit influence bank profitability.

Besides, Naceur and Kandil (2008) evaluated the influence of capital obligation on bank performance and cost of intermediation employing Generalized Method of Moment (GMM) on time series data during the 1989-2004 period. They used the ratio of net loans to deposit and ratio of capital to total asset and deposit as independent variables while return on equity and return on asset as the dependent variables to measure bank profitability. The results showed that the capital adequacy is a forecaster of a bank's performance. Gurdmundssoa, Ngok-Kisingula and Odongo (2013) assessed the task of regulatory capital obligation on bank control and competition in Kenya from 2001-2011 using panel data estimation of time series data. The results showed that, regulatory competence enhances the competition in banking sectors. Ravindra, Vyasi and Manmeet (2008) studied the impact of capital adequacy of the performance of selected commercial Banks in India using panel data models. The authors concluded that there is a positive association between capital adequacy ratio and profitability.

Common in the aforementioned studies is that they excluded the public banks, hence the need for the current research. To a certain extent, one may argue that commercial banks are heterogeneous from public banks because of political interference.

DATA AND METHODOLOGY

For the empirical investigation, both static and dynamic panel data analyses are utilized and effectively applied to a dataset consisting of the seven largest private and public Indian banks spanning the 2009-2012 period. The term 'panel data' refers to the pooling of time series and cross-sectional observations of banks, on the same individual variables over several time periods (Baltagi, 2003). Panel data allow one to account for heterogeneity of the entities being observed. In addition, because of the size of the data set,' there is more variability and hence less collinearity among the variables. Private banks were separated from public banks because of the heterogeneity between the two.

The Static Model

The use of pooled time series and cross sections allows us to take into account the unobserved and time-invariant heterogeneity across different banks. For the estimation of the models, the dataset that consists of N, which denotes partial units, was used; i = 1,…,N observed at T time periods, t = 1,…,T. Therefore, the total number of observations is T × N. Then, y is a (TN × 1) vector of endogenous variables, X is a (TN × k) matrix of exogenous variables, which does not include a column of units for the constant term. In the context of the research, N = 7 and T = 4. Given this, one can write a generic pooled linear regression model by ordinary least square procedure as shown in equation 1. I checked the regression specification using Ramsey's reset shown in Appendices 1 and 2.

$$y_{it} = \beta_0 + \sum_{N=1}^{N} \beta_1 X_{it} + \varepsilon_{it} \qquad (1)$$

where y_{it} is the dependent variable, β_0 is the intercept term, β_i is a k×1 vector of parameters to be estimated on the explanatory variables, and xit is a 1×k vector of observations on the explanatory variables, t = 1, . . . , T, i = 1, . . . , N and ε_{it} is random error term. Pooled OLS enables the researcher to capture the variation of what emerges through time or space simultaneously.
The specification in equation (1) suggests a linear panel data model. The associated assumptions about the model that can be taken into account are as follows:

a-Error terms are normally distributed and have zero mean and standard deviation s_i^2, $e_{it} \sim$ i.i.d. (0 ,s_i^2)
b-Similar variances among banks, $s_i^2 = se2$ "i
c-Zero covariances among banks, Cov(e_{it} ,e_{js}) = 0 for i ≠ j

If the homogeneity hypothesis is rejected, the estimates based on the pooled model are as follows:

$$\begin{matrix} Y_1 \\ Y_2 \\ . \\ . \\ Y_N \end{matrix} = \begin{matrix} X_1 \\ X_2 \\ . \\ . \\ X_N \end{matrix} \beta + \begin{matrix} \varepsilon_1 \\ \varepsilon_2 \\ . \\ . \\ \varepsilon_N \end{matrix} = X\beta + \varepsilon \qquad (2)$$

However, if the difference between β_s however significant is thought to be small, then one could consider a trade-off of accepting some bias in order to reduce variances. If the departure of homogeneity is so great, then this could result in serious distortion in the conclusion, hence the choice of the best alternative static specification that links the pros and cons of each specification. I then tested for heteroskedasticity and serial correlation as shown in Tables 1 and 2. The presence of heteroskedasticity, the statistical inference based on $\sigma^2(X'X)^{-1}$, would be biased, and t-statistics and F-statistics are inappropriate.

Table 1: Heteroskedasticity Test: Breusch-Pagan-Godfrey

Panel A: Private Banks			
F-statistic	1.579	Prob. F(4,23)	0.213
Obs*R-squared	6.032	Prob. Chi-Square(4)	0.196
Scaled explained SS	2.694	Prob. Chi-Square(4)	0.610
Panel B: Public Banks			
F-statistic	0.645	Prob. F(4,23)	0.635
Obs*R-squared	2.826	Prob. Chi-Square(4)	0.587
Scaled explained SS	1.424	Prob. Chi-Square(4)	0.839

This table tests for heteroskedasticity using Breusch-Pagan-Godfrey under the assumption that the error variance is a linear function of X_t. This can be written as: $\delta_t 2 = \alpha 1 + \alpha 2 X t$ *for t =1,2,.....n*

Table 2: Breusch-Godfrey Serial Correlation LM Test

Panel A: Private Banks			
F-statistic	0.073	Prob. F(2,21)	0.9295
Obs*R-squared	0.194	Prob. Chi-Square(2)	0.9074
Panel B: Public Banks			
F-statistic	1.885	Prob. F(2,21)	0.176
Obs*R-squared	4.261	Prob. Chi-Square(2)	0.118

The LM tests for serial correlation often in time series data. That is, the violation of: $Cov(u_t u_{t-s}) = E(u_t u_{t-s}) = 0$ for all t $\neq$ s

The fixed effect model assumes that despite the variation in intercept across the banks, each individual intercept does not vary from time to time. Therefore, the intercept β_{1it} means it is time-invariant. Therefore, the fixed effect model can be expressed as follows:

$$y_{it} = \beta_{1it} + \sum_{N=1}^{N} \beta_1 X_{it} + \varepsilon_{it} \quad (3)$$

Where y is the dependent variable for profitability and X denotes the variables of interest (capital adequacy, non-performing loans, credit to deposit and net interest margin ratios). The fixed effect across the firm was not significant individually or as a group as shown in Table 3.

The common slope coefficients and constants may not be fixed but random. In this case, the random effects model would be appropriate. In a nutshell, the random effect is a compromise between pooling under complete homogeneity and pooling with common slope coefficient, but with the intercept varying cross-sectionally. That is, all of the elements in the coefficient vector, slopes as well as intercepts, are random variables rather than fixed parameters.

Table 3: Fixed Effects on Banks

Private Banks		Public Banks	
Bank	**Effect**	**Bank**	**Effect**
ICICI Bank	0.012	STATE	-4.439
HDFC	-0.030	Punjab	-1.373
Axis Bank	0.308	Canara	3.955
Kotak Mahihndra	0.022	baroda	-0.272
ING Vysya Bank	-0.593	INDIA	-0.937
Induslnd bank	0.134	UNION	1.598
Yes bank	0.156	IDBI	1.469

This table shows the fixed effects across each bank, both public and private.

Under the assumption of intercepts for the cross-section, which are random variables, and slope coefficients, which are fixed parameters, the vector would represent slopes while only the random error term would have two components. Thus:

$$\varepsilon_i = \begin{matrix} \mu_i \\ \mu_i \\ . \\ . \\ \mu i \end{matrix} + \begin{matrix} \eta_{i1} \\ \eta_{i2} \\ . \\ . \\ \eta_{iT} \end{matrix} \qquad (4)$$

The μ_i represents randomness, which is due to the choice of the cross-section (the random intercept), while η_{it} represents the randomness stemming from the cross-section and time period.

The argument in favor of the random effects model is that the fixed effects model often results in a loss of many degrees of freedom and also eliminates a large portion of the total variation in the panel. Another argument is that β_i combines several factors specific to the cross-sectional units and as such they represent 'specific ignorance' (Maddala, 2001). Hence, β_i can be treated as random variables by much the same argument that ε_{it} represents 'general ignorance' can be treated as random variables. On the other hand, there are two arguments in favor of the use of the fixed effects model. The first, common in the analysis of variance literature, is that if the analysis wants to make inferences about only this set of cross-sectional units, then β_i can be treated as fixed. On the other hand, if one wants to make inferences about the population from which these cross-sectional data come, then β_i should be treated as random. The Hausman test, which is derived from the t test, can identify the best model using the restricted F test, which can be expressed as follows:

$$F = \frac{(R^2_{UR} - R^2_R)/m}{(1-R^2_{UR})/(n-k)} \qquad (5)$$

Where R^2_{UR} and R^2_R are the values obtained from the unrestricted and unrestricted regressions, respectively. In addition, model specification was tested using the Ramsey reset test as shown in Appendix 2. Further, in order to test for structural break, recursive least squares (RELS) was used. This assesses how β changes over time. The basic idea is that if β changes significantly, then there is a structural break. The results of the two panels indicated no strong evidence to suggest poolability of the model.

RESULTS

As shown in Table 4, the mean return on assets that measures profitability for private banks is 14.01, which is slightly higher than that of public banks (13.30). This could be attributed to the efficiency of private banks in managing the non-performing assets. As shown, the mean for non-performing assets for private banks is just 0.38 compared with 13.30 for public banks. One of the biggest assets (excluding properties) is advances. If such advances are not readily accessible, a bank's financial performance will be adversely affected. The Reserve Bank of India has classified advances into basically four categories: standard asset, which refers to a loan that is easily recoverable. The second category is substandard assets, which are non-performing assets for periods of less than 12 months. The third category is doubtful debts, which are assets classified as non-performing loans exceeding 12 months. The fourth category is a loss where the loss has been identified and will be written off as bad debt.

Table 4: Descriptive Statistics

	Private Banks					Public Banks				
	CAR	**NPA**	**NIM**	**CD**	**ROE**	**CAR**	**NPA**	**NIM**	**CD**	**ROE**
Mean	16.85	0.38	4.28	70.83	14.01	13.30	13.30	13.30	13.30	13.30
Maximum	21.22	1.11	6.86	100.34	20.89	15.38	15.38	15.38	15.38	15.38
Minimum	11.65	0.03	2.34	31.57	7.06	11.31	11.31	11.31	11.31	11.31
Std. Dev	2.67	0.29	1.15	17.01	3.79	1.06	1.06	1.06	1.06	1.06
N	28	28	28	28	28	28	28	28	28	28

This table shows the descriptive statistics results for both private and public banks. CAR is capital adequacy ratio; NPA is non-performing assets; NIM is the net interest margin; CD is credit to deposit ratio; ROE is the return of equity.

In terms of capital adequacy, the results indicate that private banks are more capitalized, with a mean of 16.85 compared with 13.30 for public banks. Better capitalized banks may reflect higher management, quality, thereby generating a positive and a negative coefficient sign in the income and cost regression, respectively, resulting in an expected positive impact on profitability. In addition, Berger (1995) noted that well capitalized firms face lower expected bankruptcy costs, which in turn reduce their cost of funding and in turn increase their income. The results also show that the net interest margin for private banks is 4.28 compared with 13.30 for public banks.

Table 5 shows the correlation matrix for both private and public banks. Clearly, the capital adequacy ratio is positively associated with profitability in both cases. This implies that the more capitalized the bank, the more profitable it is. The capital adequacy ratio is the total of Tier 1 and Tier 2 capital and is measured as the ratio of capital to risk-adjusted assets and off-balance sheet exposure determined on a risk-weighted basis. A higher ratio reflects a bank's ability to absorb unanticipated capital losses.

As regards to asset quality, I analyzed non-performing loans. The degree to which provisions are made in anticipation of, or concurrent with, actual impairment in the loan portfolio reflects credit quality. A privatized bank may aggressively build its loan portfolio and could be forced to make large provisions for unanticipated bad debts. As shown in the correlation matrixes, there is a negative association between NPA and ROE. Although in both cases, the coefficient is negative, the magnitude for private banks is much higher than for the public banks. It is also possible that a privatized bank may be more efficient in managing its loan portfolio and therefore carry only a small loan loss provision. However, it is paramount to note that banks can smooth incomes by making higher provisions than necessary when credit quality and net income are high. Consequently, they may not increase provisions as much as they should if credit quality is deteriorating. Gunther and Moore (2000) argue that income smoothing will ensure that banks with asset quality problems can raise net income and retained earnings, thereby boosting Tier 1 capital.

Table 5: Pearson Correlation Matrix for Private Banks

	CAR	NPA	NIM	CD	ROE
Panel A: Private Banks					
CAR	1				
NPA	0.273	1			
NIM	-0.015	0.058	1		
CD	-0.079	0.044	0.319	1	
ROE	0.031	-0.706	-0.106	0.226	1
Panel B: Public Banks					
CAR	1				
NPA	-0.321	1			
NIM	0.277	0.019	1		
CD	-0.093	0.313	-.243	1	
ROE	0.340	-.352	.619	117	1

The table shows the Pearson correlation between the independent and dependent variables. Panel A is on the private banks and panel B is on public banks. CAR is capital adequacy ratio; NPA is non-performing assets; NIM is the net interest margin; CD is credit to deposit ratio; ROE is the return of equity.

Further, as shown in Table 6, capital adequacy has positive coefficient and significant at 1% using pooled OLS for private banks. However, as regards to the public banks, although positive coefficient, it's not significant. This is in line with Pasiouras and Kosmidou (2007) and García-Herrero et al. (2009) implying that, the best-performing banks are those that maintain a high level of equity relative to their assets. One could attribute this to the fact that, the banks with higher capital ratios tend to face lower costs of funding due to lower prospective bankruptcy costs. For a bank with capital below its equilibrium ratio, the expected bankruptcy costs are relatively high, and an increase in the capital ratios raises the expected profits by lowering the interest expenses on uninsured debt. However the negative association between capital adequacy and profitability was noted by Goddard et al. (2010) in eight European Union member countries between 1992 and 2007. The negative coefficient could be because banks are required to retain a certain amount that is not lend out and hence is tied capital. However, banks with higher capital–asset ratios are considered relatively safer in the event of loss or liquidation. On the other hand, low-capitalized banks may be considered risky. The results show a positive effect of inefficiency on risk-taking, which supports the moral hazard hypothesis that poor performers are more vulnerable to risk-taking than high-performance banks.

The need for risk management in the banking sector is inherent in the nature of the banking business. Poor asset quality is one major cause of bank failures. During periods of increased uncertainty, financial institutions may decide to diversify their portfolios and/or raise their liquid holdings in order to reduce their risk. Abreu and Mendes (2002), who examined the banks in Portugal, Spain, France and Germany, noted that the loans-to-assets ratio, as a proxy for risk, has a positive impact on the bank's profitability. Table 6 shows that in both private and public banks, non-performing assets have a significant negative coefficient using pooled OLS in line with Bourke (1989) and Molyneux and Thornton (1992). This implies that, the more the non-performing loans, the less profitable the bank is hence decreasing liquidity position. An interesting result is the effect of interest margin. The results indicate a negative coefficient for both public and private banks. Although it is significant at 1% for public banks, it is 10% for private banks. The negative and significant coefficient implies that the lower the interest the bank charges, the more profitable they are. The lower the interest, the more the bank is likely to attract borrowers and the ease it likely the borrower to honor the obligation. Indeed, the correlation for both private and private banks indicates that there is a positive association between the NIM and NPA indicating the higher the interest rates, the higher the non-performing.

Table 6: Regression Analysis Using Pooled OLS, Fixed Effect and Random Effect

	Private Banks			**Public Banks**		
Variable	**Pooled OLS**	**Fixed Effect**	**Random Effect**	**Pooled OLS**	**Fixed Effects**	**Random Effect**
C	15.849**	20.701**	16.332***	3.650	5.959	4.176
	(1.392)	(6.087)	(3.742)	(3.770)	(10.059)	(8.751)
CAR	0.348***	-0.110	0.299	0.306	0.005	0.291
	(0.065)	(0.255)	(0.178)	(0.258)	(0.888)	(0.611)
CD	-0.030**	-0.021	-0.032	0.006	-0.052	0.002
	(0.010)	(0.041)	(0.027)	(0.017)	(0.065)	(0.042)
NIM	-0.352*	-0.360	-0.232	4.465***	5.793*	4.446***
	(0.154)	(0.686)	(0.436)	(0.446)	(2.563)	(1.074)
NPA	-10.730***	-4.737	-10.664***	-3.496***	-2.148**	-3.472**
	(0.597)	(7.839)	(1.716)	(0.666)	(3.656)	(1.619)
Adj. R sqrd	0.67	0.68	0.57	0.49		0.41
F –Statistic	87.396***	6.593**	9.677***	41.395***	0.57	5.601**
AIC	4.383	4.69		5.169	5.286	
Hannan-Quinn	4.421	4.844		5.208	5.446	
DW	1.761	2.030	2.029	1.600	1.968	0.953
Hausman test		Chi sqr stat. 5.838			Chi sqr stat. 10.091	
		p. value. 0.212			p. value. 0.038	

*This table shows the result of running multiple regression analyzing applying the pooled ordinary least square, fixed effects and random effects. Independent variables: CAR is capital adequacy ratio; NPA is non-performing assets; NIM is the net interest margin; CD is credit to deposit ratio and dependent variable, ROE is the return of equity. AIC is Akaike Information Criteria. ***, **, and * indicate significance at the 1,5 and 10 percent levels respectively.*

CONCLUSION

The objective of this study was to assess how private banks differ from public banks in terms of risk management. Using 14 banks for the 2009-2012 period, the data indicates that private banks are more capitalized compared with public banks. The CAR is 17% for private banks and 13% for public banks. The RBI has set CAR for Indian banks to be 9%, which is higher than in most developed countries. The capital adequacy ratio on public sectors continues to decline due to an elevated credit demand and obligation of higher provisions to buffer against asset quality deterioration. NPA negative impacts on the capital adequacy ratio, profitability and bank credibility (Kumar and Singh, 2012). Using fixed effects, the results are consistent with previous studies (Kaaya and Pastroy, 2013) Frederick, 2012), Kithinji, 2010) Felix and Claudine, 2008). That is, the effect of NPA is significant in influencing negatively the profitability of both private and public banks. The increase of NPA on both public and private banks could be attributed to the diversion of funds away from the actual purpose for which they were granted as well as misappropriation of funds by borrowers. Apart from that severe economic conditions and market factors stemming from regulatory changes, recessionary conditions and feeble resources for inefficient management and stressed labor relations have affected the conditions of business and forced them to default on their loan repayments. The research denotes that the public sector banks had to face a reduction in NIM significantly high compared to private banks. This could be because private banks could hedge themselves by diversification. Therefore, the results indicate that credit risk management significantly affects both banks, though compared to the public sector, private banks are far better capitalized and managed more effectively in terms of asset quality. However, for future research, there is a need to include other macroeconomic variables and the size of the bank in assessing capital adequacy and profitability for both private and public banks.

Appendix 1: Measurement of the Variables

Variable	Proxy	Measurement
Profitability	ROE	Profit available to shareholders/ shareholders' funds.
Capital adequacy ratio	CAR	Tier 1 + Tier 2 capital
Asset quality	NPA	Non-performing assets/ total assets.
Management quality	Credit Deposit	Credit (loans) / Total deposits
Earning ability	NIM	Interest earning- Interest on deposit.

This table shows the measurements of variables. Dependent variable, profitability measured by Return on Equity (ROE); dependent variables, capital adequacy ratio (CAR), asset quality measured by non-performing assets (NPA), management quality and earning ability measured by net interest margin (NIM)

Appendix 2: Test of Specification. Ramsey RESET

Panel A: Public Banks			
	Value	**df**	**Probability**
t-statistic	0.151	22	0.880
F-statistic	0.023	(1, 22)	0.880
Likelihood ratio	0.029	1	0.864
F-test summary:			
	Sum of Sq.	**df**	**Mean Squares**
Test SSR	0.284	1	0.284
Restricted SSR	271.72	23	11.81
Unrestricted SSR	271.43	22	12.338
LR test summary:			
	Value	**df**	
Restricted LogL	-71.546	23	
Unrestricted LogL	-71.531	22	
Panel B: Private Banks			
	Value	**df**	**Probability**
t-statistic	0.297	22	0.768
F-statistic	0.088	(1, 22)	0.768
Likelihood ratio	0.112	1	0.737
F-test summary:			
	Sum of Sq.	**df**	**Mean Squares**
Test SSR	0.495	1	0.495
Restricted SSR	123.80	23	5.382
Unrestricted SSR	123.30	22	5.604
LR test summary:			
	Value	**df**	
Restricted LogL	-60.541	23	
Unrestricted LogL	-60.484	22	

This table shows the result of Ramsey Reset test employed to test a linear specification against a non-linear specification using F test statistic: The F test statistics is expressed as:

$$F_{(M;N-k-1)} = \frac{(SSR_{\hat{Y}} - SSR_{\hat{Y}^2})/M}{SSR_{\hat{Y}^2}/(N-K)} = \frac{(SSR_R - SSR_{UR})/M}{SSR_{UR}/(N-K)}$$

Where SSR_s are the sum of squared residuals for the respective regressions;
M is the number of restrictions; N is the number of observations;
K is the number of parameters estimated in the unrestricted equation.
Specification: ROE C CAR CREDIT_DEPOSIT NIM NPA. Omitted Variables: Squares of fitted values

Appendix 3: Redundant Fixed Effects Tests

Panel A: Public Banks			
Effects Test	**Statistic**	**d.f.**	**Prob.**
Cross-section F	2.383	(6,17)	0.074
Cross-section Chi-square	17.092	6	0.008
Panel B: Private Banks			
Cross-section F	1.551	(6,16)	0.024
Cross-section Chi-square	12.379	6	0.054

This table shows that in both panels, the p-values associated to the F-statistics and the Chi-square statistics are both significant at 10%, which provides evidence against the null hypothesis that the fixed effects are all equal to each other. This suggests that there is unobserved heterogeneity.

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