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Analysis of Financial Statement

Firm Valuation in Emerging Markets

Discovering Thoughts, Inventing Future

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Firm Valuation in Emerging Markets and the Exposure to Country Risk

By Oliviero Roggi, Alessandro Giannozzi & Tommaso Baglioni

Link Campus University, Italy

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We tested our new measures of a company's exposure to country risk on Brazilian companies listed on the Bovespa Index. The results confirm that the new approaches can be effectively applied to stable-growth companies, providing with a more reliable estimate of the premium effectively requested by investors in the past. Applying the new approaches, the cost of equity reflects the effective exposure of a company to country risk without being over- or underestimated, as is the case with other existing approaches.

Keywords: emerging markets, cost of equity estimation, country risk premium, lambda.

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FIRMVALUATIONINEMERGINGMARKETSANDTHEEXPOSURETOCOUNTRYRISK

Strictly as per the compliance and regulations of:

Firm Valuation in Emerging Markets and the Exposure to Country Risk

Oliviero Roggi [α], Alessandro Giannozzi [σ] & Tommaso Baglioni [ρ]

Abstract- The goal of this paper is to propose new methods to measure the effective exposure to country risk of emerging-market companies. Starting from Damodaran (2003), we propose three new approaches: the "Prospective Lambda", the "Retrospective Lambda" and the "Company Effective Risk Premium".

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I. Introduction

Valuation in emerging markets is a topic that is extensively discussed in the literature. Companies that operate in emerging markets are exposed to a series of risks that are not faced by mature-market companies. Consequently, investors require a higher return than that requested in a mature market, and hence the cost of equity needs to be adjusted to reflect the additional risk perceived, taking into account a country risk premium. The majority of the models of country risk proposed in the literature do not consider the fact that a firm incorporated in an emerging market might operate mainly in mature markets and *viceversa*, i.e., a firm incorporated in a developed market may have a significant amount of operations in undeveloped markets. Therefore, each company has a different exposure to country risk, depending on where it operates, and the adjusted cost of equity needs to reflect this exposure.

The main literature in this field (Damodaran, 2003) proposes three methods, called "lambda", to estimate companies' effective exposure to country risk. The first method is based on the percentage of revenues that the company earns in the local market, compared with the revenues that the average company earns in the local market. The second approach is based on a comparison of the change in earnings per share of the company, denominated in the country's currency, and the change in the country sovereign bond denominated in US dollars. The last method (regression approach) considers the sensitivity of the company stock returns to the returns of the country sovereign bond denominated in US dollars.

The aim of this paper is to propose three new methods to measure the effective exposure to country risk of emerging-market companies. The first method, called the "Prospective Lambda", represents the effective exposure according to analysts' estimates of growth. The second method, called the "Retrospective Lambda", represents the ex-post effective exposure to country risk; hence, it refers to historical data, while the "Company Effective Risk Premium" is a generalization of the Retrospective Lambda and expresses the premium effectively requested by investors to invest in that specific company.

The country risk premium model implemented in our analysis is the one proposed by Damodaran (2003), which is called the "melded approach". This model considers both the country bond default spread and the volatility of equity markets in a country relative to the volatility of the country bond denominated in US dollars.

The empirical analysis is based on 23 companies, listed on the leading indicator of the Brazilian stock market's average performance (Bovespa Index), for the year 2013. *First*, we tested existing measures of a company's exposure to country risk with Brazilian companies. In particular, to test the effectiveness of the existing measures, we regressed companies stock returns against the 10-year Brazilian sovereign bond denominated in US dollars. *Second*, we tested the new measures of a company's exposure to country proposed in this study[1], the "Retrospective Lambda" and the "Company Effective Risk Premium" on Ibovespa companies[2].

The results demonstrate that, in 2013, the extra return asked to invest in Brazil was on average greater than the value of the country risk premium obtained from existing measures. This result confirms that the

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[1] The first method was not tested because is based on analyst estimates of growth, which are not very reliable, especially for emerging markets.

[2] The analysis excludes preferred stocks and units that are comprised of different equities, e.g., a mix common and preferred stock. Because of the impossibility of having a reliable estimate of their free cash flows, banks and insurance companies have also been excluded from the analysis.

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approaches to measure the exposure to country risk proposed in this study can be effectively applied by financial analysts to stable-growth companies that operate in emerging markets.

We improve upon the existing literature by proposing new approaches to measure the effective exposure to country risk that yield estimates of both the premium effectively requested by investors in the past and the premium linked to future growth estimates. Moreover, the latter approach can be generalized to allow for a first period of high growth.

The paper is structured as follows: Section 2 presents a literature review. Section 3 reports the results obtained using the regression approach. Section 4 is dedicated to the new approaches to measure

companies' exposure to country risk. Section 5 presents the results of the empirical analysis. Conclusions are offered in Section 6.

II. Literature Review

The main models proposed in the literature for estimation of the cost of equity in emerging markets have been classified according to their nature and to the investor's nature and amount of diversification. We classified the models according both to the investor's nature and the nature of the model, with the latter factor reflecting whether the model is based on the CAPM. Table 1 reports our classification.

Table 1 : Classification of the main models developed for estimation of the cost of equity in emerging markets

MODELS CLASSIFICATION	CAPM-BASED MODEL	NON CAPM-BASED MODEL
GLOBAL WELL-DIVERSIFIED INVESTOR	• Global CAPM (Stulz, 1995) • D-CAPM model (Estrada, 2002) • Damodaran model (2003) • Adjusted Local CAPM (Pereiro, 2001) • Adjusted Hybrid CAPM (Pereiro, 2001) • Goldman Sachs model (Mariscal and Hargis, 1999) • Hybrid model (Bodnar, Dumas and Marston, 2003) • Lessard model (Lessard, 1996) • Local CAPM (Stulz, 1995) • Salomon–Smith–Barney model (Zenner and Akaydin, 2002) • Soenen and Johnson Model (2008)	
IMPERFECTLY DIVERSIFIED LOCAL INSTITUTIONAL INVESTOR	• Damodaran total beta (2003) • Godfrey and Espinosa model (1996)	• Estrada Downside Risk model (2000, 2001)
NON-DIVERSIFIED ENTREPRENEUR		• Erb-Harvey-Viskanta model (1995)

The majority of the models proposed in the literature are CAPM-based models, which can be applied to estimate the cost of equity in emerging markets in the case of a globally well-diversified investor. The most widely known models are the **Global CAPM** and the **Local CAPM** (Stulz, 1995).

Several authors, such as Damodaran (2003), Pereiro (2001) and Lessard (1996), adjusted the cost of equity by adding a country risk premium taking in consideration the risk of investing in emerging markets. All of the models proposed in the literature, with their respective formulas, are summarized in Table 2.

Table 2 : Main models for computation of the cost of equity (K_e) in emerging markets

MODEL	FORMULA	DESCRIPTION
• Global CAPM	$K_e = r_{fg} + \beta_g * (R_g - r_{fg})$	**RISK FREE RATE:** rfg → global risk-free rate; rf,l → local country risk-free rate; rf,US → US risk-free rate. **MARKET RETURN:** Rg → global market return; Rl → local market return; Rm,US → US market return. **BETA:** βadj → (σcountry / σUS) * 0.60; βcountry,US → country beta, computed against the US market returns; βd → downside beta, estimated as follows: $\frac{E[Min[(R_i - \mu_i), 0]Min[(R_m - \mu_m)\lambda, 0]]}{E[Min[(R_m - \mu_m)\lambda, 0]^2]}$; βg → global company beta, calculated regressing company's stock returns against returns on the global market index; βl → local company beta, calculated regressing company's stock returns against returns on the local market index; βl,g → local company beta, beta calculated regressing returns on the local equity market index against the global market index; βpeers → average beta of comparable companies quoted in the global market; βUS project → beta of a US-based project comparable to the offshore project. **OTHER INPUTS:** CCRit → country i credit rating (CCR), where t is measured in half-years; CSi, t+1 → semiannual return in USD for country i, where t is measured in half-years; CRP → country risk premium, usually computed as the default spread among the emerging market sovereign US$ bond and the corresponding US sovereign bond; Rid → idiosyncratic risk premium related to the special features of the target firm (e.g., specific firm credit rating as embodied in its corporate debt spread, industry cyclicality, percentage of revenues coming from the target country, etc.); Ri^2 → indicates the portion of variance in the volatility of the emerging market explained by the country risk premium, and is equal to 40%; RMi → ratio between the semistandard deviations of returns with respect to the mean of the emerging market i and the world market (US); PR → political risk premium; ρ lm, lbond → correlation of dollar returns between the local stock market and the sovereign bond used to measure country risk; σcountry, σUS, σi → standard deviation of equity returns of, respectively, the local equity market, the U.S. equity market and of company i; γ1, γ2, γ3 → γ1 measures the access to capital markets; γ2 indicates the susceptibility of the industry to political intervention, and γ3 indicates the portion of the firm's local investments in respect to the total assets. The range of both γ1, γ2 and γ3 go from 0 to 10, with a 0 indicating the best access to markets, for γ1, the least susceptibility to political intervention, for γ2, and a small portion of local investment in respect to firm's total assets, for γ3.
• D-CAPM model	$K_e = r_{fg} + \beta_d * (R_g - r_{fg})$	
• Damodaran model	$K_e = r_{f,US} + \beta_l * (R_{m,US} - r_{f,US}) + CRP$	
• Adjusted Local CAPM	$K_e = r_{fg} + CRP + \beta_l * (R_l - r_{fl}) * (1 - R_i^2)$	
• Adjusted Hybrid CAPM	$K_e = r_{fg} + CRP + \beta_{l,g} * \beta_{peers} * (R_g - r_{fg}) * (1 - R_i^2)$	
• Goldman Sachs model	$K_e = r_{f,US} + \beta_l * (R_{m,US} - r_{f,US}) * (\sigma_{country}/\sigma_{US}) * (1 - \rho_{lm,lbond}) + CRP + Rid$	
• Hybrid model	$K_e = r_{fl} + \beta_g * (R_g - r_{fg}) + \beta_l * (R_l - r_{fl})$	
• Lessard model	$K_e = r_{f,US} + \beta_{country,US} * \beta_{US project} * (R_{m,US} - r_{f,US}) + CRP$	
• Local CAPM	$K_e = r_{fl} + \beta_l * (R_l - r_{fl})$	
• Damodaran total beta	$\beta_i = \rho_{i,m} * \sigma_i / \sigma_m \Rightarrow \sigma_i / \sigma_m = \beta_i / \rho_{i,m} = \beta_{total}$	
• Godfrey and Espinosa model	$K_e = r_{f,US} + CRP + \beta_{adj} * (R_{m,US} - r_{f,US})$	
• Salomon–Smith–Barney model	$K_e = r_{fl} + \beta_g * (R_g - r_{fg}) + CRP * [(\gamma1 + \gamma2 + \gamma3)/30]$	
• Erb-Harvey-Viskanta model	$CS_{i,t+1} = \alpha_0 + \alpha_1 * \ln(CCR_{it}) + \varepsilon_{i,t+1}$	
• Soenen and Johnson	$K_e = r_{f,US} + PR + \beta_{US project} * \beta_{country,US} * R_{m,US}$	
• Estrada Downside Risk model	$K_e = r_{f,US} + (R_g - r_{fg}) * RM_i$	

Because to the fact that not all firms are equally exposed to country risk, we believe that the effective exposure to country risk is needed in company valuation. Damodaran (2003) was the first one to address this problem proposing a measure of a company's exposure to country risk, called "lambda" (λ), and the following approaches for its estimation:

• The revenues approach
• The accounting earnings approach
• The regression approach

The first approach takes into consideration only where the revenues are generated, stating that a company that derives a small percentage of revenues in the country should be less exposed to country risk than the average company should. Thus, lambda is estimated as follows:

$$\lambda_x = \frac{\% \text{ of revenues got in the country for company } x}{\% \text{ of revenues got in the country for the average company}} \qquad (2.1)$$

The second approach compares the change in earnings per share, denominated in the country's currency, with the change in the sovereign bond denominated in US dollars with 10-year maturity.

The last approach is the regression method. It consists of estimation of lambda through a regression of company stock returns against the return of the 10-year sovereign US dollar-denominated bond issued by the emerging country. The slope of the regression indicates the sensitivity of the stock prices to country risk and is taken as a measure of lambda.

In our study we decided to test only the regression approach, in order to have a significant number of observations. In particular, we regressed the stock returns of Brazilian companies listed on the Ibovespa against the 10-year Brazilian sovereign bond denominated in US dollars. The idea was to calculate lambda to check how the effective exposure to Brazil's country risk of each company of the Brazilian equity index changed over the period of 2012-2014 as Brazil's country risk premium changed. The results of the regression analysis are presented in the next section.

Starting from Damodaran (2003), we propose new methods to determine the effective exposure to country risk of emerging-market companies, and we test them with the companies of the leading indicators of the Brazilian stock market's average performance: the Bovespa Index.

III. TESTING EXISTING MEASURES OF COMPANY EXPOSURE TO COUNTRY RISK USING BRAZILIAN FIRMS

To test the effectiveness of Damodaran's regression approach for lambda estimation, we regressed the stock returns of the companies listed on Ibovespa against C-Bond returns (the 10-year Brazilian US dollar-denominated sovereign bond). The companies used in the analysis and the results are reported in Appendix A.

The results of the regression analysis indicate very low R-squared values and high p-values. The value of each slope was meaningless and, consequently, cannot be used as a proxy of the companies' exposure to country risk. This result could be mainly due to problems regarding the use of a "fixed-maturity bond", the 10-year one. In fact, the benchmark of the tenor on the curve usually changes from one year to another, but the analysis needs to be implemented with data that span many years to have a sufficient number of data points for the linear regression to be sensible.

The prices of different bonds, with different characteristics, comprise a time series that represents the price of the 10-year-maturity sovereign bond at different times. The time series is thus composed at each time by the bond that has a ten-year maturity at that time; then, one year after, for example, when that bond has a maturity of nine years, another bond with a 10-year maturity becomes the benchmark of the tenor. Hence, the value of the lambda obtained with the regression approach using a ten-year curve composed of multiple bonds will certainly be skewed. We encountered this problem using the C-bond: over the period of 2012-2014, two different bonds were part of the ten-year curve: EC359050 Corp until November 2013 and EJ901174 Corp afterwards. When the benchmark changed, the price of the curve also changed (from 135.2 to 94.75), thus making the value of the obtained lambda unreliable even if the statistics of the regression did not turn out to be meaningless. Moreover, for many periods, the 10-year benchmark does not even exist, as can be observed from Figure 1.
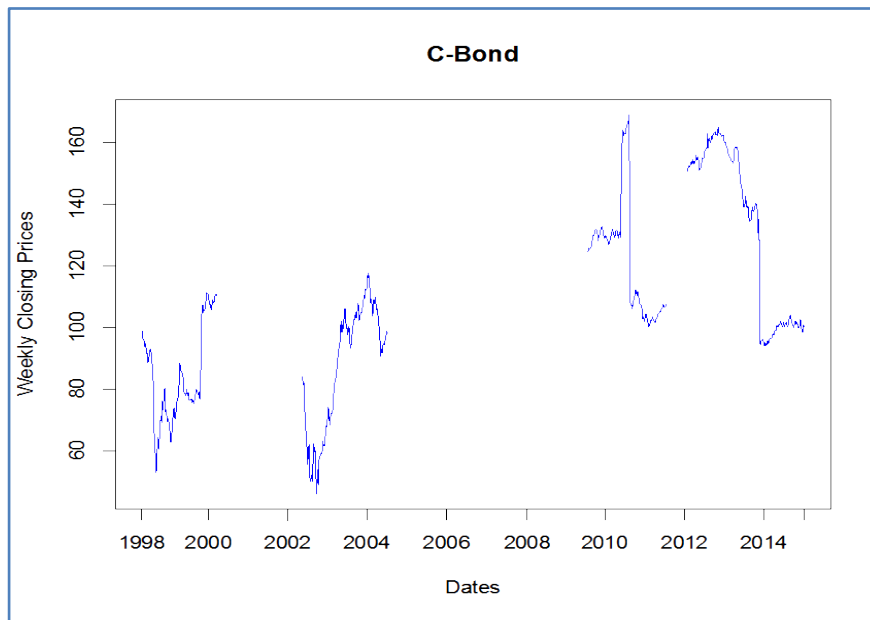
Figure 1 : C-BOND historical price from May 1998 until January 2015

We therefore decided to perform the analysis with other sovereign US dollar-denominated bonds issued by the Brazilian government with different maturities (2021, 2024, 2025 and 2041) to check whether we would have obtained a better result. The companies and bonds used for this analysis are listed in Appendix A. The results of the regression analysis were again unacceptable in terms of the p-value for the majority of the times and, even when they were acceptable, the R-squared value was close to zero. These negative results may be related to the different characteristics and liquidity of bonds with different maturities. As countries become less risky over time, as Brazil did over the last decade, the country bonds may no longer carry the risk connotations that they used to carry. Therefore, the lambda obtained using returns on a government bond that will mature in 2040 is linked to investors' expectations and beliefs that are completely

different from the ones that investors have for a sovereign bond that will mature in 2020. Moreover, the price of a bond moves closer to its face value as it approaches its maturity date, making the choice difficult. Finally, we regressed the companies' stock returns against the returns on the sovereign CDS spread, implementing the approach proposed by Damodaran (2009b). The uncertainty regarding the choice of the CDS was again related to the maturity: in the market, sovereign CDSs with several different maturities are traded, and their returns are highly correlated, as shown in Figure 2.

	CBRZ1U1.CBIL.Curncy	CBRZ1U2.CBIL.Curncy	CBRZ1U3.CBIL.Curncy	CBRZ1U5.CBIL.Curncy	CBRZ1U7.CBIL.Curncy	CBRZ1U10.CBIL.Curncy
CBRZ1U1.CBIL.Curncy	1	0.9	0.89	0.85	0.84	0.85
CBRZ1U2.CBIL.Curncy	0.9	1	0.98	0.95	0.94	0.94
CBRZ1U3.CBIL.Curncy	0.89	0.98	1	0.98	0.96	0.97
CBRZ1U5.CBIL.Curncy	0.85	0.95	0.98	1	0.99	0.98
CBRZ1U7.CBIL.Curncy	0.84	0.94	0.96	0.99	1	0.98
CBRZ1U10.CBIL.Curncy	0.85	0.94	0.97	0.98	0.98	1
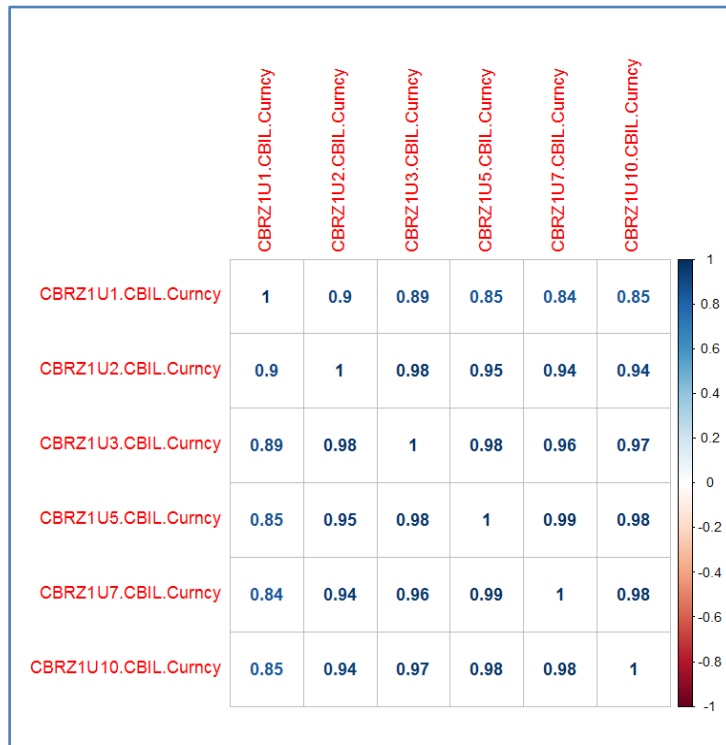
Figure 2 : Brazilian sovereign CDS spread return correlation, with maturity from 1 (CBRZ1U1) to 10 years (CBRZ1U10), over the period 2004-2014

We performed an analysis to check whether there was a significant relationship between the returns on the Brazilian CDS spread and the returns on the Ibovespa companies' stock price, but the results were again unacceptable.

A significant value was obtained only when we performed the analysis against the Bovespa Index, which is the main indicator of the average performance of the Brazilian stock market. The R-squared value was on average near 20%, and the p-value was approximately zero, but lambda had a negative value. The negative slope obtained reflects the fact that as the returns on the Brazilian CDS spread increase, the returns on the Bovespa Index usually decrease. When investors' perception of the country risk increases, the average return for the whole market decreases. Moreover, a negative slope cannot be used as a measure of lambda because it would mean decreasing the cost of equity instead of augmenting it because of the additional risks that affect an emerging country. As clearly shown in Figure 3, the sovereign CDS spread is highly volatile and thus should not be used to estimate lambda.

Daily 5 and 10 Years Brazil CDS Spread
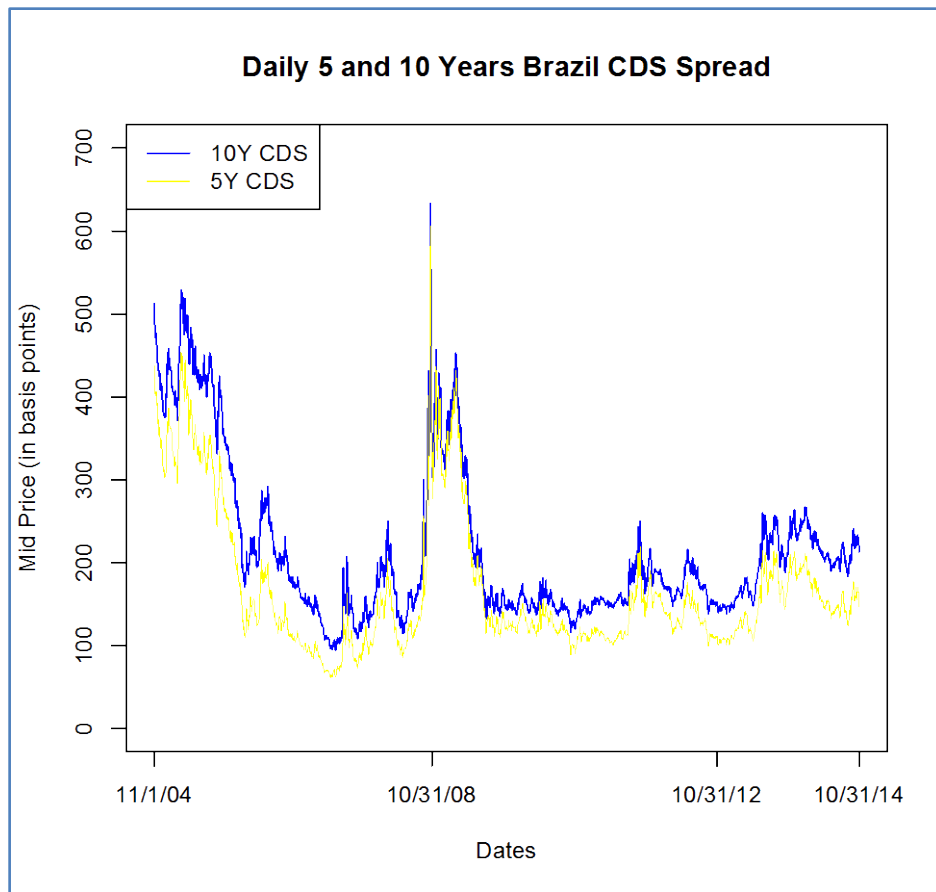
Figure 3 : Plot of daily prices of the five- and ten-year maturity Brazilian CDS spreads

We believe that Damodaran's regression approach does not work because the majority of investors do not consider historical prices for government bonds in the market; what they normally consider is the yield. The reason for this difference is that benchmark bonds issued at different times have different characteristics, such as the terms of maturity and coupon. Because of the differences in these characteristics, a bond may be priced very differently between two benchmarks for the same tenor. For instance, if a 20-year-maturity bond issued 10 years ago that bears a coupon of 7.5% is now rolled up to become the current 10-year benchmark bond because of its reduced maturity, the bond still pays the same 7.5% coupon. This coupon may be very different from the coupon of a 10-year benchmark bond issued today, which may have, for example, only a 5% coupon. Differences such as these will have an impact on the price of the bonds; therefore, a comparison between them is not meaningful.

IV. A Proposal to Measurecompanies' Exposure to Country Risk

The impossibility of determining a reliable measure of a company's exposure to country risk using existing approaches inspired us to develop the following new measures:

- The Prospective Lambda
- The Retrospective Lambda
- The Company Effective Risk Premium

a)   The Prospective Lambda

The "Prospective Lambda" is based on future expected growth rates. The formula is a variant of the implied equity risk premium formula[3], and can be implemented for each company. Lambda (λ) is estimated breaking the cost of equity down into the sum of the risk-free rate, the product of beta and the mature market equity risk premium (ERP), and the portion of country risk premium that affects the company. The last is the product of lambda and the country risk premium (CRP), where lambda is the only unknown parameter.

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[3] See: Lee, Ng, and Swaminathan (2005), and Damodaran (2009a).

$$\text{Company}_x\,\text{Market Cap}_t = \frac{\text{FCFE}_t * \text{Expected FCFE growth}_{t+1}}{\text{Ke}_t - g_t} \qquad (4.1)$$

So,

$$\text{Ke}_t - g_t = \frac{\text{FCFE}_t * \text{Expected FCFE growth}_{t+1}}{\text{Company}_x\,\text{Market Cap}_t} \qquad (4.1.a)$$

Decomposing the cost of equity (Ke),

$$\text{rf}_t + \text{Beta}_t * \text{ERP}_t + \lambda_t * \text{CRP}_t - g_t = \frac{\text{FCFE}_t * \text{Expected FCFE growth}_{t+1}}{\text{Company}_x\,\text{Market Cap}_t} \qquad (4.1.b)$$

Assuming that the company grows at the risk-free rate,

$$\lambda_t * \text{CRP}_t = -\text{Beta}_t * \text{ERP}_t + \frac{\text{FCFE}_t * \text{Expected FCFE growth}_{t+1}}{\text{Company}_x\,\text{Market Cap}_t} \qquad (4.1.c)$$

Thus,

$$\lambda_t = [-\text{Beta}_t * \text{ERP}_t + \frac{\text{FCFE}_t * \text{Expected FCFE growth}_{t+1}}{\text{Company}_x\,\text{Market Cap}_t}]/\text{CRP}_t \qquad (4.1.d)$$

where ERP_t is the mature market equity risk premium calculated at time t; rf_t is the risk-free rate at time t, which is assumed to be equal to the company's stable growth rate, and Market Cap is the company Market Capitalization.

b) The Retrospective Lambda

The Retrospective Lambda relies only on past data for estimation of lambda. It represents an ex-post measure of the effective exposure to country risk over the past year and is suitable for stable-growth firms only.

$$\lambda_t = [-\text{Beta}_t * \text{ERP}_t + \frac{\text{Normalized FCFE}_{t+1}}{\text{Company}_x\,\text{Market Cap}_t}]/\text{CRP}_t \qquad (4.2)$$

c) The Company Effective Risk Premium

In order to avoid the uncertainty regarding the choice of the model for the country risk premium to implement, we derive the Company Effective Risk Premium by taking the product of lambda and the country risk premium:

$$\text{Company Effective Risk Premium}_t = [-\text{Beta}_t * \text{ERP}_t + \frac{\text{Normalized FCFE}_{t+1}}{\text{Company}_x\,\text{Market Cap}_t}] \qquad (4.3)$$

The company effective risk premium should be added to the cost of equity to correctly estimate the adjusted discount rate when valuing stable-growth companies.

V. Testing the Retrospective Lambda and the Company Effective Risk Premium Onbrazilian Companies

To check the reliability of the models proposed in the previous section, we calculated the Retrospective Lambda and the Company Effective Risk Premium for 23 companies listed on the Bovespa Index[4].

For the purpose of our analysis, we calculated the Retrospective Lambda and the Company Effective Risk Premium, using a free cash flow-to-equity model in which the normalized free cash flows to equity of the year t+1 were replaced with the trailing12-months free cash flows to equity[5] of the year t+1 obtained from Bloomberg Professional Database.

We calculated beta as the ratio of the covariance between the Bovespa Index returns and the company stock returns to the variance of the Index returns using two-year weekly returns.

For each week, we used the value of the mature market equity risk premium (calculated by Damodaran[6]) that referred to the month of the week in which we estimated lambda.

For the purpose of the analysis, we used Damodaran's "melded approach":

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[4] Preferred stocks and units were excluded because of the infeasibility of the approach when not considering common stocks. We also decided to exclude banks and insurance companies because of the impossibility of having a reliable estimate of the free cash flows of the firms in these industries. Companies reporting negative FCFE were excluded from the analysis as well.

[5] For each week, the value of the FCFEt+1 that referred to one year later, i.e., fifty-two weeks after the week of interest, was used.

[6] See http://pages.stern.nyu.edu/~adamodar/

$$\text{Country Risk Premium } = \text{ Default spread } * \frac{\sigma \text{ Equity}}{\sigma \text{ Country Bond}} \tag{5.1}$$

The default spread was calculated as the difference between the yield of the 10 years Brazilian bond denominated in US dollars (GTUSDBR10Y Govt) and the US 10 years T.bond yield (USGG10YR Index). The standard deviation of the previous two years of the emerging country equity index returns was used as the country equity standard deviation. For the country bond standard deviation, we used the two years' past returns of the bond EC359050 Corp (maturity 2024).

The company stock price was obtained from Bloomberg Professional Database. Each lambda was calculated for every week of 2013; the values obtained are reported in the table below and represent the averages of the values for the fifty-two weeks of 2013.

Table 3 : Average Country Risk Premium, Retrospective Lambda and Company Effective Risk Premium of Brazil for the year 2013

	Country Risk Premium 2013	Retrospective Lambda	Company Effective Risk Premium
Average Brazil	*4.53%*	*1.18*	*5.37%*

Table 4 : Average Country Risk Premium, Retrospective Lambda and Company Effective Risk Premium of Ibovespa companies for the year 2013

IBOV INDEX				
Ticker	**Company Name**	**Retrospective Lambda**	**Company Effective Risk Premium**	**GICS Industry Group Name**
ABEV3 BS Equity	*Ambev SA*	*0.24*	*1.06%*	*Food Beverage & Tobacco*
CIEL3 BS Equity	*Cielo SA*	*0.38*	*1.64%*	*Software & Services*
BRFS3 BS Equity	*BRF SA*	*0.71*	*3.29%*	*Food Beverage & Tobacco*
PETR3 BS Equity	*Petroleo Brasileiro SA*	*0.91*	*4.35%*	*Energy*
JBSS3 BS Equity	*JBS SA*	*2.70*	*11.79%*	*Food Beverage & Tobacco*
UGPA3 BS Equity	*Ultrapar Participacoes SA*	*1.18*	*5.13%*	*Energy*
BVMF3 BS Equity	*BM&FBovespa SA - Bolsa de Valores Mercad*	*0.33*	*1.58%*	*Diversified Financials*
VALE3 BS Equity	*Vale SA*	*1.01*	*4.56%*	*Materials*
KROT3 BS Equity	*Kroton Educacional SA*	*0.44*	*1.88%*	*Consumer Services*
CCRO3 BS Equity	*CCR SA*	*1.41*	*6.31%*	*Transportation*
CTIP3 BS Equity	*CETIP SA - Mercados Organizados*	*0.27*	*1.37%*	*Diversified Financials*
TBLE3 BS Equity	*Tractebel Energia SA*	*0.89*	*3.58%*	*Utilities*
TIMP3 BS Equity	*Tim Participacoes SA*	*1.52*	*7.09%*	*Telecommunication Services*
SBSP3 BS Equity	*Cia de Saneamento Basico do Estado de Sa*	*3.09*	*13.93%*	*Utilities*
CPFE3 BS Equity	*CPFL Energia SA*	*1.12*	*4.02%*	*Utilities*
RENT3 BS Equity	*Localiza Rent a Car SA*	*1.14*	*5.22%*	*Transportation*
NATU3 BS Equity	*Natura Cosmeticos SA*	*0.40*	*2.02%*	*Household & Personal Products*
QUAL3 BS Equity	*Qualicorp SA*	*1.04*	*4.81%*	*Health Care Equipment & Services*
MULT3 BS Equity	*Multiplan Empreendimentos Imobiliarios S*	*0.39*	*1.71%*	*Real Estate*
ENBR3 BS Equity	*EDP - Energias do Brasil SA*	*3.05*	*12.36%*	*Utilities*
MRFG3 BS Equity	*Marfrig Global Foods SA*	*2.97*	*16.89%*	*Food Beverage & Tobacco*
CYRE3 BS Equity	*Cyrela Brazil Realty SA Empreendimentos*	*0.58*	*3.14%*	*Consumer Durables & Apparel*
ECOR3 BS Equity	*EcoRodovias Infraestrutura e Logistica S*	*1.41*	*5.84%*	*Transportation*

Among all the companies reported in Table 4, the average Retrospective Lambda is equal to 1.18. This means that in 2013,on average, brazilian companies had an exposure to Brazil country risk1.18 times greater than the country risk premium calculated with Damodaran's "melded" approach, which was 4.53% in 2013 (weekly average).

The average Company Effective Risk Premium is equal to 5.37%, meaning that in 2013, the effective rate of return required by investors for equity investments in Brazil was, on average, 5.37% greater than in a mature market.

VI. Conclusions

In this paper, we propose three new approaches to calculate the effective exposure to country risk of emerging-market companies. The impossibility of estimating a reliable measure of company exposure to country risk with existing approaches inspired us to develop the Prospective Lambda, Retrospective Lambda and the Company Effective Risk Premium. The three methods are an implementation of the implied cost of equity approach, in particular, the Prospective Lambda, which is based on growth estimates. The Retrospective Lambda and the Company Effective Risk Premium were developed to overcome the bias underlying analyst estimates of growth that can make the final result relatively random.

The Retrospective Lambda reflects the exposure to country risk that a company effectively had over the past year, whereas the Company Effective Risk Premium reflects the premium effectively requested by investors over the past year.

The Retrospective Lambda and the Company Effective Risk Premium were tested on 23 Brazilian companies using trailing twelve-month free cash flows to equity data.

The results demonstrate that in 2013the extra return required by investors to invest in Brazil was on average greater than the value of the country risk premium obtained from existing measures. Hence, using our new approaches to estimate the company exposure to country risk would have resulted in a higher cost of equity, on average, thereby leading to lower company values.

We believe that our approaches are more reliable than existing measures because they provide an estimate of both the premium effectively requested by investors in the past and the premium linked to future growth estimates.

Applying our approaches, the cost of equity reflects the effective exposure of a company to country risk without being over- or underestimated, as is the case with other existing approaches.

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Appendix A - Companies used for the regression approach analysis

Table 5 : Companies, sovereign bonds and sovereign CDS spread used for the implementation of the regression approach

REGRESSION APPROACH	WEEKLY US$ RETURNS	WEEKLY BR$ RETURNS	MONTHLY BR$ RETURNS
C-BOND	• Ambev • Banco Bradesco • Embraer	• Ambev • Embraer • IBOVESPA	• Embraer • IBOVESPA
BRAZIL4 ⅜ 01/21 Corp	• Banco Itaú	• IBOVESPA	
BRAZIL 8.875 2024 Corp		• Ambev • IBOVESPA	
BRAZIL 8.75 2025 Corp		• America Latina Logistica • Ambev • Embraer • IBOVESPA	
BRAZIL 5.625 2041 Corp		• Ambev • Embraer • IBOVESPA • Vale	
BRAZIL Sovereign CDS Spread 1 Year Maturity		• Embraer • IBOVESPA	
BRAZIL Sovereign CDS Spread 5 Years Maturity		• America Latina Logistica • Ambev • Embraer • IBOVESPA • Vale	
BRAZIL Sovereign CDS Spread 10 Years Maturity		• Ambev • Embraer • IBOVESPA	

Appendix B – Results of the regression approach analysis

Univariate regressions have been run regressing Ibovespa companies stock returns against returns on Brazilian sovereign bonds with different maturities, and returns on Brazilian sovereign CDS spread. Both weekly and monthly returns regressions have been run with two years data, i.e., 104 observations in the former case, and just 24 observations in the latter case. Except when otherwise specified, companies prices are in Brazilian Real, while bonds prices and CDS spread are always in US$.

- Regressions run against Brazilian sovereign bonds:
C-Bond = Brazilian sovereign curve with 10Y maturity.

Bovespa Monthly returns vs. C-Bond						
Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
4-30-2014 ~ 5-31-2012	-0.00456	0.12617	0.01014	0.11822	4.92%	29.74%
3-31-2014 ~ 4-30-2012	-0.00741	0.11409	0.01021	0.11921	4.00%	34.89%
2-28-2014 ~ 3-30-2012	-0.01129	0.10167	0.00962	0.11239	3.59%	37.54%
1-31-2014 ~ 2-29-2012	-0.00883	0.11135	0.00990	0.11572	4.04%	34.64%
12-30-2013 ~ 1-31-2012	-0.00207	0.20656	0.00983	0.09721	17.03%	4.51%
11-29-2013 ~ 12-29-2011	-0.00612	0.36828	0.00930	0.12888	27.07%	0.92%
10-31-2013 ~ 11-30-2011	-0.00516	0.38482	0.00909	0.12707	29.42%	0.62%
9-30-2013 ~ 10-31-2011	-0.00112	0.37075	0.01037	0.14616	22.63%	1.88%
8-30-2013 ~ 9-30-2011	-0.00611	0.37755	0.01059	0.14926	22.53%	1.91%
7-31-2013 ~ 8-31-2011	-0.00990	0.39764	0.01041	0.14721	24.90%	1.31%
6-28-2013 ~ 7-29-2011	-0.01398	0.31848	0.01116	0.14857	17.28%	4.34%
5-31-2013 ~ 6-30-2011	-0.01090	0.27000	0.01070	0.14430	13.72%	7.48%
4-30-2013 ~ 5-31-2011	-0.01089	0.26016	0.01088	0.14947	12.10%	9.57%
3-29-2013 ~ 4-29-2011	-0.01130	0.31490	0.01062	0.16236	14.60%	6.54%
2-28-2013 ~ 3-31-2011	-0.01206	0.35443	0.01090	0.17772	15.31%	5.87%
1-31-2013 ~ 2-28-2011	-0.00959	0.33475	0.01093	0.17822	13.82%	7.37%
12-31-2012 ~ 1-31-2011	-0.01107	0.34155	0.01113	0.18246	13.74%	7.46%
11-30-2012 ~ 12-31-2010	-0.01195	0.33135	0.01072	0.17433	14.11%	7.05%
10-31-2012 ~ 11-30-2010	-0.01357	0.34500	0.01058	0.17038	15.71%	5.52%
9-28 2012 ~ 10-29-2010	-0.01139	0.33867	0.01062	0.17085	15.15%	6.01%
8-31-2012 ~ 9-30-2010	-0.01041	0.34450	0.01091	0.17528	14.94%	6.21%
7-31-2012 ~ 8-31-2010	-0.00689	0.18484	0.01071	0.11238	10.95%	11.42%
6-29-2012 ~ 7-30-2010	-0.00367	0.18845	0.01165	0.12231	9.74%	13.76%
5-31-2012 ~ 6-30-2010	-0.00594	0.11782	0.01210	0.11067	4.90%	29.86%

Embraer monthly returns vs. C-Bond						
Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
4-30-2014 ~ 5-31-2012	0.00661	-0.21291	0.01599	0.18644	5.60%	26.57%
3-31-2014 ~ 4-30-2012	0.01404	-0.18252	0.01663	0.19415	3.86%	35.74%
2-28-2014 ~ 3-30-2012	0.02159	-0.16564	0.01741	0.20333	2.93%	42.40%
1-31-2014 ~ 2-29-2012	0.01799	-0.18541	0.01666	0.19476	3.96%	35.15%
12-30-2013 ~ 1-31-2012	0.02254	-0.12633	0.01639	0.16199	2.69%	44.38%
11-29-2013 ~ 12-29-2011	0.02511	-0.20189	0.02511	0.22866	3.42%	38.68%
10-31-2013 ~ 11-30-2011	0.01844	-0.22641	0.01615	0.22580	4.37%	32.69%
9-30-2013 ~ 10-31-2011	0.02163	-0.19873	0.01558	0.21957	3.59%	37.52%
8-30-2013 ~ 9-30-2011	0.03225	-0.21275	0.01588	0.22380	3.95%	35.21%
7-31-2013 ~ 8-31-2011	0.02797	-0.21138	0.01685	0.23832	3.45%	38.47%
6-28-2013 ~ 7-29-2011	0.02969	-0.27019	0.01680	0.22363	6.22%	23.98%
5-31-2013 ~ 6-30-2011	0.02638	-0.26693	0.01726	0.23276	5.64%	26.38%

Ambev weekly returns vs. C-Bond						
Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
5-2-2014 ~ 5-11-2012	0.00029	-0.53047	0.00255	0.07853	0.45%	50.09%
4-25-2014 ~ 5-4-2012	0.00068	-0.04276	0.00247	0.07632	0.31%	57.65%
4-18-2014 ~ 4-27-2012	0.00063	-0.04187	0.00247	0.07638	0.29%	58.48%
4-11-2014 ~ 4-20-2012	0.00115	-0.03407	0.00252	0.07777	0.19%	66.22%
4-4-2014 ~ 4-13-2012	0.00140	-0.03341	0.00256	0.07911	0.17%	67.37%
3-28-2014 ~ 4-6-2012	0.00132	-0.03412	0.00257	0.07919	0.18%	66.75%
3-21-2014 ~ 3-30-2012	0.00092	-0.03539	0.00257	0.07945	0.19%	65.70%
3-14-2014 ~ 3-23-2012	0.00129	-0.02966	0.00262	0.08084	0.13%	71.45%
3-7-2014 ~ 3-16-2012	0.00147	-0.02896	0.00261	0.08051	0.13%	71.98%
2-28-2014 ~ 3-9-2012	0.00218	-0.02324	0.00268	0.08265	0.08%	77.91%
2-21-2014 ~ 3-2-2012	0.00218	-0.02313	0.00268	0.08263	0.08%	78.01%
2-14-2014 ~ 2-24-2012	0.00239	-0.02132	0.00268	0.08280	0.06%	79.74%
2-7-2014 ~ 2-17-2012	0.00266	-0.02009	0.00271	0.08366	0.06%	81.07%
1-31-2014 ~ 2-10-2012	0.00227	-0.02593	0.00271	0.08379	0.09%	75.76%

Bovespa weekly returns vs. C-Bond						
Date	*Intercept*	*Lambda*	*Standard Error Intercept*	*Standard Error Lambda*	*R-Squared*	*p-value*
5-2-2014 ~ 5-11-2012	-0.00081	0.04543	0.00265	0.08175	0.30%	57.96%
4-25-2014 ~ 5-4-2012	-0.00126	0.03820	0.00264	0.08142	0.22%	63.99%
4-18-2014 ~ 4-27-2012	-0.00125	0.03905	0.00264	0.08139	0.23%	63.24%
4-11-2014 ~ 4-20-2012	-0.00124	0.03967	0.00264	0.08132	0.23%	62.67%
4-4-2014 ~ 4-13-2012	-0.00164	0.03527	0.00264	0.08154	0.18%	66.63%
3-28-2014 ~ 4-6-2012	-0.00202	0.03495	0.00263	0.08115	0.18%	66.76%
3-21-2014 ~ 3-30-2012	-0.00271	0.02734	0.00259	0.07987	0.11%	73.29%
3-14-2014 ~ 3-23-2012	-0.00352	0.02080	0.00254	0.07831	0.07%	79.11%
3-7-2014 ~ 3-16-2012	-0.00311	0.02086	0.00253	0.07816	0.07%	79.01%
2-28-2014 ~ 3-9-2012	-0.00310	0.02042	0.00253	0.07810	0.07%	79.43%
2-21-2014 ~ 3-2-2012	-0.00276	0.02388	0.00255	0.07863	0.09%	76.20%
2-14-2014 ~ 2-24-2012	-0.00262	0.02616	0.00255	0.07861	0.11%	74.00%
2-7-2014 ~ 2-17-2012	-0.00231	0.02673	0.00257	0.07940	0.11%	73.71%
1-31-2014 ~ 2-10-2012	-0.00260	0.02244	0.00257	0.07952	0.08%	77.83%

Embraer weekly returns vs. C-Bond						
Date	*Intercept*	*Lambda*	*Standard Error Intercept*	*Standard Error Lambda*	*R-Squared*	*p-value*
5-2-2014 ~ 5-11-2012	0.00223	-0.00315	0.00379	0.11682	0.00%	97.85%
4-25-2014 ~ 5-4-2012	0.00252	0.00152	0.00378	0.11685	0.00%	98.97%
4-18-2014 ~ 4-27-2012	0.00256	0.00080	0.00379	0.11686	0.00%	99.46%
4-11-2014 ~ 4-20-2012	0.00317	0.00791	0.00378	0.11670	0.00%	94.61%
4-4-2014 ~ 4-13-2012	0.00381	0.01406	0.00382	0.11777	0.01%	90.52%
3-28-2014 ~ 4-6-2012	0.00401	0.01563	0.00401	0.01563	0.02%	89.50%
3-21-2014 ~ 3-30-2012	0.00406	0.01192	0.00383	0.11830	0.00%	92.00%
3-14-2014 ~ 3-23-2012	0.00518	0.02251	0.00384	0.11842	0.04%	84.96%
3-7-2014 ~ 3-16-2012	0.00542	0.02321	0.00383	0.11810	0.04%	84.46%
2-28-2014 ~ 3-9-2012	0.00479	0.02020	0.00378	0.11671	0.03%	86.29%
2-21-2014 ~ 3-2-2012	0.00488	0.02093	0.00378	0.11658	0.03%	85.78%
2-14-2014 ~ 2-24-2012	0.00513	0.01743	0.00382	0.11784	0.02%	88.27%
2-7-2014 ~ 2-17-2012	0.00485	0.01988	0.00380	0.11736	0.03%	86.59%
1-31-2014 ~ 2-10-2012	0.00555	0.03097	0.00377	0.11653	0.07%	79.09%

Ambev US$ weekly returns vs. C-Bond						
Date	*Intercept*	*Lambda*	*Standard Error Intercept*	*Standard Error Lambda*	*R-Squared*	*p-value*
5-2-2014 ~ 5-11-2012	-0.00065	0.02227	0.00300	0.09248	0.06%	81.02%
4-25-2014 ~ 5-4-2012	-0.00063	0.02746	0.00300	0.09262	0.09%	76.75%
4-18-2014 ~ 4-27-2012	-0.00068	0.02865	0.00300	0.09267	0.09%	75.79%
4-11-2014 ~ 4-20-2012	-0.00029	0.03423	0.00302	0.09315	0.13%	71.40%
4-4-2014 ~ 4-13-2012	-0.00018	0.03294	0.00304	0.09377	0.12%	72.61%
3-28-2014 ~ 4-6-2012	-0.00040	0.03205	0.00304	0.09391	0.11%	73.36%
3-21-2014 ~ 3-30-2012	-0.00114	0.02679	0.00303	0.09358	0.08%	77.52%
3-14-2014 ~ 3-23-2012	-0.00100	0.03064	0.00305	0.09402	0.10%	74.51%
3-7-2014 ~ 3-16-2012	-0.00074	0.03133	0.00303	0.09359	0.11%	73.85%
2-28-2014 ~ 3-9-2012	-0.00038	0.03411	0.00305	0.09396	0.13%	71.74%
2-21-2014 ~ 3-2-2012	-0.00058	0.03228	0.00303	0.09361	0.12%	73.10%
2-14-2014 ~ 2-24-2012	-0.00051	0.03090	0.00304	0.09389	0.11%	74.27%
2-7-2014 ~ 2-17-2012	-0.00028	0.03224	0.00306	0.09454	0.11%	73.38%
1-31-2014 ~ 2-10-2012	-0.00086	0.02301	0.00304	0.09395	0.06%	80.70%
1-24-2014 ~ 2-03-2012	-0.00032	0.06126	0.00302	0.07331	0.68%	40.53%

Banco Bradesco US$ weekly returns vs. C-Bond

Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
5-2-2014 ~ 5-11-2012	0.00219	0.13992	0.00421	0.12976	1.13%	28.35%
4-25-2014 ~ 5-4-2012	0.00161	0.13215	0.00422	0.13017	1.00%	31.24%
4-18-2014 ~ 4-27-2012	0.00147	0.13330	0.00422	0.13026	1.02%	30.86%
4-11-2014 ~ 4-20-2012	0.00122	0.12955	0.00423	0.13035	0.96%	32.27%
4-4-2014 ~ 4-13-2012	0.00057	0.12101	0.00420	0.12958	0.85%	35.26%
3-28-2014 ~ 4-6-2012	-0.00020	0.11952	0.00419	0.12940	0.83%	35.79%
3-21-2014 ~ 3-30-2012	-0.00174	0.10084	0.00403	0.12439	0.64%	41.95%
3-14-2014 ~ 3-23-2012	-0.00277	0.09333	0.00395	0.12180	0.57%	44.53%
3-7-2014 ~ 3-16-2012	-0.00212	0.09407	0.00392	0.12085	0.59%	43.82%
2-28-2014 ~ 3-9-2012	-0.00231	0.09266	0.00392	0.12087	0.57%	44.51%
2-21-2014 ~ 3-2-2012	-0.00216	0.09445	0.00393	0.12119	0.59%	43.76%
2-14-2014 ~ 2-24-2012	-0.00267	0.08769	0.00391	0.12078	0.51%	46.95%
2-7-2014 ~ 2-17-2012	-0.00270	0.08800	0.00391	0.12080	0.52%	46.80%
1-31-2014 ~ 2-10-2012	-0.00348	0.07565	0.00388	0.11987	0.39%	52.94%

Embraer US$ weekly returns vs. C-Bond

Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
5-2-2014 ~ 5-11-2012	0.00134	0.04218	0.00402	0.12390	0.11%	73.42%
4-25-2014 ~ 5-4-2012	0.00070	0.03409	0.00403	0.12461	0.07%	78.50%
4-18-2014 ~ 4-27-2012	0.00100	0.03367	0.00403	0.12450	0.07%	78.74%
4-11-2014 ~ 4-20-2012	0.00093	0.03292	0.00403	0.12439	0.07%	79.18%
4-4-2014 ~ 4-13-2012	0.00139	0.03788	0.00404	0.12461	0.09%	76.18%
3-28-2014 ~ 4-6-2012	0.00198	0.04042	0.00407	0.12552	0.10%	74.81%
3-21-2014 ~ 3-30-2012	0.00169	0.03191	0.00405	0.12507	0.06%	79.92%
3-14-2014 ~ 3-23-2012	0.00164	0.03258	0.00405	0.12491	0.07%	79.48%
3-7-2014 ~ 3-16-2012	0.00260	0.03232	0.00405	0.12504	0.07%	79.65%
2-28-2014 ~ 3-9-2012	0.00258	0.03086	0.00405	0.12503	0.06%	80.56%
2-21-2014 ~ 3-2-2012	0.00169	0.02230	0.00399	0.12317	0.03%	85.67%
2-14-2014 ~ 2-24-2012	0.00178	0.02333	0.00399	0.12332	0.04%	85.03%
2-7-2014 ~ 2-17-2012	0.00212	0.02596	0.00404	0.12468	0.04%	83.55%
1-31-2014 ~ 2-10-2012	0.00166	0.01808	0.00400	0.12375	0.02%	88.41%
1-24-2014 ~ 2-03-2012	0.00235	0.05516	0.00396	0.09629	0.32%	56.80%

BRAZIL4 ⅞ 01/21 Corp = Brazilian sovereign bond with maturity 2021

Bovespa weekly returns vs. BRAZIL4 ⅞ 01/21 Corp

Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
5-2-2014 ~ 5-11-2012	-0.00062	0.73485	0.00254	0.25812	7.36%	0.53%
4-25-2014 ~ 5-4-2012	-0.00098	0.68776	0.00254	0.26264	6.30%	1.02%
4-18-2014 ~ 4-27-2012	-0.00103	0.68198	0.00254	0.26342	6.17%	1.10%
4-11-2014 ~ 4-20-2012	-0.00107	0.68293	0.00254	0.26220	6.24%	1.06%
4-4-2014 ~ 4-13-2012	-0.00148	0.64500	0.00256	0.26339	5.55%	1.60%
3-28-2014 ~ 4-6-2012	-0.00181	0.62762	0.00255	0.26333	5.28%	1.90%
3-21-2014 ~ 3-30-2012	-0.00246	0.64756	0.00250	0.25790	5.82%	1.36%
3-14-2014 ~ 3-23-2012	0.00326	0.64876	0.00245	0.25264	6.07%	1.17%
3-7-2014 ~ 3-16-2012	-0.00287	0.61068	0.00245	0.25297	5.41%	1.76%
2-28-2014 ~ 3-9-2012	-0.00286	0.60632	0.00245	0.25259	5.35%	1.82%
2-21-2014 ~ 3-2-2012	-0.00252	0.63593	0.00246	0.25403	5.79%	1.39%
2-14-2014 ~ 2-24-2012	-0.00235	0.65627	0.00245	0.25428	6.13%	1.13%
2-7-2014 ~ 2-17-2012	-0.00206	0.63248	0.00249	0.25771	5.58%	1.58%
1-31-2014 ~ 2-10-2012	-0.00231	0.61089	0.00249	0.26011	5.13%	2.08%

Banco Itau' US$ weekly returns vs. BRAZIL4 ⅞ 01/21 Corp						
Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
5-2-2014 ~ 5-11-2012	0.00362	1.24924	0.00403	0.40893	8.38%	0.29%
4-25-2014 ~ 5-4-2012	0.00294	1.20588	0.00408	0.42175	7.42%	0.52%
4-18-2014 ~ 4-27-2012	0.00169	1.23520	0.00414	0.42899	7.52%	0.49%
4-11-2014 ~ 4-20-2012	0.00159	1.21879	0.00414	0.42738	7.38%	0.53%
4-4-2014 ~ 4-13-2012	0.00072	1.13836	0.00417	0.42938	6.45%	0.93%
3-28-2014 ~ 4-6-2012	-0.00014	1.11977	0.00419	0.43313	6.15%	1.11%
3-21-2014 ~ 3-30-2012	-0.00144	1.16067	0.00410	0.42351	6.86%	0.72%
3-14-2014 ~ 3-23-2012	-0.00287	1.16009	0.00406	0.41900	6.99%	0.67%
3-7-2014 ~ 3-16-2012	-0.00229	1.10413	0.00403	0.41605	6.46%	0.92%
2-28-2014 ~ 3-9-2012	-0.00231	1.09956	0.00403	0.41554	6.42%	0.94%
2-21-2014 ~ 3-2-2012	-0.00217	1.11043	0.00403	0.41643	6.52%	0.89%
2-14-2014 ~ 2-24-2012	-0.00224	1.11138	0.00404	0.41843	6.47%	0.92%
2-7-2014 ~ 2-17-2012	-0.00203	1.09297	0.00404	0.41918	6.14%	1.05%
1-31-2014 ~ 2-10-2012	-0.00273	0.99426	0.00397	0.41420	5.35%	1.82%

BRAZIL 8.875 2024 Corp = Brazilian sovereign bond with maturity 2024

Ambev Weekly Returns vs. BRAZIL 8.875 2024 Corp						
Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
5-2-2014 ~ 5-11-2012	0.00029	-0.19623	0.00253	0.18316	1.11%	28.65%
4-25-2014 ~ 5-4-2012	0.00066	-0.16781	0.00246	0.17824	0.86%	34.87%
4-18-2014 ~ 4-27-2012	0.00059	-0.16232	0.00246	0.17919	0.80%	36.71%
4-11-2014 ~ 4-20-2012	0.00114	-0.13526	0.00251	0.18251	0.54%	46.03%
4-4-2014 ~ 4-13-2012	0.00139	-0.13517	0.00255	0.18567	0.52%	46.83%
3-28-2014 ~ 4-6-2012	0.00129	-0.13727	0.00255	0.18916	0.53%	46.44%
3-21-2014 ~ 3-30-2012	0.00092	-0.12491	0.00256	0.18761	0.43%	50.71%
3-14-2014 ~ 3-23-2012	0.00128	-0.11253	0.00261	0.19163	0.34%	55.83%
3-7-2014 ~ 3-16-2012	0.00145	-0.10764	0.00260	0.19048	0.31%	57.32%
2-28-2014 ~ 3-9-2012	0.00216	-0.09735	0.00267	0.19558	0.24%	61.97%

Bovespa Weekly Returns vs. BRAZIL 8.875 2024 Corp						
Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
5-2-2014 ~ 5-11-2012	-0.00080	0.17469	0.00263	0.19080	0.82%	36.20%
4-25-2014 ~ 5-4-2012	-0.00125	0.15338	0.00262	0.19026	0.63%	42.20%
4-18-2014 ~ 4-27-2012	-0.00120	0.16442	0.00262	0.19094	0.72%	39.12%
4-11-2014 ~ 4-20-2012	-0.00121	0.17073	0.00262	0.19065	0.78%	37.26%
4-4-2014 ~ 4-13-2012	-0.00161	0.16123	0.00263	0.19122	0.69%	40.11%
3-28-2014 ~ 4-6-2012	-0.00199	0.13618	0.00262	0.19158	0.49%	47.88%
3-21-2014 ~ 3-30-2012	-0.00264	0.16311	0.00257	0.18824	0.73%	38.82%
3-14-2014 ~ 3-23-2012	-0.00348	0.11002	0.00253	0.18556	0.34%	55.45%
3-7-2014 ~ 3-16-2012	-0.00307	0.10297	0.00252	0.18488	0.30%	57.88%

BRAZIL 8.75 2025 Corp = Brazilian sovereign bond with maturity 2025.

Ambev weekly returns vs. BRAZIL 8.75 2025 Corp						
Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
5-2-2014 ~ 5-11-2012	0.00033	-0.15782	0.00254	0.22101	0.50%	47.68%
4-25-2014 ~ 5-4-2012	0.00073	-0.09998	0.00247	0.21562	0.21%	64.39%
4-18-2014 ~ 4-27-2012	0.00068	-0.10138	0.00247	0.21577	0.22%	63.95%
4-11-2014 ~ 4-20-2012	0.00120	-0.07338	0.00252	0.21950	0.11%	73.88%
4-4-2014 ~ 4-13-2012	0.00150	-0.02485	0.00256	0.22183	0.01%	91.10%
3-28-2014 ~ 4-6-2012	0.00143	-0.00757	0.00257	0.22981	0.00%	97.38%
3-21-2014 ~ 3-30-2012	0.00108	0.02396	0.00257	0.23350	0.01%	91.85%
3-14-2014 ~ 3-23-2012	0.00147	0.05981	0.00261	0.23702	0.06%	80.13%
3-7-2014 ~ 3-16-2012	0.00165	0.05972	0.00260	0.23562	0.06%	80.04%

America Latina Logistica weekly returns vs. BRAZIL 8.75 2025 Corp

Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
5-2-2014 ~ 5-11-2012	0.00198	0.64185	0.00452	0.39371	2.54%	10.61%
4-25-2014 ~ 5-4-2012	0.00196	0.63228	0.00452	0.39545	2.24%	11.29%
4-18-2014 ~ 4-27-2012	0.00065	0.60894	0.00456	0.39847	2.24%	12.96%
4-11-2014 ~ 4-20-2012	0.00093	0.62694	0.00457	0.39882	2.37%	11.90%
4-4-2014 ~ 4-13-2012	-0.00014	0.57747	0.00453	0.39297	2.07%	14.48%
3-28-2014 ~ 4-6-2012	-0.00050	0.44968	0.00453	0.40500	1.17%	27.45%
3-21-2014 ~ 3-30-2012	-0.00084	0.46851	0.00453	0.41137	1.26%	25.74%
3-14-2014 ~ 3-23-2012	-0.00153	0.41540	0.00455	0.41236	0.99%	31.61%
3-7-2014 ~ 3-16-2012	-0.00156	0.41302	0.00455	0.41162	0.98%	31.80%

Bovespa weekly returns vs. BRAZIL 8.75 2025 Corp

Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
5-2-2014 ~ 5-11-2012	-0.00045	0.56278	0.00257	0.22362	5.85%	1.34%
4-25-2014 ~ 5-4-2012	-0.00084	0.54169	0.00256	0.22380	5.43%	1.73%
4-18-2014 ~ 4-27-2012	-0.00084	0.54107	0.00256	0.22375	5.42%	1.74%
4-11-2014 ~ 4-20-2012	-0.00085	0.54210	0.00256	0.22334	5.46%	1.70%
4-4-2014 ~ 4-13-2012	0.00041	0.59462	0.00384	0.28032	8.26%	3.89%

Embraer weekly returns vs. BRAZIL 8.75 2025 Corp

Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
5-2-2014 ~ 5-11-2012	0.00197	-0.64492	0.00369	0.32139	3.80%	4.74%
4-25-2014 ~ 5-4-2012	0.00156	-0.65210	0.00371	0.32395	3.82%	4.68%
4-18-2014 ~ 4-27-2012	0.00185	-0.64743	0.00370	0.32362	3.78%	4.81%
4-11-2014 ~ 4-20-2012	0.00193	-0.64038	0.00370	0.32324	3.71%	5.03%
4-4-2014 ~ 4-13-2012	0.00262	-0.59745	0.00371	0.32182	3.27%	6.63%
3-28-2014 ~ 4-6-2012	0.00295	-0.64411	0.00375	0.33546	3.49%	5.76%
3-21-2014 ~ 3-30-2012	0.00323	-0.65830	0.00375	0.34095	3.53%	5.63%
3-14-2014 ~ 3-23-2012	0.00332	-0.64573	0.00376	0.34054	3.41%	6.08%
3-7-2014 ~ 3-16-2012	0.00433	-0.68204	0.00376	0.33989	3.80%	4.74%

BRAZIL 5.625 2041 Corp = Brazilian sovereign bond with maturity 2041

Ambev monthly returns vs. BRAZIL 5.625 2041 Corp

Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
9-30-2014 ~ 10-31-2012	0.00207	-0.02030	0.00916	0.18961	0.05%	91.57%
8-29-2014 ~ 9-28-2012	0.00309	-0.05187	0.00906	0.19907	0.31%	79.69%
7-31-2014 ~ 8-31-2012	-0.00013	-0.11033	0.00902	0.20547	1.29%	59.67%
6-30-2014 ~ 7-31-2012	0.00135	-0.07706	0.00896	0.19533	0.70%	69.70%
5-30-2014 ~ 6-29-2012	0.00188	-0.07182	0.00893	0.19036	0.64%	70.96%
4-30-2014 ~ 5-31-2012	0.00132	-0.04893	0.00906	0.19425	0.29%	80.35%
3-31-2014 ~ 4-30-2012	0.05825	0.01889	0.00926	0.19882	0.04%	92.52%
2-28-2014 ~ 3-30-2012	0.00946	-0.00113	0.01004	0.21715	0.00%	99.59%
1-31-2014 ~ 2-29-2012	0.01078	0.00515	0.01037	0.22582	0.00%	98.20%
12-30-2013 ~ 1-31-2012	0.01155	-0.01713	0.01006	0.21972	0.03%	93.86%
11-29-2013 ~ 12-29-2011	0.01722	0.03959	0.01089	0.23743	0.13%	86.91%
10-31-2013 ~ 11-30-2011	0.01738	0.08424	0.01083	0.24332	0.54%	73.25%
9-30-2013 ~ 10-31-2011	0.01861	0.08762	0.01066	0.23295	0.64%	71.04%
8-30-2013 ~ 9-30-2011	0.01861	0.08762	0.01066	0.23295	0.64%	71.04%
7-31-2013 ~ 8-31-2011	0.02879	0.24341	0.01295	0.28027	3.32%	39.45%
6-28-2013 ~ 7-29-2011	0.02273	0.16758	0.01429	0.30710	1.34%	59.08%
5-31-2013 ~ 6-30-2011	0.02312	0.21361	0.01443	0.34961	1.67%	54.75%
4-30-2013 ~ 5-31-2011	0.02182	0.16193	0.01514	0.43583	0.62%	71.38%
3-28-2013 ~ 4-29-2011	0.02575	0.34349	0.01509	0.47363	2.34%	47.60%
2-28-2013 ~ 3-31-2011	0.02898	0.25862	0.01500	0.47602	1.32%	59.24%
1-31-2013 ~ 2-28-2011	0.03160	0.19755	0.01457	0.46359	0.82%	67.42%
12-28-2012 ~ 1-31-2011	0.01582	0.72785	0.01615	0.58014	6.68%	22.28%
11-30-2012 ~ 12-30-2010	0.02653	0.33582	0.01602	0.54589	1.69%	54.48%
10-31-2012 ~ 11-30-2010	0.02348	0.40580	0.01530	0.47953	3.15%	40.65%

| Bovespa monthly returns vs. BRAZIL 5.625 2041 Corp | | | | | | |
Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
9-30-2014 ~ 10-31-2012	0.00325	0.72571	0.00857	0.17622	43.53%	0.00%
8-31-2014 ~ 9-30-2012	0.00711	0.62582	0.00816	0.17828	35.90%	0.20%
7-31-2014 ~ 8-31-2012	0.00501	0.54466	0.00790	0.17889	29.64%	0.59%
6-30-2014 ~ 7-31-2012	0.00226	0.54266	0.00743	0.16045	34.21%	0.27%
5-31-2014 ~ 6-30-2012	-0.00053	0.51584	0.00733	0.15510	33.46%	0.31%
4-30-2014 ~ 5-31-2012	-0.00413	0.54774	0.00872	0.18593	28.29%	0.75%
3-31-2014 ~ 4-30-2012	-0.00698	0.50626	0.00899	0.19199	24.01%	1.51%
2-28-2014 ~ 3-31-2012	-0.00994	0.46046	0.00861	0.18506	21.96%	2.09%
1-31-2014 ~ 2-29-2012	-0.00716	0.49694	0.00878	0.19010	23.70%	1.58%
12-31-2013 ~ 1-31-2012	-0.00014	0.45097	0.00995	0.21770	16.32%	5.02%
11-30-2013 ~ 12-31-2011	0.00068	0.46378	0.00988	0.21643	17.27%	4.34%
10-31-2013 ~ 11-30-2011	-0.00020	0.45040	0.00989	0.22351	15.58%	5.63%
9-30-2013 ~ 10-31-2011	0.00253	0.54321	0.01049	0.23044	20.17%	2.77%
8-31-2013 ~ 9-30-2011	0.00081	0.55784	0.01076	0.23661	20.17%	2.77%
7-31-2013 ~ 8-31-2011	-0.00593	0.51281	0.01081	0.23286	18.06%	3.84%
6-30-2013 ~ 7-31-2011	-0.00965	0.47951	0.01109	0.23728	15.66%	5.56%
5-31-2013 ~ 6-30-2011	-0.00805	0.32928	0.01093	0.26350	6.63%	22.46%
4-30-2013 ~ 5-31-2011	-0.00894	0.33245	0.01136	0.32467	4.55%	31.70%
3-31-2013 ~ 4-30-2011	-0.00974	0.37368	0.01128	0.35021	4.92%	29.75%
2-28-2013 ~ 3-31-2011	-0.00848	0.36311	0.01145	0.35912	4.44%	32.30%
1-31-2013 ~ 2-28-2011	-0.00601	0.31774	0.01146	0.36006	3.42%	38.71%
12-31-2012 ~ 1-31-2011	-0.00874	0.39945	0.01221	0.43332	3.72%	36.66%
11-30-2012 ~ 12-31-2010	-0.00879	0.31638	0.01156	0.39345	2.86%	42.99%
10-31-2012 ~ 11-30-2010	-0.00989	0.34891	0.01106	0.34641	4.41%	32.48%

| Embraer monthly returns vs. BRAZIL 5.625 2041 Corp | | | | | | |
Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
9-30-2014 ~ 10-31-2012	0.02021	-0.83153	0.01247	0.25810	32.06%	0.39%
8-29-2014 ~ 9-28-2012	0.01716	-0.79271	0.01258	0.27660	27.18%	0.90%
7-31-2014 ~ 8-31-2012	0.01646	-0.86137	0.01267	0.28887	28.78%	0.69%
6-30-2014 ~ 7-31-2012	0.01622	-0.81543	0.01247	0.27191	29.02%	0.66%
5-30-2014 ~ 6-29-2012	0.01523	-0.85770	0.01254	0.26738	31.87%	0.41%
4-30-2014 ~ 5-31-2012	0.00608	-0.87264	0.01380	0.29598	28.32%	0.74%
3-31-2014 ~ 4-30-2012	0.01354	-0.76161	0.01499	0.32189	20.28%	2.72%
2-28-2014 ~ 3-30-2012	0.01924	-0.77304	0.01583	0.34229	18.82%	3.42%
1-31-2014 ~ 2-29-2012	0.01501	-0.85755	0.01469	0.31970	24.64%	1.36%
12-30-2013 ~ 1-31-2012	0.01757	-0.87284	0.01443	0.31515	25.85%	1.12%
11-29-2013 ~ 12-29-2011	0.01781	-0.86587	0.01444	0.31471	25.60%	1.17%
10-31-2013 ~ 11-30-2011	0.01362	-0.82758	0.01443	0.32434	22.83%	1.82%
9-30-2013 ~ 10-31-2011	0.01884	-0.74775	0.01402	0.30617	21.33%	2.31%
8-30-2013 ~ 9-30-2011	0.02699	-0.74393	0.01454	0.31971	19.75%	2.96%
7-31-2013 ~ 8-31-2011	0.02501	-0.86351	0.01477	0.31954	24.92%	1.30%
6-28-2013 ~ 7-29-2011	0.02591	-0.89855	0.01456	0.31272	27.29%	0.88%
5-31-2013 ~ 6-30-2011	0.02735	-1.11109	0.01445	0.35007	31.41%	0.44%
4-30-2013 ~ 5-31-2011	0.03026	-1.26316	0.01486	0.42767	28.39%	0.73%
3-28-2013 ~ 4-29-2011	0.02626	-1.39727	0.01509	0.47362	28.35%	0.74%
2-28-2013 ~ 3-31-2011	0.02252	-1.34858	0.01545	0.49048	25.57%	1.17%
1-31-2013 ~ 2-28-2011	0.02388	-1.37599	0.01544	0.49134	26.28%	1.04%
12-28-2012 ~ 1-31-2011	0.02832	-1.36680	0.01747	0.62762	17.73%	4.04%
11-30-2012 ~ 12-30-2010	0.01463	-0.87761	0.01736	0.59145	9.10%	15.20%
10-31-2012 ~ 11-30-2010	0.01418	-0.67566	0.01638	0.51363	7.29%	20.19%

Vale monthly returns vs. BRAZIL 5.625 2041 Corp

Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
9-30-2014 ~ 10-31-2012	-0.00910	0.19640	0.01392	0.28802	2.07%	50.24%
8-29-2014 ~ 9-28-2012	-0.00352	0.10183	0.01411	0.31020	0.49%	74.58%
7-31-2014 ~ 8-31-2012	-0.00125	0.27466	0.01387	0.31611	3.32%	39.43%
6-30-2014 ~ 7-31-2012	-0.01047	0.17475	0.01312	0.28619	1.67%	54.77%
5-30-2014 ~ 6-29-2012	-0.00907	0.23841	0.01330	0.28367	3.11%	40.97%
4-30-2014 ~ 5-31-2012	-0.01203	0.27403	0.01402	0.30071	3.64%	37.20%
3-31-2014 ~ 4-30-2012	-0.00945	0.31441	0.01375	0.29535	4.90%	29.86%
2-28-2014 ~ 3-30-2012	-0.00717	0.35216	0.01365	0.29515	6.08%	24.55%
1-31-2014 ~ 2-29-2012	-0.00805	0.34305	0.01371	0.29855	5.66%	26.29%
12-30-2013 ~ 1-31-2012	0.00032	0.32881	0.01472	0.32152	4.54%	31.76%
11-29-2013 ~ 12-29-2011	-0.00194	0.30373	0.01492	0.32521	3.81%	36.05%
10-31-2013 ~ 11-30-2011	-0.00474	0.31998	0.01493	0.33563	3.97%	35.08%
9-30-2013 ~ 10-31-2011	-0.00577	0.31880	0.01483	0.32388	4.22%	33.57%
8-30-2013 ~ 9-30-2011	-0.00665	0.34432	0.01496	0.32907	4.74%	30.68%
7-31-2013 ~ 8-31-2011	-0.01700	0.29996	0.01456	0.31505	3.96%	35.14%
6-28-2013 ~ 7-29-2011	-0.01954	0.31571	0.01411	0.30320	4.70%	30.91%
5-31-2013 ~ 6-30-2011	-0.02002	0.33994	0.01420	0.34413	4.25%	33.40%
4-30-2013 ~ 5-31-2011	-0.01596	0.09635	0.01442	0.41516	0.24%	81.86%
3-28-2013 ~ 4-29-2011	-0.01634	0.11436	0.01426	0.44768	0.30%	80.07%
2-28-2013 ~ 3-31-2011	-0.01481	0.04298	0.01425	0.45233	0.04%	92.52%
1-31-2013 ~ 2-28-2011	-0.01240	-0.00630	0.01412	0.44925	0.00%	98.89%
12-28-2012 ~ 1-31-2011	-0.00630	-0.23382	0.01500	0.53883	0.85%	66.86%
11-30-2012 ~ 12-30-2010	-0.01072	-0.21405	0.01314	0.44784	1.03%	63.74%
10-31-2012 ~ 11-30-2010	-0.01170	-0.21560	0.01254	0.39308	1.35%	58.89%

Regressions run against Brazilian sovereign CDS spread:
CBRZ1U1 CBIL Curncy = Brazilian 1Y sovereign CDS spread.

Bovespa weekly returns vs. CBRZ1U1 CBIL Curncy

Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
5-2-2014 ~ 5-11-2012	-0.00080	-0.08045	0.00237	0.01628	19.32%	-
4-25-2014 ~ 5-4-2012	-0.00104	-0.07911	0.00237	0.01648	18.42%	-
4-18-2014 ~ 4-27-2012	-0.00110	-0.07829	0.00237	0.01647	18.13%	-
4-11-2014 ~ 4-20-2012	-0.00109	-0.07832	0.00237	0.01648	18.14%	-
4-4-2014 ~ 4-13-2012	-0.00134	-0.07835	0.00238	0.01659	17.94%	-
3-28-2014 ~ 4-6-2012	-0.00167	-0.07824	0.00237	0.01650	18.07%	-
3-21-2014 ~ 3-30-2012	-0.00220	-0.07425	0.00235	0.01661	16.39%	-
3-14-2014 ~ 3-23-2012	-0.00295	-0.07215	0.00231	0.01635	16.03%	-
3-7-2014 ~ 3-16-2012	-0.00286	-0.07223	0.00231	0.01661	15.64%	-
2-28-2014 ~ 3-9-2012	-0.00281	-0.07245	0.00231	0.01659	15.76%	-

Embraer weekly returns vs. CBRZ1U1 CBIL Curncy

Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
5-2-2014 ~ 5-11-2012	0.00225	-0.00799	0.00376	0.02585	0.09%	75.80%
4-25-2014 ~ 5-4-2012	0.00256	-0.01038	0.00376	0.02614	0.15%	69.23%
4-18-2014 ~ 4-27-2012	0.00260	-0.01079	0.00376	0.02609	0.17%	68.02%
4-11-2014 ~ 4-20-2012	0.00319	-0.01115	0.00376	0.02608	0.18%	66.99%
4-4-2014 ~ 4-13-2012	0.00381	-0.01090	0.00379	0.02641	0.17%	68.06%
3-28-2014 ~ 4-6-2012	0.00402	-0.01030	0.00380	0.02648	0.15%	69.79%
3-21-2014 ~ 3-30-2012	0.00409	-0.00896	0.00381	0.02687	0.11%	73.95%
3-14-2014 ~ 3-23-2012	0.00519	-0.01136	0.00382	0.02695	0.17%	67.42%
3-7-2014 ~ 3-16-2012	0.00537	-0.00722	0.00380	0.02731	0.07%	79.20%
2-28-2014 ~ 3-9-2012	0.00475	-0.00702	0.00376	0.02699	0.07%	79.53%

CBRZ1U5 CBIL Curncy = Brazilian 5Y sovereign CDS spread

Ambev weekly returns vs. CBRZ1U5 CBIL Curncy

Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
5-2-2014 ~ 5-11-2012	0.00058	-0.02270	0.00253	0.03170	0.50%	47.55%
4-25-2014 ~ 5-4-2012	0.00099	-0.03054	0.00245	0.03077	0.96%	32.33%
4-18-2014 ~ 4-27-2012	0.00093	-0.02971	0.00246	0.03077	0.91%	33.66%
4-11-2014 ~ 4-20-2012	0.00143	-0.03277	0.00250	0.03131	1.06%	29.77%
4-4-2014 ~ 4-13-2012	0.00168	-0.02997	0.00254	0.03185	0.86%	34.90%
3-28-2014 ~ 4-6-2012	0.00163	-0.03101	0.00255	0.03184	0.92%	33.24%
3-21-2014 ~ 3-30-2012	0.00126	-0.02927	0.00256	0.03210	0.81%	36.39%
3-14-2014 ~ 3-23-2012	0.00161	-0.02998	0.00260	0.03268	0.82%	36.11%
3-7-2014 ~ 3-16-2012	0.00173	-0.02630	0.00259	0.03265	0.63%	42.24%
2-28-2014 ~ 3-9-2012	0.00243	-0.02996	0.00266	0.03348	0.78%	37.28%

America Latina Logistica weekly returns vs. CBRZ1U5 CBIL Curncy

Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
5-2-2014 ~ 5-11-2012	0.00197	-0.12753	0.00446	0.05579	4.87%	2.43%
4-25-2014 ~ 5-4-2012	0.00198	-0.12634	0.00446	0.05597	4.76%	2.61%
4-18-2014 ~ 4-27-2012	0.00063	-0.12142	0.00450	0.05640	4.35%	3.37%
4-11-2014 ~ 4-20-2012	0.00092	-0.12328	0.00451	0.05655	4.45%	3.16%
4-4-2014 ~ 4-13-2012	0.00000	-0.12210	0.00447	0.05597	4.46%	3.15%
3-28-2014 ~ 4-6-2012	-0.00035	-0.11776	0.00444	0.05549	4.23%	3.63%
3-21-2014 ~ 3-30-2012	-0.00056	-0.11886	0.00445	0.05591	4.24%	3.59%
3-14-2014 ~ 3-23-2012	-0.00117	-0.11698	0.00447	0.05617	4.08%	3.98%
3-7-2014 ~ 3-16-2012	-0.00137	-0.11909	0.00446	0.05626	4.21%	3.67%
2-28-2014 ~ 3-9-2012	-0.00224	-0.11549	0.00445	0.05608	3.99%	4.20%
2-21-2014 ~ 3-2-2012	-0.00282	-0.11159	0.00445	0.05607	3.74%	4.93%
2-14-2014 ~ 2-24-2012	-0.00345	-0.10987	0.00448	0.05655	3.57%	5.48%

Bovespa weekly returns vs. CBRZ1U5 CBIL Curncy

Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
5-2-2014 ~ 5-11-2012	-0.00023	-0.16147	0.00231	0.02893	23.39%	-
4-25-2014 ~ 5-4-2012	-0.00056	-0.15947	0.00231	0.02894	22.94%	-
4-18-2014 ~ 4-27-2012	-0.00061	-0.15842	0.00231	0.02895	22.70%	-
4-11-2014 ~ 4-20-2012	-0.00061	-0.15848	0.00231	0.02894	22.72%	-
4-4-2014 ~ 4-13-2012	-0.00093	-0.15877	0.00231	0.02899	22.73%	-
3-28-2014 ~ 4-6-2012	-0.00120	-0.15810	0.00230	0.02880	22.81%	-
3-21-2014 ~ 3-30-2012	-0.00178	-0.15304	0.00228	0.02862	21.90%	-
3-14-2014 ~ 3-23-2012	-0.00257	-0.15022	0.00224	0.02808	21.91%	-
3-7-2014 ~ 3-16-2012	-0.00237	-0.14955	0.00223	0.02813	21.70%	-
2-28-2014 ~ 3-9-2012	-0.00238	-0.14910	0.00223	0.02812	21.61%	-

Embraer weekly returns vs. CBRZ1U5 CBIL Curncy

Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
5-2-2014 ~ 5-11-2012	0.00229	-0.01214	0.00377	0.04716	0.06%	79.74%
4-25-2014 ~ 5-4-2012	0.00259	-0.01414	0.00377	0.04725	0.09%	76.53%
4-18-2014 ~ 4-27-2012	0.00263	-0.01474	0.00377	0.04720	0.10%	75.50%
4-11-2014 ~ 4-20-2012	0.00323	-0.01825	0.00376	0.04716	0.15%	69.96%
4-4-2014 ~ 4-13-2012	0.00384	-0.01672	0.00380	0.04756	0.12%	72.58%
3-28-2014 ~ 4-6-2012	0.00404	-0.01430	0.00381	0.04763	0.09%	76.47%
3-21-2014 ~ 3-30-2012	0.00410	-0.01260	0.00382	0.04792	0.07%	79.31%
3-14-2014 ~ 3-23-2012	0.00520	-0.01626	0.00382	0.04801	0.11%	73.55%
3-7-2014 ~ 3-16-2012	0.00540	-0.01231	0.00381	0.04801	0.06%	79.82%
2-28-2014 ~ 3-9-2012	0.00477	-0.01025	0.00376	0.04743	0.05%	82.94%

Vale weekly returns vs. CBRZ1U5 CBIL Curncy

Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
5-2-2014 ~ 5-11-2012	-0.00203	-0.07179	0.00369	0.04611	2.32%	12.26%
4-25-2014 ~ 5-4-2012	-0.00218	-0.07265	0.00369	0.04634	2.35%	12.00%
4-18-2014 ~ 4-27-2012	-0.00191	-0.07199	0.00367	0.04605	2.34%	12.11%
4-11-2014 ~ 4-20-2012	-0.00168	-0.07315	0.00366	0.04582	2.44%	11.35%
4-4-2014 ~ 4-13-2012	-0.00141	-0.07107	0.00368	0.04610	2.28%	12.62%
3-28-2014 ~ 4-6-2012	-0.00201	-0.07032	0.00366	0.04571	2.27%	12.70%
3-21-2014 ~ 3-30-2012	-0.00184	-0.06835	0.00367	0.04611	2.11%	14.13%
3-14-2014 ~ 3-23-2012	-0.00255	-0.06589	0.00366	0.04601	1.97%	15.52%
3-7-2014 ~ 3-16-2012	-0.00180	-0.06560	0.00367	0.04625	1.93%	15.91%
2-28-2014 ~ 3-9-2012	-0.00183	-0.06367	0.00367	0.04627	1.82%	17.18%

BRAZIL CDS USD SR 10Y Corp = Brazilian 10Y sovereign CDS spread

Bovespa weekly returns vs. BRAZIL CDS USD SR 10Y Corp

Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
5-2-2014 ~ 5-11-2012	-0.00018	-0.16877	0.00241	0.03672	17.16%	-
4-25-2014 ~ 5-4-2012	-0.00061	-0.16707	0.00240	0.03654	17.01%	-
4-18-2014 ~ 4-27-2012	-0.00067	-0.16530	0.00240	0.03650	16.74%	-
4-11-2014 ~ 4-20-2012	-0.00060	-0.16514	0.00240	0.03655	16.67%	-
4-4-2014 ~ 4-13-2012	-0.00087	-0.16515	0.00241	0.03675	16.53%	-
3-28-2014 ~ 4-6-2012	-0.00126	-0.16832	0.00239	0.03644	17.30%	-
3-21-2014 ~ 3-30-2012	-0.00182	-0.16069	0.00237	0.03643	16.02%	-
3-14-2014 ~ 3-23-2012	-0.00261	-0.16135	0.00231	0.03558	16.78%	-
3-7-2014 ~ 3-16-2012	-0.00241	-0.16042	0.00231	0.03573	16.50%	-
2-28-2014 ~ 3-9-2012	-0.00237	-0.16129	0.00230	0.03572	16.66%	-

Embraer weekly returns vs. BRAZIL CDS USD SR 10Y Corp

Date	Intercept	Lambda	Standard Error Intercept	Standard Error Lambda	R-Squared	p-value
5-2-2014 ~ 5-11-2012	0.00222	0.00295	0.00377	0.05757	0.000%	95.93%
4-25-2014 ~ 5-4-2012	0.00250	0.00184	0.00377	0.05751	0.000%	97.45%
4-18-2014 ~ 4-27-2012	0.00255	0.00082	0.00377	0.05737	0.000%	98.87%
4-11-2014 ~ 4-20-2012	0.00315	-0.00091	0.00377	0.05740	0.000%	98.73%
4-4-2014 ~ 4-13-2012	0.00375	0.00031	0.00380	0.05805	0.000%	99.57%
3-28-2014 ~ 4-6-2012	0.00395	0.00103	0.00381	0.05825	0.000%	98.59%
3-21-2014 ~ 3-30-2012	0.00399	0.00451	0.00382	0.05885	0.000%	93.91%
3-14-2014 ~ 3-23-2012	0.00506	0.00476	0.00383	0.05896	0.000%	93.58%
3-7-2014 ~ 3-16-2012	0.00528	0.01074	0.00381	0.05907	0.032%	85.61%
2-28-2014 ~ 3-9-2012	0.00463	0.01798	0.00377	0.05843	0.093%	75.89%

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Performance of Conventional and Islamic Banks

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Abstract- This paper investigates the differences in mean cost, revenue, and profit efficiency of conventional and Islamic banks based on size and location by using three sets of samples over the 1992–2007period from 54 countries. The study uses financial ratio analysis. The results showed that Islamic banks in both samples are more cost efficient than the conventional banks. While, the results of revenue efficiency (ROAE) ratio reveal that conventional banks are more profitable. However, the results of profit efficiency were inclusive.

GJMBR - C Classification : JEL Code : G21

PERFORMANCEOFCONVENTIONALANDISLAMICBANKS

Strictly as per the compliance and regulations of:

Performance of Conventional and Islamic Banks

Ahmad Alharbi

Abstract- This paper investigates the differences in mean cost, revenue, and profit efficiency of conventional and Islamic banks based on size and location by using three sets of samples over the 1992–2007period from 54 countries. The study uses financial ratio analysis. The results showed that Islamic banks in both samples are more cost efficient than the conventional banks. While, the results of revenue efficiency (ROAE) ratio reveal that conventional banks are more profitable. However, the results of profit efficiency were inclusive.

I. Introduction

The literature on the performance of Islamic banks is still in its initial stages. Recent empirical efforts have begun to change this, but the findings in the literature are mixed and inconclusive. The analysis in this study addresses the gap in the literature on the comparative performance of Islamic and conventional banks. This paper mainly addresses the effects of bank size and location on the efficiency of conventional and Islamic banks operating in OIC countries by using two samples, a sample including all conventional and Islamic banks in OIC countries and a sample constrained to the countries in which both banking types operate. Some studies only concentrate on countries with both banking types, and other studies use a mixed sample. By using two samples, the outcomes of this study can give a better view of the performance of both banking types.

II. Literature Review

According to Bader et al. (2007), efficiency has been examined in a number of different contexts: (a) cross-country comparisons or country-specific conditions, (b) foreign-owned banks versus domestic-owned banks, (c) comparisons of bank type (e.g. large or small, specialized or diversified, retail or wholesale), (d) government ownership versus private ownership, (e) new versus old bank, (f) before and after mergers or acquisitions, (g) before and after a financial crisis (e.g., the 1997 Asian crisis), and (h) analyses of the effects of deregulation and liberalization. This paper analyzes and compares the efficiency (cost, profit and revenue) of conventional and Islamic banks. Also, the analysis is conducted based on size and location of both bank types.

Bader et al. (2007) examines the cost, revenue, and profit efficiency of 43 Islamic banks and 37 conventional banks in 21 OIC countries from 1990 to

2005. Attention is given to bank size, age, and location. The profitability ratios are ROAA and ROAE. The revenue-efficiency category also consists of two ratios: NIM and other operating income to average assets divided by average assets. Finally, cost efficiency is represented by cost-income ratio (overhead divided by pre-provision income) and non-interest expenses ratio (the ratio of non-interest expenses or overhead plus provisions to the average value of assets). The results show no significant differences between Islamic and conventional banking systems on these indicators. The same results are obtained when the banks are grouped into small and large size based on their total assets. This indicates that the size of the banks in Bader et al. (2007) does not affect their cost, profit, or revenue efficiencies. Furthermore, the authors group banks based on their age. The results reveal no significant differences between the cost efficiencies of old and new conventional and Islamic banks. However, the NIM ratio for new conventional banks is significantly higher than the NIM ratio for new Islamic banks. There are no significant differences between old conventional banks and old Islamic banks in terms of revenue and profit efficiency. Finally, the study concludes that location does not impact the efficiency of conventional and Islamic banks.

Hassan, Mohamad and Bader (2009) explore the effects of size and age on the cost, revenue, and profit efficiencies of a sample of 40 banks (18 conventional and 22 Islamic) in 11 countries from 1990 to 2005. Those countries are OIC members located in the MENA region. The study uses a Data Envelope Analysis (DEA) non-parametric approach. The results suggest that there are no significant differences in the cost, revenue, or profit efficiencies of both bank types. Furthermore, the results reveal that large versus small banks, large conventional versus large Islamic, and small conventional versus small Islamic banks are no different in terms of efficiency. The study also indicates that large conventional banks and large Islamic banks are more revenue efficient than their small counterparts but small Islamic banks are more profit efficient. Nevertheless, these results are not significant. Moreover, there are no significant differences in efficiency between old conventional and old Islamic banks. The cost and profit efficiencies of old conventional banks are slightly better than they are for old Islamic banks. Old Islamic banks are more revenue efficient than old conventional banks though. The profit efficiency of new Islamic banks is significantly better than that of new conventional banks.

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Abdul-Majid, Saal and Battisti (2010) compare the efficiency of Islamic and conventional banks using a sample of 23 Islamic and 88 conventional banks from 10 countries from 1996 to 2002. The authors use an output distance function, and the results indicate that the potential efficiency outputs of Islamic banks are lower than the potential outputs for conventional banks. The authors argue that constrained opportunities in terms of investments are the cause for the lower efficiencies in Islamic banks. Similarly, Abdul-Majid (2010) examines the efficiency of conventional and Islamic banks in 10 countries that have both banking types from 1996 to 2002. The sample consists of 23 Islamic and 88 conventional banks, and cost and output distance functions are used for the estimates. The results show that Islamic banks have higher input requirements than do conventional banks.

Ariss (2010) analyzes the competitive conditions prevailing in Islamic and conventional global banking markets and investigates the differences in profitability between conventional and Islamic banks using a sample of 58 Islamic and 192 conventional banks across 13 countries from 2000 to 2006. Ariss uses a multi-variate analysis method and does not find differences in profitability levels across Islamic and conventional banks. In a smaller sample of banks with similar macroeconomic conditions, Srairi (2010) investigates the profit and cost efficiencies of 48 conventional and 23 Islamic banks from 1999 to 2007 in GCC countries. A stochastic frontier analysis is used, and the results indicate that conventional banks are better than Islamic banks in terms of profit and cost efficiency.

Beck, Demirgüç-Kunt and Merrouche (2010) compare conventional and Islamic banks, controlling for other bank and country characteristics. They use two samples—large and small—for the 1995–2007 period. The large sample includes 2,857 conventional banks and 99 Islamic banks across 141 countries. The smaller sample includes 397 conventional banks and 89 Islamic banks across 20 countries. The authors use z scores and a linear fixed-effects model to assess the difference between the two banking systems. The variables in their study are grouped into four categories: business model, efficiency, assets quality, and stability. The business model consists of three variables: fee income to total operating income, non-deposit funding to total funding, and gross loans to total loans. The efficiency category has two variables: overhead to total assets and cost to income ratio. The asset-quality effect is captured by the ratios of loan-loss reserves to total gross loans, loan-loss provision to total gross loans, and non-performing loans to total gross loans. Finally, stability is measured by z scores, returns on assets, an equity-to-asset ratio, and maturity matching.

Beck, Demirgüç-Kunt and Merrouche (2010) show few significant differences in business orientation, efficiency, asset quality, and stability. Islamic banks are more cost efficient than conventional banks in the large sample, but not more profitable. The results for the smaller sample indicate that there is no difference in profitability between conventional and Islamic banks. However, the conventional banks are more cost effective compared to Islamic banks. Conventional banks that operate in countries with a higher market share of Islamic banks are less stable but more cost efficient. The study compares the effect of the recent financial crisis on both of the banking systems. The authors conclude that Islamic banks performed better than conventional banks during the financial crisis. The authors attribute this to the higher capitalization and liquidity reserves of Islamic banks.

In another cross-country study, Kaouther, Viviani and Belkacem (2011) examine the differences between conventional and Islamic banks with a particular focus on leverage and profitability. Using a sample of 109 banks (50 Islamic and 59 conventional) from 18 countries from 2004 to 2008 from the Thomson ONE database, they conduct t tests, binary logistic regressions, and a discriminant analysis using leverage and profitability ratios and their determinants. The findings show that ROA and ROE ratios are slightly higher (although not significant) for Islamic banks. However, the net-margin ratio shows that Islamic banks are less profitable than conventional banks, and the results are significant at the 5% level.

Olson and Zoubi (2011) compare accounting-based and economic-based measures of efficiency and profitability of 83 banks from 10 MENA countries from 2000 to 2008. The analysis, with country dummy variables, shows that GCC conventional banks are more cost efficient than non-GCC conventional banks and GCC Islamic banks. Also, the results reveal that Islamic banks in the GCC region are more profitable (ROE) than GCC and non-GCC conventional banks but are less cost efficient. Based on the overall results of their study, Olson and Zoubi argue that accounting-based and economics-based approaches give similar measures of relative bank performance but explain that they do measure different aspects of financial performance.

In an earlier study, Olson and Zoubi (2008) use 26 financial ratios to examine whether it is possible to distinguish between conventional and Islamic banks in GCC countries on the basis of financial characteristics alone. The financial ratios fall into five general categories: profitability, efficiency, asset quality, liquidity, and risk. The data period spans from 2000 to 2005. However, the number of banks differ from one year to another, with 25 banks (13 conventional and 12 Islamic) in 2000, 28 banks (14 conventional and 14 Islamic) in 2001, 47 banks (29 conventional and 18 Islamic) in both 2002 and 2003, 46 banks (28 conventional and 18 Islamic) in 2004, and 44 banks (28 conventional and 16 Islamic) in 2005. The authors input the 26 financial ratios

into logit, neural-network, and k-means nearest neighbor classification models to distinguish between conventional and Islamic banks. The results reveal that Islamic banks are more profitable than conventional banks. The findings for interest or commission income divided by average total assets show that the efficiency ratios are significantly smaller for Islamic banks and that net non-interest margins are significantly smaller for conventional banks. Also, asset-quality ratios vary between the two banking systems. The provision for loan losses to average total loans and advances, allowances for loan losses at the end of the year over average total loans, and advances used as asset-quality ratios are all smaller for Islamic banks. In contrast, the liquidity ratios are not significantly different between conventional and Islamic banks. However, the risk ratios indicate a significant difference between the two banking systems. The loans-to-deposits ratio is larger for Islamic banks, and the reverse is true for the ratio of liabilities to shareholder capital. The results from the risk indicators are consistent with the notion that Islamic banks are riskier than conventional banks.

Metwally (1997) compares the performance of 15 conventional banks and 15 Islamic banks from all over the world in terms of liquidity, leverage, credit risk, profit, and efficiency by using logit, probit, and discriminate analyses. The findings suggest that, compared to conventional banks, Islamic banks rely on their equity to finance their activities and face more difficulties in attracting deposits. Second, Metwally finds that Islamic banks are more conservative in their lending and therefore have higher cash-deposit ratios than conventional banks. Finally, the study shows that profitability and efficiency are not different between conventional and Islamic banks.

In another cross-country study, Johnes, Izzeldin and Pappas (2009) use a financial-ratio analysis and a DEA to investigate the efficiency of conventional and Islamic banks in the GCC region from 2004 to 2007. For the financial-ratio analysis, the authors adopt the same ratios as Bader et al. (2007). The results reveal that Islamic banks are more revenue and profit efficient but less cost efficient than conventional banks. Specifically, ROAA is always higher for Islamic banks throughout the entire study period. However, the ratios of cost to income and non-interest expenses to average assets are higher for Islamic banks compared to conventional banks. The revenue-efficiency variables of NIM and other-operating income to average assets are higher for Islamic banks, but the results are only significant for other operating income. The findings of the econometric method indicate that gross efficiency is higher for conventional banks. In general, the findings show that the financial-ratio analysis and the econometric methods are complements rather than substitutes.

Iqbal (2001) compare the performance of conventional and Islamic banks operating in a dual-bank system. The sample consists of 12 banks for each bank type from seven countries from 1990 to 1998. The study uses *t* tests to compare several financial ratios grouped into five categories: asset quality, liquidity, deployment ratio, cost-to-income ratio, and profitability. The results indicate that Islamic banks are more cost and profit efficient.

Akhter et al. (2011) use financial ratios to compare the performance and efficiency of conventional and Islamic banks in Pakistan. The study uses nine financial ratios in the areas of profitability (ROA, ROE, and total cost to total income), liquidity risk (net loans to asset ratio, liquid asset to customer deposits and short-term funds, and net loans to total deposits and borrowing), and credit risk (equity to total assets, equity to total loans, and impaired loans to gross loans) from 2006 to 2010. The study shows no significant differences between conventional and Islamic banks in terms of profitability. However, there are differences in liquidity and credit performance, both in favor of Islamic banks. In another recent study on Pakistani banks, Hanif et al. (2012) compares the performance of 22 conventional banks and 5 Islamic banks from 2005 to 2009. They also use nine ratios grouped into four categories: profitability (ROA, ROE, and total cost to income), liquidity (net loans to asset ratio, liquid assets to customer deposits and short-term funds, and net loans to total deposits and borrowing), risk management (equity to total assets, equity to total loans, and impaired loans to gross loans), and solvency (Bank-o-meter model). Their findings suggest that conventional banks are more profitable (ROA and ROE) and liquid than Islamic banks. In contrast, Islamic banks are better in terms of credit risk management and solvency maintenance.

Samad and Hassan (1999) use financial ratios to compare the profitability performance of one Islamic bank, Bank Islam Malaysia Berhad, with eight conventional banks in the same country from 1984 to 1997. These ratios are grouped into four categories: profitability (ROA, ROE, and profit over total expenses), liquidity (cash-deposit ratio, loan-deposit ratio, current assets to current liabilities, and current assets to total assets), risk and solvency (dept-equity ratio, debt-to-total-asset ratio, equity multiplier, and loan-to-deposit ratio), and commitment to the domestic and Muslim community (long-term loans to total loans, deposit invested in government bonds over total deposits, and mudaraba-musharaka to total loans). The study finds no significant differences in profitability between Bank Islam Malaysia Berhad and the conventional banks. Also, risk and insolvency ratios and commitment to the domestic and Muslim community ratios did not show any significant differences. Muslim community ratios include long-term loans to total loans, deposits invested in government bonds over total deposits, and mudaraba-musharaka to total loans. However, the study indicates

that Bank Islam Malaysia Berhad is more liquid than conventional banks. Safiullah (2010) replicates Samad and Hassan (1999) with some modifications to examine the Bangladeshi banking system. He uses a financial-ratio analysis to compare the ratios of profitability, liquidity, and solvency; business development, efficiency, and productivity; and commitment to economy and community of conventional and Islamic banks from 2004 to 2008. This study documents the superiority of Islamic banks in the areas of business development, profitability, liquidity, and solvency. Also, Samad (2004) uses a financial-ratio analysis to examine the comparative performance of Islamic and conventional commercial banks in Bahrain during the post–Gulf War period with respect to profitability, liquidity risk, and credit risk. The author uses nine financial ratios over the period from 1999 to 2001 for 15 conventional banks and six Islamic banks to compare the performance of both banking systems. The paper concluded that there is a significant difference in credit performance (equity-to-asset ratio, equity-to-net-loan ratio, and non-performing loans to gross loans), as the performance of Islamic banks is superior to that of conventional banks. Samad (2004) argues that this was probably largely due to the higher rates of equity per capita that the Islamic banks maintain in his study. The indicators of profitability (ROA, ROE, and cost-to-income ratio) and liquidity (net loans over total assets, liquid assets over customer deposits, and short-term funds and net loans over total deposits and borrowings) show no significant differences.

In a more recent study, this one on the Malaysia banking system, Masruki et al. (2011) compare the performance of two Islamic Banks (Bank Islam and Bank Muamalat) against benchmarks of conventional banks from 2004 to 2008. The authors use four financial ratios: profitability, liquidity, risk, solvency, and efficiency (NIM and net financing revenue over assets). The analysis utilizes equality-of-means tests. The findings reveal that Islamic banks are less profitable (ROAA and ROAE) than conventional banks but more liquid. Also, Islamic banks are more efficient than conventional banks. Furthermore, Abdul-Majid, Nor and Said (2003) examine the productive efficiency of conventional and Islamic banks in the country from 1993 to 2000 using a stochastic frontier cost function approach. They conclude that efficiency levels of conventional and Islamic banks are not different. Moreover, their results suggest that bank efficiency is not a function of ownership status (e.g., public or private, foreign or local). In addition, Mokhtar, Abdullah and Al-Habshi (2006) use the data of 20 Islamic windows, 2 full-fledged Islamic banks, and 20 conventional banks from 1997 to 2003 to investigate their efficiency. They measure the technical efficiency and cost efficiency for those banks, and the results show that Islamic banks (full-fledged and Islamic windows) are less efficient than conventional banks.

Also, the study reveals that full-fledged Islamic banks are more efficient than Islamic windows, whereas foreign Islamic windows are more efficient than conventional banks. Borkbh (2011) examines a sample of 17 Islamic banks and 15 conventional banks from 2000 to 2008 from eight Middle Eastern countries with dual-bank systems. The author uses a stochastic frontier approach to investigate both banking systems. The findings show that conventional banks are more technical, altercative, and cost efficient than Islamic banks.

Scholars have also compared the efficiency and performance of conventional and Islamic banks before, during, and after the recent financial crisis (2007–2008). Bourkhis and Nabi (2011) attempt to answer two questions: "Have Islamic banks been more resistant than their counterparts to the 2007–2008 financial crisis?" and "Could the presence of Islamic banks in a conventional banking system enhance the overall systemic stability?" The authors collect data from 343 conventional banks and 64 Islamic banks in 19 OIC countries from 1993 to 2009 to analyze the financial-crisis effect on both banking systems' soundness indicators, including (capital adequacy, earnings and profitability, asset quality, efficiency and liquidity). The analysis uses equality-of-means tests and z scores. The equality-of-means results show that Islamic banks are more profitable than conventional banks before the crisis. During the crisis, large Islamic banks remain more profitable than the large conventional banks. However, Islamic banks become less profitable after the crisis. Also, their results show that large Islamic banks are more resilient to the financial crisis than small Islamic banks. The second approach shows that conventional banks are financially stronger than Islamic banks through the three periods (before, during, and after the crisis). Furthermore, small Islamic banks are financially stronger than large Islamic banks in the period before the financial crisis, and the reverse is true during and after the crisis. Also, the study reveals surprising results that contradict the notion that Islamic banks are more immune to financial crisis; indeed, in Bourkhis and Nab, conventional banks are more resistant to the 2007–2008 financial crisis than are Islamic banks. Finally, the existence of large Islamic banks enhances the stability of the overall banking system.

Hasan and Dridi (2010) examine the trends of profitability, credit and asset growth, and external ratings for 120 banks (one quarter were Islamic) before and after the 2007–2008 crisis. Each of the countries in the sample has a dual-bank system and a considerable presence of Islamic banks. The study suggests that the profitability of Islamic banks prior to the crisis (2005–2007) was higher than that of conventional banks, but the period from 2008 to 2009 shows similar results for both banking systems. Also, large Islamic banks outperformed small Islamic banks. The credit and asset growth of Islamic banks are higher than the rates for

conventional banks during the crisis (2008–2009). Also, external rating agencies are in favor of Islamic banks during the crisis.

Parashar and Venkatesh (2010) compared conventional banks and Islamic banks in the GCC region over the 2006–2009 period based on five performance parameters: capital adequacy (capital as defined by Basel divided by risk weighted assets), efficiency (cost-to-income ratio), profitability (ROAA and ROAE), liquidity (liquid assets over total assets), and leverage (equity over total assets). The authors use equality-of-means tests. The analysis for the full study period shows that Islamic banks outperform conventional banks in terms of capital adequacy, ROAA, ROAE, and leverage. The results for before and during the crisis reveal that ROAA is significantly higher for Islamic banks than for conventional banks. ROAE do not show any differences between the two bank types during the crisis; however, this ratio was higher for Islamic banks before the crisis. Also, the analysis shows that conventional banks' ROAE, ROAA, and liquidity declined during the crisis, whereas capital adequacy ratio, ROAE, and leverage declined for Islamic banks.

Also, some studies have investigated the efficiency of Islamic banks without comparing them to conventional banks. For example, in a cross-country study, Hassan (2005) examines cost, profit, and x-efficiency and finds that Islamic banks are less efficient at containing cost relative to profit generation. His results also reveal that large Islamic banks generated profit more efficiently.

III.   Data and Methodology

This section investigates the differences in mean cost, revenue, and profit efficiency of conventional and Islamic banks based on size and location by using three sets of samples over the 1992–2007 period. The first sample contains all conventional and Islamic banks in the 54 OIC countries in the Bank Scope database. Specifically, this sample consists of 686 conventional banks (Islamic windows and conversion years are not included) and 110 Islamic banks. The other sample is constrained to the countries that have both conventional and Islamic banks in the country. The second sample

consists of 348 conventional banks (Islamic windows and conversion years were not included) and the third sample are made of 70 Islamic banks, the countries which have a dual banking system in OIC countries are 23 countries, see Table 1, Table 2, and Table 3. The data are collected for 17 years; however, because a 2-year moving average is used, the study period is reduced to 16 years. The data are verified and checked for errors. Regarding bank size, in the literature there are no specific amounts of assets that differentiate large, medium, and small banks. However, this study classifies a bank as large if its assets (constant 2005 USD) are greater than USD 500 million. This number is chosen because about 50% of the banks in the sample have assets that are less than or equal to USD 500 million.

The use of financial ratios is not a new way to measure efficiency and performance, as it dates back to the end of the 19th century (Horrigan, cited in Bader et al. 2007). Since then, many researchers have used this technique (e.g., Akhter et al. 2011; Ariff et al. 2011; Beck, Demirgüç-Kunt & Merrouche 2010; O'Connor 1973; Olson & Zoubi 2008; Chen & Shimerda 1981; Sabi 1996; Safiullah 2010; Samad 2004). According to Halkos and Salamouris (cited in Bader et al. 2007), there are two reasons to use financial ratios as a tool for analysis: (a) to remove disparities to allow comparisons between different-sized banks, and (b) to control for sector characteristics, thereby permitting the comparison of an individual bank's ratios with some benchmark for the sector. Furthermore, some scholars consider a financial-ratios analysis complementary to econometric methods (e.g., Halkos & Salamouris 2004; Johnes, Izzeldin & Pappas 2009; Rouse, Putterill & Ryan 2002).

In particular, this study adopts the methodology and ratios from Bader et al. (2007) and Ariff et al. (2011), who utilize a modified version of Bader et al (2007). These authors use t tests and one-way ANOVAs to compare the performance of conventional and Islamic banks. However, one small change is that moving averages are used in the denominator for all ratios except for the cost-to-income ratio.

This this study uses independent sample t test (equation 3; compares the means for two

$$F = \frac{\overline{x_1} - \overline{x_2}}{\sqrt{(S_1{}^2/n_1) + (S_2{}^2/n_2)}} \qquad (3)$$

Where $S_1{}^2$ and $S_2{}^2$ are the standard deviation, n the sample size, and $\overline{x_1}$ and $\overline{x_2}$ are the sample means.

Alpha chosen to be 0.10 ($\alpha = 0.10$)

A one way ANOVA test is used to test the composite null hypothesis that several sub-populations had the same mean. For the ANOVA, post hoc procedures are used. Specifically, a complete set of

pair-wise comparisons for the treatment groups is analyzed using a corrected level of significance in each comparison so that the group wise error does not exceed a preselected significance level, such as $\alpha = .01$.

The ANOVA F statistic tests (equation 4):

$H_0: \mu_1 = \mu_2 = \ldots = \mu_I$

$H_a:$ the μ_i do not all equal 0.

$$F = \frac{MSG}{MSE} = \left[\frac{\left(\frac{SSG}{I-1}\right)}{\left(\frac{SSE}{I-1}\right)}\right] \qquad (4)$$

$$MSG = \frac{n_1(\bar{x}_1 - \bar{x})^2 + n_2(\bar{x}_2 - \bar{x})^2 + \cdots + n_I(\bar{x}_I - \bar{x})^2}{I - 1}$$

MSG, the mean square for groups, measures how different the individual means are from the overall mean ($\sim$ weighted average of square distances of sample averages to the overall mean). SSG is the sum of squares for groups.

$$MSE = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2 + \cdots + (n_I - 1)s_I^2}{N - I}$$

MSE, the mean square for error is the pooled sample variance s_p^2 and estimates the common variance σ^2 of the I populations ($\sim$ weighted average of the variances from each of the I samples). SSE is the sum of squares for error. Where

$$S_i = \sqrt{\frac{\sum_{j=1}^{n_i}(y_{ij} - y_i)}{n_i - 1}}$$

Also, Tukey's honest square difference test (HSD) is adopted because it controls Type I error very well.

Tukey's honest square difference test (HSD; equation 5):

$$HSD = \frac{M_1 - M_2}{\sqrt{MS_W \left[\frac{1}{n}\right]}} \quad (5)$$

Here M_1 and M_2 are the mean values, MS_W mean square width, and n number per mean.

Alpha are equal 0.10 ($\alpha = 0.10$).

A Levene's test is used to decide whether the population variances are likely to be equal. The p value is used in the same way as it is used in the t test; that is, reject H_0 if $p < \alpha$. The test shows that the samples are homogenized.

Six ratios (cost to income, non-interest expenses, net interest margin, return on average assets and return on average equity) are used to compare the performance of conventional and Islamic banks and are categorized into three groups: cost efficiency, revenue efficiency, and profit efficiency.

a) Cost Efficiency

Isik and Hassan (cited in Srairi 2010) define cost efficiency as "a measure of how far bank's cost is from the best practice bank's cost if both were to produce the same output under the same environmental conditions" (p. 48). In the present study cost efficiency is measured with cost to income ratio (CTIR) and non-interest expenses ratio (NIER). Cost to income ratio is calculated by dividing overhead by income after provisions. For conventional banks as well as Islamic banks, the items that make up a bank's costs are very similar, consisting mainly of salaries, wages, rent, and so forth. However, Islamic banks typically incur additional costs, such the costs of maintaining a *shariah* board. Studies find high values for the cost to income ratio for both bank types. The other ratio, non-interest expenses, is measured by non-interest expenses or overhead plus provisions to the average value of assets. This ratio expresses the expense per unit of assets. The lower this ratio, the better the bank's cost efficiency.

b) Revenue Efficiency

This measure indicates how well a bank is expected to perform in terms of profit relative to other banks in the same period in producing the same set of outputs (Bader et al. 2007). The ratios that make up this measure are NIM and other operating income to average assets. The NIM for Islamic banks is the income from its investment activities minus the profit distributed to its depositors and investors. This ratio is not adjusted for risk. The other operating income for conventional and Islamic banks indicates the value of other operating income generated for every dollar of assets value (Ariff et al. 2011). The higher this ratio, the more revenue efficient the bank will be.

c) Profit Efficiency

This measure is defined as the ratio between the actual profit of a bank and the maximum level that could be achieved by the most efficient bank (Maudos et al., cited in Srairi 2010). The most commonly used ratios to measure profit are ROAA and ROAE. However, ROAE must be interpreted with caution because evidence shows that income smoothing is practiced in many countries (Ariff et al. 2011). The ratios used in this study are shown in Table 4.

Table 4 : Definitions of variables

Category	Financial ratio	Description
Cost efficiency ratios	Cost to income ratio (CTIR)	Overhead as a percentage of income generated before provisions. The major cost element of this ratio is normally salaries.
	Non-interest expenses ratio (NIER)	The ratio of overhead plus provisions to the average value of assets.
Revenue efficiency ratios	Net interest margin (NIM)	Net interest revenue divided by average earning assets.
	Other operating income (OPIR)	Calculated by dividing other operating income by average assets.

Profit efficiency ratios	Return on average assets (ROAA)	Net income as a percentage of book value of average total assets.
	Return on average equity (ROAE)	Net income as a percentage of book value of average total equity capital.

IV. Empirical Results

The analysis of both samples according to bank size and location is described below.

a) Performance of Conventional and Islamic Banks

The analysis begins with the performance of conventional and Islamic banks using the entire sample (Table 5). The *t* test shows mixed results when cost efficiency ratios are compared for both bank types. The cost to income ratio (CTIR) shows that conventional banks are more cost efficient, and the non-interest expenses ratio (NIER) indicates that Islamic banks are more cost efficient. This may be because Islamic banks pay higher salaries and incur extra costs (e.g., a *shariah* board), which can lead to a higher CTIR than in conventional banks. The NIER results suggest that Islamic banks allocate small amounts of assets to bad loans due to the nature of some of their transactions, such as *ijarah* and lease-back schemes, which are less risky than conventional bank loans. However, the NIM values indicate that conventional banks are more revenue efficient, which is consistent with Kaouther, Viviani and Belkacem (2011). On the other hand, there is no significant difference in the mean scores of other operating income ratio (OPIR) between conventional and Islamic banks. This contradicts findings from Hassan, Mohamad and Bader (2009) and Johnes, Izzeldin and Pappas (2009). When profit efficiency is measured by ROAE, the results indicate that conventional banks are more profit efficient than Islamic banks. This is in line with Beck, Demirgüç-Kunt and Merrouche (2010) but contradicts Metwally (1997) and Kaouther Viviani and Belkacem (2011). However, when profit efficiency is measured by ROAA, there are no significant differences by bank type.

Table 5 : Results for cost, revenue, and profit efficiency of conventional and Islamic banks

Category	Statistic	Cost efficiency		Revenue efficiency		Profit efficiency	
		CTIR	NIER	NIM	OPIR	ROAA	ROAE
Conventional banks	*M*	169.34	4.10	4.14	2.60	1.04	11.78
	SD	128.43	4.83	4.13	2.57	4.36	8.52
Islamic banks	*M*	188.70	2.83	3.36	2.68	1.06	10.03
	SD	165.09	2.14	3.76	2.69	2.00	7.39
	t-test	3.60	6.17	4.85	0.86	0.13	5.12

Table 6 shows the effect of bank size on efficiency. The means of cost-efficiency ratios (CTIR and NIER) are lower for big banks than for small banks. In addition, big banks are more profit efficient (ROAE) than small banks. Nevertheless, small banks are more revenue efficient (NIM, OPIR), and both of these results are significant at the 1% level.

Table 6 : Results for cost, revenue, and profit efficiency of big and small banks

Category	Statistic	Cost efficiency		Revenue efficiency		Profit efficiency	
		CTIR	NIER	NIM	OPIR	ROAA	ROAE
Big banks	*M*	150.35	2.96	3.25	1.70	1.05	12.26
	SD	101.38	3.56	2.97	1.54	2.51	6.70
Small banks	*M*	189.69	4.87	4.68	3.45	1.16	11.03
	SD	167.66	4.79	4.74	3.16	4.29	10.08
	t-test	10.89	17.29	14.65	28.65	1.31	5.55

Next, the effect of bank size on the performance of conventional and Islamic banks is discussed. The results in Table 7 show that large conventional banks are more cost efficient (CTIR) than small conventional banks, large Islamic banks, and small Islamic banks. However, the findings for the NIER ratio suggest that large Islamic banks are more cost efficient than large conventional banks, small conventional banks, and small Islamic banks. Also, small Islamic banks are more cost efficient than small conventional banks for both of

the measuring variables—CTIR and NIER—with a significance of 10% and 1%, respectively.

Table 7 : Results of cost, revenue, and profit efficiency for conventional and Islamic banks based on their size

Bank size	Bank category	Statistic	Cost efficiency		Revenue efficiency		Profit efficiency	
			CTIR	NIER	NIM	OPIR	ROAA	ROAE
Big	Conventional	*M*	147.28	3.16	3.43	1.74	1.75	12.26
		SD	93.38	3.92	3.21	1.53	2.50	6.71
	Islamic	*M*	200.95	2.37	2.83	1.99	2.12	10.74
		SD	187.14	1.50	2.09	2.60	2.63	7.14
		t-test	8.91	3.47	3.77	2.63	3.06	4.17
Small	Conventional	*M*	193.75	5.08	4.78	3.45	1.16	10.99
		SD	171.55	5.00	4.71	3.22	4.51	10.79
	Islamic	*M*	173.48	3.57	4.12	3.54	0.97	8.99
		SD	157.49	2.75	5.20	3.00	2.19	7.90
		t-test	1.94	4.01	2.31	0.48	0.77	3.02
ANOVA *p*		Between groups	.000	.000	.000	.000	.000	.000

Next, revenue efficiency is analyzed. When NIM is the measuring variable, small conventional banks outperform large conventional and Islamic banks. Also, the t-test shows that small conventional banks is more revenue efficient (NIM). Similarly, small Islamic banks perform better than large conventional and Islamic banks. Also, the results for OPIR show that small conventional banks are more revenue efficient than large banks (conventional and Islamic). Furthermore, the mean for revenue efficiency (OPIR) for small Islamic banks exceeds the means for large conventional and large Islamic banks. Moreover, small Islamic banks perform better than small conventional banks when measured by OPIR; however, this result is not significant. The findings related to NIM and OPIR are in line with Bader et al. (2007), although their findings are not significant. This clearly shows that small banks are more revenue efficient than large banks, and this contradicts Hassan, Mohamad and Bader (2009). The results of Bader et al. (2007), albeit non-significant, show that small banks are more revenue efficient than large banks. Also, the results indicate that small conventional banks outperform small Islamic banks.

Using multiple comparison tests, the results of profit efficiency (ROAA) show that large Islamic banks are more profit efficient than large conventional banks, small conventional banks, and small Islamic banks. This finding is in line with Bader et al. (2007), although their results are not signifcant. On the other hand, the results for ROAE suggest that large and small conventional banks are more profit efficient than large and small Islamic banks, respectively. Also, large conventional banks are more profitable than small conventional banks and small Islamic banks. Furthermore, a t test shows that large Islamic banks are more profitable when

compared to small Islamic banks. The results are significant for ROAA and ROAE, and these findings are consistent with Brown and Skully (2005) and Hassan (2005). All of the findings in this paragraph for the effect of bank size on efficiency contradict Hassan, Mohamad and Bader (2009) but are consistent with Bader et al. (2007) for ROAA ratio (their findings are slightly in favor of large Islamic banks).

Next, a general analysis is conducted for the entire sample of banks in the 54 countries on the basis of location (Table 8). The results from multiple comparison tests show that Asian banks are more cost efficient than banks in Africa and Middle East and Turkey, and the results are significant (CTRI). However, the NIER ratio indicates that banks in the Middle East and Turkey are more cost efficient than banks in the other regions. On the other hand, African banks are more revenue efficient (in terms of NIM and OPIR) than banks operating in Asia and the Middle East and Turkey. This in line with Bader et al. (2007) and here their results are significant in case of OPIR. In contrast, the profit-efficiency results are inconclusive. Specifically, the multiple-comparison tests reveal that the banks in the Middle East and Turkey are more profit efficient than the banks in Asia when ROAA is the measuring variable but that the banks in Africa become the most profit efficient when ROAE is the variable. This in line with Bader et al. (2007), and their findings are almost significant in the case of ROAA.

For the next analysis, conventional and Islamic banks are separated (Table 9). The cost-efficiency analysis shows that Islamic banks are more cost efficient than conventional banks. However, the results vary by region: When the measuring variable is CTIR, Islamic banks in Asian countries score better than

conventional and Islamic banks in other regions, whereas, for NIER, Islamic banks in the Middle East and Turkey outperform conventional and Islamic banks in other regions. These results contradict Bader et al. (2007); however, their results show that Islamic banks in Asia are slightly cost efficient (NIER).

Table 8 : Results for cost, revenue, and profit efficiency for all banks (selected regions)

Region	Statistic	Cost efficiency		Revenue efficiency		Profit efficiency	
		CTIR	NIER	NIM	OPIR	ROAA	ROAE
Africa	*M*	220.18	5.53	5.24	3.94	1.23	13.00
	SD	163.88	4.10	4.06	3.01	1.63	10.70
Asia	*M*	147.88	3.86	3.40	2.46	1.01	11.00
	SD	114.98	5.80	3.34	2.49	1.85	8.09
Middle East and Turkey	*M*	149.28	2.71	3.51	1.64	1.27	11.47
	SD	112.52	2.20	4.25	1.64	1.23	7.00
ANOVA *p* Between groups		.000	.000	.000	.000	.000	.000

Regarding revenue efficiency (NIM and OPIR), the previous test reveals that African Islamic banks are more revenue efficient. Also, conventional banks in Africa are more revenue efficient than conventional banks in Asia, and than Islamic banks in Asia and the Middle East and Turkey (NIM). In addition, the OPIR results show that African conventional banks are more revenue efficient than Islamic and conventional banks in all other regions. The same test shows that Islamic banks in the Middle East and Turkey are more profit efficient when profitability was measured by ROAA. The same test is carried out for the ROAE ratio and reveals that conventional banks in Africa outperform Islamic banks in the same region and both bank types in all other regions. In general, the effect of location on bank performance are very similar to the effects found in Bader et al. (2007).

Table 9 : Results for cost, revenue, and profit efficiency of conventional and Islamic banks

Bank category	Statistic	Cost efficiency		Revenue efficiency		Profit efficiency	
		CTIR	NIER	NIM	OPIR	ROAA	ROAE
African conventional	*M*	215.65	5.58	5.15	3.84	1.23	13.29
	SD	153.43	4.16	3.751	2.99	3.10	11.00
African Islamic	*M*	272.22	4.91	5.66	5.00	1.13	11.05
	SD	211.19	2.91	6.02	3.23	1.83	7.76
	t-test	4.59	1.71	1.66	5.51	0.42	2.64
Asian conventional	*M*	149.55	4.00	3.50	2.60	1.06	11.10
	SD	118.05	6.12	3.41	2.66	2.75	7.94
Asian Islamic	*M*	109.44	2.34	2.06	1.31	0.21	6.06
	SD	128.31	1.50	2.05	0.85	1.55	10.54
	t-test	3.63	2.64	4.52	5.777	3.33	6.31
Middle East and Turkey conventional	*M*	153.30	3.01	3.97	1.60	1.25	11.74
	SD	114.05	2.47	4.85	1.73	3.13	7.32
Middle East and Turkey Islamic	*M*	167.91	2.33	2.80	2.04	1.37	10.60
	SD	151.83	1.50	1.94	2.10	1.73	7.23
	t-test	2.11	4.85	4.82	4.65	0.75	2.76
ANOVA *p*	Between groups	.000	.000	.000	.000	.000	.000

Next, *t* tests are used to compare the performance of both bank types in the same regions. The results show that African conventional banks are more cost efficient (CTIR), whereas Islamic banks are more revenue efficient (OPIR). Furthermore, the test provides evidence that the mean scores of ROAA and ROAE are significantly better for conventional than for Islamic banks, although the results are only significant

for ROAE. This identical to Bader et al. (2007) findings. Moving to Asia, the results reveal that Islamic banks have the lowest costs (CTIR and NIER); however, conventional banks have more revenue (NIM, OPIR) and profit (ROAA, and ROAE). The results for the Asian region are all significant at the 1% level. The results for banks in the Middle East and Turkey are inconclusive for cost efficiency. For instance, the findings for CTIR reveal that conventional banks are more cost efficient, whereas the NIER results show the opposite. Also, the results of revenue efficiency are not uniform: Islamic banks are more efficient at generating profit (OPIR) but not for NIM. However, conventional banks outperform Islamic banks when it comes to profitability (ROAE). The results of Middle East and Turkey region are identical to that of Bader et al. (2007) although here it is significant.

The analysis of the entire sample shows some differences between the two bank types. This contradicts Bader et al. (2007); Hassan, Mohamad and Bader (2009); and Ariss (2010). However, the present findings are in line with Beck, Demirgüç-Kunt and Merrouche (2010).

b) *Performance of Conventional and Islamic Banks (Dual-Bank System)*

Table 10 shows the results for Islamic and conventional banks that operated in countries with a dual-bank system. The results indicate that Islamic banks are more cost efficient than conventional banks on CTIR and NIER. This in line with Iqbal (2001) and Masruki et al. (2011) but contradicts Borkbh (2011); Beck, Demirgüç Kunt and Merrouche (2010); and Johnes, Izzeldin and Pappas (2009). On the other hand, the revenue efficiency analysis shows mixed results, as conventional banks perform better on the NIM ratio and Islamic banks fare better on the other operating-income ratio. Furthermore, the mean values of ROAA and ROAE do not vary across bank type, meaning that profit efficiency does not differ between conventional and Islamic banks. The findings of profitability are in line with Akhter et al. (2011); Beck, Demirgüç-Kunt and Merrouche (2010); Samad (2004); and Samad and Hassan (1999). Similar to Bader et al. (2007), the effect of profit efficiency is not significant, but in the present study, conventional banks are more profitable in terms of ROAE ratio, whereas the opposite is the case in Bader et al (2007). Also, the results of revenue efficiency are the same in both studies. However, the results of cost efficiency are mixed in Bader et al. (2007), but in this study the results indicate that Islamic banks are more cost efficient for both of the measuring variables.

The effect of bank size on the performance of conventional and Islamic banks in dual-bank systems is analyzed next. Table 11 summarizes these results. The multiple-comparison tests indicate that large Islamic banks are more cost efficient (CTIR) than large and small conventional banks, and the same findings are obtained for small Islamic banks. Also, both large and small Islamic banks fare better than large and small conventional banks on NIER but worse on NIM. For the other revenue ratio (OPIR), the mean value for small Islamic banks is higher than the mean value of large and small conventional banks, although those comparisons do not reach significance. In terms of profit efficiency, the table shows that there are no significant differences between conventional and Islamic banks when ROAA is the measuring variable. However, this changes when ROAE is the measuring variable, as large and small conventional banks outperform large and small Islamic banks. The results here differ from the results of the whole sample in the case of cost efficiency only. The results of the dual-banking sample are consistent, showing that large Islamic banks are more cost efficient. In the total sample, although large banks are more cost efficient, the results are mixed. Furthermore, the results obtained here are consistent with Bader et al.'s (2007) finding that large banks are more cost and profit efficient than small banks, whereas small banks are more revenue efficient (the results in the present study are significant). In addition, the present study shows that large Islamic banks are more cost efficient, whereas Bader et al. (2007) indicates that large conventional banks are more cost efficient than small conventional and Islamic banks (the outcomes for revenue efficiency are identical in both studies). The results for revenue efficiency (ROAA) are the same in both studies; however, the results for ROAE are different (for small Islamic and conventional banks). For instance the cost-efficiency results show mixed outcomes in Bader et al. (2007), which contrasts with our findings. Also, the ROAA results differ between the two studies, but the revenue-efficiency (NIM and OPIR) results are the same.

Table 10 : Results for cost, revenue, and profit efficiency of conventional and Islamic banks

Category	Statistic	Cost efficiency		Revenue efficiency		Profit efficiency	
		CTIR	NIER	NIM	OPIR	ROAA	ROAE
Conventional banks	*Mean*	182.09	3.30	3.60	1.80	0.85	10.00
	SD	121.97	4.30	4.15	1.72	4.80	35.74
Islamic banks	*Mean*	165.78	2.47	2.53	1.98	1.02	7.26
	SD	129.90	1.62	1.90	2.15	2.13	25.22
	t-test	1.87	3.78	5.47	2.27	0.79	1.60

Next, the analysis turns to the performance of conventional and Islamic banks by location for the dual-bank countries (Table 12). The results for the cost efficiency is identical for that of the entire sample as Asian Islamic banks are more cost efficient when CTIR is the measuring variable. However, the results for revenue efficiency (NIM and OPIR) differ from the results for the entire sample in that here African conventional banks are more efficient, whereas in the entire sample African Islamic banks are the most efficient. For profit efficiency (ROAA) the outcome is the same, whereas for ROAE African conventional banks are the more profit efficient. When Islamic and conventional banks compared within the same region the outcome differs than that of the entire sample. For instance, African Islamic banks are more cost efficient than conventional banks, but in the analyses of the entire sample, African Islamic banks have a higher mean CTIR and NIER than their counterparts. The results for revenue efficiency do not show significant differences between the two banking systems (in Africa), but in the entire sample Islamic banks are more revenue efficient for both of the measuring variables. The findings for profit efficiency in both samples are identical, which confirms that conventional banks are better than Islamic banks at generating profit in Africa. There is no change in the results between the total sample and the dual-bank sample when it comes to Asia, although the significance levels are weaker for the dual-bank sample.

Table 11 : Results for cost, revenue, and profit efficiency of conventional and Islamic banks based on asset size

Bank size	Category	Statistic	Cost efficiency		Revenue efficiency		Profit efficiency	
			CTIR	NIER	NIM	OPIR	ROAA	ROAE
Big	Conventional bank	*M*	158.58	3.31	3.60	1.79	0.84	11.18
		SD	121.72	4.32	4.16	1.71	4.82	7.25
	Islamic bank	*M*	137.91	2.45	2.51	1.98	1.98	9.38
		SD	109.93	1.63	1.90	2.26	2.15	7.32
		t-test	3.34	3.80	5.48	1.25	0.78	2.96
Small	Conventional bank	*M*	155.15	3.32	3.61	1.18	0.86	11.15
		SD	117.11	4.33	4.17	1.72	4.84	7.22
	Islamic bank	*M*	138.17	2.46	2.49	1.99	1.02	9.35
		SD	109.66	1.63	1.88	2.61	2.14	7.35
		t-test	2.85	3.84	5.64	2.14	0.73	2.98
ANOVA *p*		Between groups	.000	.000	.000	0.02	0.77	0.01

Regarding the Middle East and Turkey, the dual sample shows that Islamic banks are more cost efficient (CTIR and NIER), and this contradicts Olson and Zoubi (2011). In the present study, there is no variation by bank type for the entire sample. The revenue-efficiency outcome is the same in both samples. However, profitability shows significant changes in the dual-bank analysis; specifically, in the whole sample conventional banks outperform Islamic banks (ROAE), but the ROAE means are not significantly different for conventional and Islamic banks in the dual-bank sample. For the ROAA ratio, the results in both analyses indicate that Islamic

banks are more profitable, but the results are only significant (although weak) for the dual-bank sample. The results for profitability are in line with Olson and Zoubi (2008) and Olson and Zoubi (2011).

The effect of location on Islamic and conventional bank performance (dual-banking sample) are significant in this study but not in Bader et al. (2007). For example, the results for cost efficiency (CTIR and NIER) here indicate that Asian Islamic banks are the most cost efficient, whereas Bader et al. (2007) shows mixed results. Also, the results of revenue efficiency are different; in Bader et al. (2007) African Islamic banks are the more revenue efficient, but in the present study African conventional banks are the more revenue efficient. The results for revenue efficiency are the same in both studies, but in the present study they are significant. Also, for the comparisons of conventional

and Islamic banks in the same region, the two studies show different results. In Africa the results for cost and revenue efficiency are mixed in Bader et al. (2007), but in the present study the results indicate that Islamic banks are more cost efficient (CTRI and NIER) but conventional banks are more revenue and profit efficient. Also, Bader et al. (2007) finds mixed results for Asian banks for cost and revenue efficiency but consistent results for profit efficiency; however, the present study shows that Islamic banks are more cost efficient but less revenue and profit efficient than their conventional counterparts. Regarding the Middle East and Turkey, both studies show the same findings for revenue and profit efficiency; nevertheless, the results for cost efficiency are mixed for Bader et al. (2007), but in the present study Islamic banks are more cost efficient.

Table 12 : Results of cost, revenue, and profit efficiency of conventional and Islamic banks in selected regions

Bank category	Statistic	Cost efficiency		Revenue efficiency		Profit efficiency	
		CTIR	NIER	NIM	OPIR	ROAA	ROAE
African conventional	M	219.03	4.20	4.11	3.16	1.18	10.76
	SD	145.10	2.33	2.46	2.80	1.73	7.66
African Islamic	M	144.58	2.80	3.63	2.83	0.91	6.80
	SD	123.16	2.39	1.81	2.81	1.33	5.53
	t-test	3.25	3.18	1.28	0.77	1.04	3.24
Asian conventional	M	138.54	3.33	3.03	1.57	0.82	10.79
	SD	112.81	6.32	3.24	1.19	6.88	7.98
Asian Islamic	M	109.44	2.34	2.06	1.31	0.21	6.06
	SD	128.31	1.50	2.05	0.85	1.55	10.54
	t-test	2.81	1.56	3.23	2.61	0.11	5.79
Middle East and Turkey conventional	M	156.64	3.02	3.98	1.61	1.28	11.60
	SD	119.56	2.51	4.95	1.75	2.51	7.42
Middle East and Turkey Islamic	M	125.69	2.57	2.70	2.22	1.55	11.25
	SD	81.15	1.59	1.80	2.36	1.87	6.88
	t-test	3.93	2.65	4.20	4.01	1.71	0.72
ANOVA p	Between groups	.000	.000	.000	.000	.000	.000

V. CONCLUSION

The results indicated that, on average, the Islamic banks in both samples are more cost efficient than the conventional banks. Also, based on the results of cost efficiency it can be said that Islamic banks can reduce their CTIR by controlling their operational expenses and conventional banks can reduce their NIER with better risk management. Moreover, the mean

of profit efficiency (ROAA) indicate that the Islamic banks are more profit efficient than the conventional banks. However, these results are marginally significant at best. On the other hand, the means for the ROAE[1] ratio reveal that conventional banks are more profitable, and the results are significant in the analysis of the total sample. The revenue-efficiency results are also not uniform. Specifically, when NIM is the measuring variable, the conventional banks outperform the Islamic banks. In contrast, the results of the other revenue-efficiency variable (OPIR) show that the Islamic banks are more efficient. This could mean that Islamic banks depend more on investments contracts (e.g., murabaha,

When income smoothing practices are taken into account, it can be said that Islamic banks are more profitable than conventional banks. Abdul Rahman and Wan Abdullah (2005), Ismail, Shaharudin, and Samudhram (2004), and Taktak, Zouari, and Boudrigua (2010) find no evidence that Islamic banks practice income smoothing.

musharakah, ijarh, and mudarabh) to generate profits. In summary, Islamic banks are more cost efficient, conventional banks are more profit efficient, and both bank types are equally revenue efficient.

The analyses provide strong evidence that bank size does matter. The analyses of bank size reveal that the large banks in this study are more cost and profit efficient, whereas the small banks are more revenue efficient. Furthermore, the small conventional and small Islamic banks are, on average, more revenue efficient than the large conventional and Islamic banks. Also, the large Islamic banks are more profitable than the large conventional banks, small conventional banks, and small Islamic banks when ROAA is the measuring variable, whereas the large conventional banks are more profitable than the large Islamic banks, small Islamic banks, and small conventional banks when ROAE is the measuring variable. In addition, the results show that small Islamic banks are more cost efficient than small conventional banks, but the latter are more revenue and profit efficient. Although small Islamic banks should be encouraged to merge, in general the results here are almost identical in both of the samples.

Also, the analysis shows that, on average, Asian Islamic banks are more cost efficient than all other banks (in Africa and the Middle East and Turkey), conventional or Islamic. The revenue-efficiency analysis reveals that African banks are more revenue efficient than banks in other regions. However, the results differ between the two samples: Islamic banks prevail on NIM and OPIR in the total sample, whereas conventional banks are stronger on both outcomes in the dual-bank sample. With respect to profitability, Islamic banks in the Middle East and Turkey are the most profitable in both samples when ROAA is the measuring variable. On the other hand, the ROAE variable shows mixed results. In the dual-bank sample, conventional banks in the Middle East and Turkey are the most profitable. For the entire sample, conventional banks in Africa are the most profitable. All of these results are significant at the 1% level.

Furthermore, the results related to Asian region reveal hat conventional banks are more revenue and profit efficient compared to its counterpart. On the other hand, the results of the African region show, in large, that Islamic banks are more cost and revenue efficient than conventional banks, however its profit efficiency is lower. Meanwhile, the efficiency analysis of conventional and Islamic banks in the Middle East and Turkey region did not give a conclusive results concerning revenue and profit efficiency, this because the outcome of the both samples (whole and dual-bank) are different. However the results of cost efficiency generally indicate the Islamic banks are more cost efficient.

It is worth noting that when only Islamic banks in the three regions are compared, African banks are the most revenue efficient, Asian banks are the most cost efficient, and banks in the Middle East and Turkey are the most profitable; these findings are consistent with Bader et al. (2007). This is true for the total sample and the dual-bank sample. When conventional banks are compared with one another, for the most part there are no significant variations by region. This shows that location plays an important role in the performance of the Islamic banking industry. This could be attributed to regulations, differences in GDP growth and GDP per capita, development of capital markets, and level of economic activity. Also, the analysis of both samples confirmed that Islamic banks were superior to conventional banks in controlling costs. However, there is a room for Islamic banks to improve their revenue efficiency. On the other hand, the results for profit efficiency are not conclusive—Islamic banks do better on ROAA, and conventional banks do better on ROAE. But, if income smoothing practices taken into account it can be said that Islamic banks are more profitable.

Finally, the results of the entire sample are almost identical to Bader et al. (2007), but both are slightly different from the results of the dual-banking system sample, where Islamic and conventional banks are compared based on size and location.

Table 1 : Number of banks by country

No.	Country	Islamic banks	Conventional banks	Total no. of banks[a]
1	Afghanistan		3	3
2	Albania		11	11
3	Algeria	1	12	13
4	Azerbaijan		16	17
5	Bahrain	6	6	17
6	Bangladesh	5	27	33
7	Benin		8	8
8	Brunei	1	1	2
9	Burkina Faso		9	9
10	Cameroon		11	11

11	Chad		3	3
12	Djibouti		2	2
13	Egypt	2	18	26
14	Gabon		5	5
15	Gambia	1	6	7
16	Guinea		5	5
17	Guyana		3	3
18	Indonesia	2	47	53
19	Iran	16		16
20	Iraq	2	7	9
21	Ivory Coast		11	11
22	Jordan	2	12	14
23	Kazakhstan		22	22
24	Kuwait	3	7	9
25	Kyrgyzstan		7	7
26	Lebanon	2	44	47
27	Libya		8	8
28	Malaysia	12	24	36
29	Maldives		1	1
30	Mali		9	9
31	Mauritania	1	6	7
32	Morocco		10	10
33	Mozambique		9	9
34	Niger		5	5
35	Nigeria		19	19
36	Oman		6	6
37	Pakistan	6	24	30
38	Palestine	1	2	3
39	Qatar	3	5	8
40	Saudi Arabia	3	7	11
41	Senegal	1	10	11
42	Sierra Leon		8	8
43	Sudan	24	1	25
44	Suriname		2	2
45	Syria	2	9	11
46	Tajikistan		3	3
47	Togo		6	6
48	Tunisia	1	16	17
49	Turkey	4	34	38
50	Turkmenistan		1	1
51	Uganda		11	11
52	UAE	5	18	19
53	Uzbekistan		14	14
54	Yemen	4	4	8
Total		110	576	699

Source: Author's calculations based on Bank Scope data
[a] Includes the windows of conventional banks and the years before and during conversion (see above).

Table 2 : Number of all banks by year each country

No.	Country/Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
1	Afghanistan	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	3	3
2	Albania	0	0	0	0	0	1	2	4	3	3	6	8	8	6	8	9	7
3	Algeria	1	2	3	6	6	4	4	6	6	6	6	7	12	11	12	13	13
4	Azerbaijan	0	0	0	2	3	4	4	4	8	8	11	13	16	16	16	16	15
5	Bahrain	0	10	10	10	10	10	10	11	11	11	12	12	15	16	17	16	16
6	Bangladesh	4	10	12	17	18	19	19	26	29	31	31	31	32	32	33	33	32
7	Benin	1	1	3	3	5	5	4	4	4	5	5	6	4	6	7	6	6
8	Brunei	0	0	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2
9	Burkina Faso	0	0	0	1	3	4	4	7	7	6	5	5	8	8	8	7	6
10	Cameroon	1	1	3	3	3	5	6	6	7	6	7	8	9	11	9	8	4
11	Chad	0	1	1	1	2	2	2	2	3	3	0	2	2	3	2	2	1
12	Djibouti	1	1	1	2	2	2	2	2	2	2	1	1	1	2	1	2	2
13	Egypt	4	19	23	23	24	24	24	24	24	25	25	25	25	24	24	26	25
14	Gabon	1	2	2	2	3	3	3	3	3	3	3	4	4	4	4	4	4
15	Gambia	0	0	0	0	1	2	1	3	3	2	2	3	4	5	7	5	4
16	Guinea	0	0	0	0	1	2	1	1	2	2	0	1	1	1	1	2	2
17	Guyana	1	1	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
18	Indonesia	7	18	23	25	28	32	36	40	41	41	40	44	50	53	48	47	45
19	Iran	2	3	3	4	4	5	9	10	11	12	14	14	14	14	15	16	15
20	Iraq	0	0	0	1	1	2	2	2	2	2	1	2	2	5	5	6	6
21	Ivory Coast	0	3	4	5	6	6	6	8	8	7	6	5	6	8	9	8	7
22	Jordan	2	8	10	11	11	11	12	12	12	14	14	14	14	14	14	14	14
23	Kazakhstan	0	0	0	2	4	9	14	11	11	15	16	18	19	18	17	21	19
24	Kuwait	1	8	8	8	8	8	8	8	8	8	8	8	8	9	9	9	9
25	Kyrgyzstan	0	0	0	0	0	0	0	0	3	6	7	5	5	5	4	4	3
26	Lebanon	33	44	44	44	45	45	45	43	42	36	37	37	31	33	33	35	34
27	Libya	0	0	1	1	2	2	2	4	4	6	5	6	5	5	5	7	6
28	Malaysia	0	4	14	20	22	21	22	22	22	24	25	27	26	29	35	35	35
29	Maldives	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
30	Mali	0	2	3	3	3	3	3	4	5	5	4	4	6	6	6	6	6
31	Mauritania	0	1	2	2	4	4	4	3	4	4	6	7	7	7	6	6	5
32	Morocco	3	5	6	6	8	9	8	8	8	8	8	8	8	9	9	9	9
33	Mozambique	1	2	2	2	3	3	3	3	4	7	7	6	6	8	8	8	8
34	Niger	0	0	1	1	1	1	1	2	3	3	4	4	4	4	5	5	4
35	Nigeria	2	4	6	10	12	13	13	14	15	18	18	17	16	18	18	19	18
36	Oman	1	5	5	5	5	5	5	5	5	5	5	5	5	5	5	6	6
37	Pakistan	3	13	13	16	17	17	17	17	17	16	16	20	22	25	29	29	29
38	Palestine	0	0	1	1	1	1	1	1	1	1	1	2	2	2	2	3	3
39	Qatar	0	5	5	6	6	6	6	6	6	7	7	7	7	7	8	8	8
40	Saudi Arabia	1	10	10	10	10	10	10	10	10	10	10	10	10	11	11	11	11
41	Senegal	0	3	4	4	7	6	5	6	6	7	9	9	9	8	8	8	8
42	Sierra Leon	2	3	3	3	3	3	3	4	4	4	4	4	4	5	6	7	7
43	Sudan	2	3	3	4	5	8	8	9	14	14	17	15	11	14	18	23	23
44	Suriname	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
45	Syria	1	1	1	1	1	1	1	1	1	1	1	1	4	7	7	11	11
46	Tajikistan	0	0	0	0	0	0	0	0	0	0	0	1	3	3	3	3	3
47	Togo	0	0	0	4	4	3	3	2	1	2	3	3	2	3	4	3	2
48	Tunisia	4	13	13	13	13	13	15	15	16	16	15	14	14	15	15	15	15
49	Turkey	3	5	7	7	7	8	9	22	22	26	30	31	35	34	35	34	34
50	Turkmenistan	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
51	Uganda	0	3	4	5	9	8	8	9	10	11	11	11	11	11	11	11	11
52	UAE	1	14	16	16	17	17	18	18	17	18	20	20	19	20	20	20	20
53	Uzbekistan	0	1	1	1	2	3	4	6	8	9	8	11	11	10	10	11	8
54	Yemen	1	3	3	3	4	4	5	5	5	6	8	8	8	8	8	7	6
	Total	84	235	280	321	361	381	399	441	466	490	507	532	553	588	605	625	597

Source: Author's calculations based on Bank Scope data.

Table 3 : Number of conventional banks by country and year (dual banking system)

No.	Country/year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
1	Algeria	1	2	3	6	6	4	4	6	6	6	6	7	12	11	12	13	13
2	Bahrain	0	10	10	10	10	10	10	11	11	11	12	12	15	16	17	16	16
3	Bangladesh	4	10	12	17	18	19	19	26	29	31	31	31	32	32	33	33	32
4	Brunei	0	0	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2
5	Egypt	4	19	23	23	24	24	24	24	24	25	25	25	25	24	24	26	25
6	Gambia	0	0	0	0	1	2	1	3	3	2	2	3	4	5	7	5	4
7	Indonesia	7	18	23	25	28	32	36	40	41	41	40	44	50	53	48	47	45
8	Iraq	0	0	0	1	1	2	2	2	2	2	1	2	2	5	5	6	6
9	Jordan	2	8	10	11	11	11	12	12	12	14	14	14	14	14	14	14	14
10	Kuwait	1	8	8	8	8	8	8	8	8	8	8	8	8	9	9	9	9
11	Lebanon	33	44	44	44	45	45	45	43	42	36	37	37	31	33	33	35	34
12	Malaysia	0	4	14	20	22	21	22	22	22	24	25	27	26	29	35	35	35
13	Mauritania	0	1	2	2	4	4	4	3	4	4	6	7	7	7	6	6	5
14	Pakistan	3	13	13	16	17	17	17	17	17	16	16	20	22	25	29	29	29
15	Palestine	0	0	1	1	1	1	1	1	1	1	1	2	2	2	2	3	3
16	Qatar	0	5	5	6	6	6	6	6	6	7	7	7	7	7	8	8	8
17	Saudi Arabia	1	10	10	10	10	10	10	10	10	10	10	10	10	11	11	11	11
18	Senegal	0	3	4	4	7	6	5	6	6	7	9	9	9	8	8	8	8
19	Syria	1	1	1	1	1	1	1	1	1	1	1	1	4	7	7	11	11
20	Tunisia	4	13	13	13	13	13	15	15	16	16	15	14	14	15	15	15	15
21	Turkey	3	5	7	7	7	8	9	22	22	26	30	31	35	34	35	34	34
22	UAE	1	14	16	16	17	17	18	18	17	18	20	20	19	20	20	20	20
23	Yemen	1	3	3	3	4	4	5	5	5	6	8	8	8	8	7	6	6
	Total	66	191	223	245	262	266	266	275	302	306	313	325	340	376	387	392	385

Source: Author's calculations based on Bank Scope data.

Table 3 : Number of Islamic banks by country and year (dual banking system)

No.	Country/year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
1	Algeria	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	Bahrain	0	3	3	3	3	3	3	3	3	3	4	4	5	5	6	6	6
3	Bangladesh	1	1	1	3	2	3	2	3	2	4	4	4	4	4	5	5	5
4	Brunei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
5	Egypt	0	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2
6	Gambia	0	0	0	0	0	1	1	1	1	0	0	0	0	1	1	0	0
7	Indonesia	0	0	0	0	0	0	0	0	1	1	1	2	2	2	2	2	2
8	Iraq	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2	2
9	Jordan	0	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2
10	Kuwait	0	1	1	1	1	1	1	1	1	1	1	1	1	2	2	3	3
11	Lebanon	0	1	1	1	1	1	1	1	0	0	1	1	1	0	1	2	2
12	Malaysia	0	0	0	1	1	1	1	1	2	3	3	3	2	5	11	11	11
13	Mauritania	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
14	Pakistan	0	0	0	0	0	0	0	0	0	0	1	2	3	5	6	6	6
15	Palestine	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
16	Qatar	0	1	1	2	2	2	2	2	2	2	2	2	2	2	3	3	3
17	Saudi Arabia	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	3	3
18	Senegal	0	0	0	0	1	1	0	0	0	0	1	1	1	0	0	0	0
19	Syria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
20	Tunisia	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
21	Turkey	1	1	1	1	1	1	1	1	1	4	4	4	4	4	4	4	4
22	UAE	0	1	1	1	1	1	2	2	2	2	3	3	3	4	4	5	5
23	Yemen	0	0	0	0	1	1	2	2	2	2	4	4	4	4	3	3	4
	Total	3	13	13	18	19	21	24	25	25	30	37	40	41	50	61	66	67

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Effect of Intellectual Capital on Return on Assets of Insurance Firms in Nigeria

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Abstract- Intellectual capital represents the efforts of *workers* towards the growth of an organization. The inability of firms to measure and quantify intellectual capital has posed fundamental problems overtime in the value measurement of firms. The purpose of this study is to evaluate the effect of IC in the value creation of insurance firms in Nigeria using their ROA. Ex-post facto research design was adopted in the selection of data. Primary and secondary data were employed. The target population consisted of 150 workers in the 3 strategic departments of human resources, accounts and marketing of 18 insurance companies using the purposive sampling technique. 150 questionnaires were distributed and a response rate of 74% was recorded. Face validity, content validity and pilot test were used to validate the instruments. The Cronbach's Alpha reliability test gave a result of (r=0.806) and (r=0.800) respectively. Regression was used for data analyses at 5% level of significance.

Keywords: *intellectual capital, financial performance, insurance firms, value added.*

GJMBR - C Classification : *JEL Code : G22*

EFFECTOFINTELLECTUALCAPITALONRETURNONASSETSOFINSURANCEFIRMSINNIGERIA

Strictly as per the compliance and regulations of:

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Abstract- Intellectual capital represents the efforts of *workers* towards the growth of an organization. The inability of firms to measure and quantify intellectual capital has posed fundamental problems overtime in the value measurement of firms. The purpose of this study is to evaluate the effect of IC in the value creation of insurance firms in Nigeria using their ROA. Ex-post facto research design was adopted in the selection of data. Primary and secondary data were employed. The target population consisted of 150 workers in the 3 strategic departments of human resources, accounts and marketing of 18 insurance companies using the purposive sampling technique. 150 questionnaires were distributed and a response rate of 74% was recorded. Face validity, content validity and pilot test were used to validate the instruments. The Cronbach's Alpha reliability test gave a result of (r=0.806) and (r=0.800) respectively. Regression was used for data analyses at 5% level of significance. Results obtained from the primary data revealed that structural capital had significant positive effect on ROA at (P<0.05) while relational capital also had a significant positive effect on ROA at (P<0.05). Aggregated P value for f-statistic was significant on ROA at (F=.000<.05) from the primary data. Secondary data analysis revealed that human capital was negatively significant on ROA at (P<0.05). Relational capital was also positively significant on ROA at (P<0.05). The aggregated f-statistic on secondary data was significant on ROA at (F=.015<.05). The study concluded that human capital (HC), structural capital (SC) and relational capital (RC) each had a statistical weak relationship with return on assets (ROA) of insurance companies in Nigeria. It was therefore recommended that a standard on intellectual capital accounting should be issued by the International Financial Reporting Committee (IFRC).

Keywords: intellectual capital, financial performance, insurance firms, value added.

I. Introduction

The return on assets (ROA) is a measurement of the earnings attributable to each naira of the asset owned in the organization during a given period. This ratio is usually used to measure the effective use of resources in the organization.

The return on assets (ROA) is calculated by dividing the net income of a company by its total assets. ROA is measured as net income or profit before interest and tax divided by the total assets of the company. Profit before tax is best suited for this measurement because taxes are not controllable by management and since firms' opportunities for availing tax incentives

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differ, it may be more prudent to use profit before tax to measure ROA (Pandey, 2010).

Although there are no fixed standards or benchmarks for ROA but the higher this ratio is the better it is for the company. A higher return on assets means that the company is using its assets efficiently and effectively. An increase in the ROA is an indication of improved profitability and improved performance of a company, (Flamholtz, 1999; Hagel, Brown & Davison, 2009).

Return on capital employed (de Pablos, 2003 & Bontis, 2004; Pandey, 2010; Niresh, 2012) can also be referred to as Return on Assets (ROA).

II. Review of Relevant Literature

a) Conceptual framework of intellectual capital

Intellectual capital is one of the most important resources that can positively impact on a firm's profitability and efficiency. Flamholtz (1999) reiterates that the world economy has shifted from the industrial in which plant and equipment were the core assets to the post-industrial era in which intellectual capital is the core asset. While most firms in the industrial era by definition relied on manufacturing capabilities, companies in the post-industrial era now rely almost completely on knowledge and information for survival and profit.

The basis for the above argument is corroborated by de Pablos (2003) and Bontis (2004) who argue that a company will gain a competitive advantage if intellectual capital is effectively harnessed in the organisation. The drivers of this intellectual capital advantage (Pulic, 2004) may be found in all employees' as well as the organization's ability to create value under a market assessment. In other words, intellectual capital (Nielsen, Bukh, Mouritsen, Johansen & Gormsen, 2006) is represented by the company's stock, such as skilled employees, knowledge and management philosophy. The study and the measurement of intellectual capital on the profitability of insurance firms is a key challenge to managers towards the fulfilment of their stewardship obligation to investors who rely on the financial information of such firms in evaluating the performance of the sector in Nigeria. Most importantly, such a study is expected to help the industry to formulate and implement strategies that will help develop its intellectual capital and guide them to benchmark themselves in order to improve their value creation as argued by Goh (2005). For example, the inclusion of intellectual capital

contributions in the financial reports of early organisations such as R.G. Barry Corporation and Skandia Insurance Corporation (Edvinsson & Malone, 1997) helped to pioneer and increase awareness in the concept of intellectual capital reporting. Intellectual capital can be categorised into:

i. *Human Capital (HC)*

This is the value of all the workers in the organization with all the attendant rewards attached to their utilization (Verguwen & Alem, 2005). These capabilities are peculiar to the workers (even though the organization invests in them) because they go away with them whenever they leave the organization (Roos & Roos, 1997).

Human capital is the generic term for the competences, skills, trainings and motivation of the employees. The human capital of the organisation comprises of all the qualities and professional skills the worker bring into the organisation. HC is owned by the worker and leaves along with him whenever he leaves the organisation. Human capital is the totality of all remunerations and rewards paid to the worker. Human capital (Namvar, Fathian, Gholamin, & Akhavan, 2011) is at the heart of intellectual capital measurement.

ii. *Structural Capital (SC)*

Structural capital is the supportive infrastructure that enables human capital to function in an organisation. Structural capital is owned by an organization and remains with it even when the worker leaves the organization. Structural capital consists of trademarks, patents, formulas, management style, company reputation, image, corporate culture, networking, mission, vision. It is the difference between non-thinking and thinking resources that use very different management methods such as culture, organizational processes, technology, absorptive capacity and information systems to achieve corporate goals (Namvar, Fathian, Gholamin, & Akhavan, 2011).

This form of capital is of strategic importance in the corporate planning and growth of any organization. Structural capital refers to all structures deployed by the workers to drive the business processes. Structural capital is owned by the enterprise and remains with it even when the worker leaves the company. This form of capital can be evaluated on how employees, organisational units and different hierarchy levels of workers exchange information and co-operate together on organisational projects. Corporate culture, which is enhanced by structural capital, comprises of all values and norms, knowledge transfer and the working manner which is peculiar to every business organisation. It also includes compliance to rules and the ability of the workers to handle failures corporately when they eventually occur. Structural capital is calculated as the difference between value added and human capital.

iii. *Relational Capital*

Relational capital is the inclination that the customers have over the goods and services of an organisation. It is the preference and loyalty that customers have over a company's brand over other products and services. Relational capital is the relationship which an organisation has with external groups and persons over time. This will include trade relationships with past, present and potential customers, suppliers, partners and the public at large. To maintain a high degree of relational capital, the organisation must exhibit a high sense of salesmanship and marketability with its sales team and open access to customers (Soumet, 2007).

b) *Theoretical framework of intellectual capital*

Over the years, a number of theories, models and definitions have been formulated through which the present day intellectual capital measurement is derived, such as:

a) The Balanced Score Card (BSC)
b) Skandia's IC Navigator
c) Economic Value Added (EVA)
d) Market Value Added (MVA)
e) Tobin's Q Ratio
f) Intellectual Capital Services' IC-Index
g) The Technology Broker's IC Audit
h) Sveiby's Intangible Asset Monitor (IAM)
i) Real Option Theory (ROT)
j) Citation-weighted Patents
k) Value Added Intellectual Coefficient (VAIC™)

c) *Empirical framework*

Despite the prominence given to the efforts of the workforce in the annual financial statements of companies in Nigeria, the measurement of intellectual capital in Nigeria is very shallow. It is true that human capital is acknowledged by the directors of companies, especially in the Chairman's Statement in the Annual Reports, yet such knowledge are not measured or articulated in the companies' financial reports. This means that the value of firms in Nigeria is under-reported.

Yuan (2001), whilst visualizing intellectual capital as an important component that reflects organizational capacity opined that intellectual capital is the potential ability of an organization and a carrier for knowledge application and skills innovation. This view was corroborated by Wang and Xu (2002) who identified intellectual capital as a wealth-creating instrument. They argue that capabilities and all kinds of knowledge elements were actually cited from intellectual capital.

In a study on the impact of investment in human resource training and development on employee effectiveness in Nigerian banks, Yahaya (2006) reiterates that an often repeated statement made by directors and chairmen of corporate organisations in their annual reports is "our main asset is our workers".

Yet, this 'main asset' is neither measured nor included in the financial report of the enterprise.

Using expenditures on the employee (salaries, wages and training costs) as well as other intrinsic values, there is a strong indication that human efforts in the organisation can actually be measured. In private organisations, intellectual capital measurement may be difficult because data for its measurement might be scanty or non-existent. In such types of organisations, very few employers of labour acknowledge the value of their employees. They fail to appreciate the fact that even physical and financial capital (capital employed) can only be productive through human efforts and manipulations. Beyond the inability of firms to measure intellectual capital, the general trend has been for management to recommend the layoff of the workforce as a way of reorganizational modification during periods of low profitability. This step or action on the workforce through layoffs may be counter-productive.

Since the measurement of intellectual capital is the process of evaluating human efforts in an analytical form, Flamholtz (1999) argues that neither financial nor managerial accounting has responded to current changes as evidenced in post-industrial economies. He realises that the accounting paradigm and related measurement technology have not been re-conceptualised to account for this economic transformation. He maintains that the continued use of measurement tools that are no longer well suited to the current era, have therefore resulted in anomalies (Flamholtz, 1999).

In May, 1995, Skandia Corporation, the top insurance and finance enterprise in Sweden, issued the world's first public Intellectual Capital Annual report. This marked a shift from the previous annual reports which were only compiled for reference purposes in companies' reports. The result of this report was the formation of the Skandia Intellectual Capital Navigator, which not only measured intellectual capital, but also provided a framework for classification and a standard for the measurement of intellectual capital.

Since organizations acquire intellectual capital to generate future revenues, it is therefore most appropriate that such human resources be considered when valuing a company by capitalizing instead of expensing such expenditures in the current period. The significance of this argument is that intellectual capital should be treated like the other assets. Since all assets are reported on the balance sheet, these also should be reported along with physical assets.

The Value Added Intellectual Coefficient, VAIC (Baldini, Liberatore & Ridi 2011) approach is used to determine a firm's efficiency in using intellectual capital resources. The sample analysis used by these scholars consisted of financial sector companies listed on the Italian Stock Exchange for the period 2006-2008. Their findings fully confirm the existence of a positive relationship between accounting values and market values on the one hand and Intellectual Capital (IC) components as measured by VAIC and market value on the other. Results show that investors attach more value relevance to Human Capital Efficiency (HCE) than to Structural Capital Efficiency (SCE) and that HCE plays an indirect role in the relationship between IC and market value.

VAIC, as measured by Ante Pulic (Pulic, 1998, 2000, 2004) has been criticised as an invalid measure of intellectual capital. The argument was premised on the fact that VAIC indicates the efficiency of the company's labour and capital investments and has nothing to do with intellectual capital. The criticism was on the use of the measurement variables as being overlapping and the results obtained from the calculations not supporting the hypothesis which states that VAIC correlates with a company's stock market value.

According to Singh (2009) human resource costs can be categorized into Capital and Revenue Expenditure. He stated that Capital expenditure would include acquisition, development, retention, update, hiring, recruitment and training costs. Whereas Revenue expenditure would include wages, salaries, bonus, commission, perquisites, allowances, short-term motivation, efficiency and maintenance costs. He concludes that the value of human resources can be calculated either on the basis of Cost of Production approach or the Capitalized Earnings Approach. He affirmed that capital expenditures are written off over the expected life of the employees, while revenue expenditures are written off or charged into the company's Profit & Loss account of the current year. Rowbottom (1998) in his thesis on intangible asset accounting and accounting policy selection in the football industry in the United Kingdom corroborates this view thus, that intellectual expenditure can be segregated into capital and revenue forms. This segregation may not be clear-cut principally because of the problem of demarcation between the various costs.

In the insurance industry, intellectual capital measurement has not been widely adopted. Moslehi, Mohaghar, Badie & Lucas (2006) in their investigation of the intellectual capital measurement and management in the Iranian insurance industry concluded that in spite of the importance of intellectual capital measurement, the insurance industry in Iran largely ignores them. They concluded that the IC toolbox does not disclose the value of the firm's intellectual resources. However, Iswati & Anshori (2007) found that intellectual capital, though new in Indonesia, has influence on the insurance companies' performance in the Jarkata Stock Exchange.

In Nigeria, studies on the measurement of intellectual capital in insurance firms are currently not available. Onafalujo, Eke & Akinlabi (2011) observe though that accounting in insurance companies, using the new IFRS recommendations is relevant to the

Nigerian financial environment but argue that the application of IFRS through the use of observable and unobservable market inputs as well as the experience variance of operators may be difficult in the short run but achievable in the long run. They identified that the inability of the workforce to uphold good ethical practices in insurance firms in Nigeria do negatively affect the practice of insurance. Though such unethical practices may work in the immediate and short run to reduce the number of claims payable, such practices will no doubt undermine the confidence of current and prospective clients and this would inevitably bring about adverse effects on the reputation and performance of the industry in the medium and long run. In a study on organisational knowledge management as a strategy for Nigerian insurance companies, Epetimehin & Ekundayo (2011) observe that intellectual capital, a vital corporate asset, will melt away unless companies do something to stop the brain drain and to retain critical knowledge. They opined that the survival of insurance companies in Nigeria is dependent upon the resolve of the workforce to eliminate unethical practices which are resorted to in avoiding liability under insurance policies. This assertion was collaborated by Alaka, Tijani & Abass (2011) when they identified the impact of strategic planning on the performance of the Nigerian insurance industry.

Furthermore, Appuhami (2007) concludes from his empirical study of the impact of intellectual capital on Thailand's financial sector that there is a significant positive relationship between investors' capital gain on shares and corporate intellectual capital.

Ong, Yeoh & Teh (2011) investigate the intellectual capital efficiency in 43 food and beverage companies listed on the Malaysian Stock Exchange between 2008 and 2010. Using the VAIC (HCE, SCE, CEE), the outcome of their study revealed that the beverage companies have greater VAIC and intellectual capital efficiency (ICE) when compared to food companies over the 3 years period.

In another study which evaluated the role of intellectual capital in the university efficiency system at Azad Islamic University in Iran; using synthetic model of genetic algorithm and decision trees, Modaresi, Rezaei & Javid (2012) observe that the development of intellectual capital affects university efficiency significantly.

Yahaya (2006) using the quantitative measure published by the Institute of Intellectual Capital Research and approved by the Saratoga Institute measured the impact of investment in human training and development on employees' effectiveness in Nigerian banks between 2001 and 2005. Her study confirmed that an assessment of the human resource effectiveness of 3 commercial banks (Zenith, First and Union bank) showed that Zenith bank with the best human resource management and accounting practice performed better than First Bank and Union bank.

Tongo (2010) in his article on accounting for intellectual capital sets out to highlight the embedment of intellectual capital accounting within the confines of strategic management. He recommends that just as in traditional accounting where independent auditors are assigned to verify the accuracy of financial reports; independent strategic managers who are external to the firm should be employed to cross-check and perhaps correct whatever information that is being reported by the intellectual capital accountants, that is, strategic managers of individual companies. He concludes that this process would help to authenticate or disapprove the contents of intellectual capital reports which are actually meant to facilitate the long term decisions that business stakeholders may be making.

Asadi (2012) investigates the relationship between intellectual capital and value creation criteria of 59 companies listed in Tehran Stock Exchange for a period of five years. The results indicate that there are significant relationships between the independent variables of intellectual capital and dependent variables of economic value added, cash value added, market value added, and refined economic value added.

Rahman (2012) gives a guide on the assessment of the value added impact of intellectual capital components, which are primarily human and structural capital, on measures of productivity, profitability and market value of a firm by employing the Value Added Intellectual Coefficient (VAIC) technique. Reviewing the intellectual capital components, he suggests measures that are of importance for improving a firm's efficiency and resources in the United Kingdom.

In a study of the effect of intellectual capital on organizational competitive advantage in Jordanian commercial banks in the Irbid district, Bataineh & Zoabi (2011) found that there were strong significant and positive influences between human and structural capital on competitive advantage, and moderate significant and positive influences with relational capital. These studies indicate that intellectual capital measurement and its effects on strategic business management are assuming a fundamental position in the contemporary business environment globally.

Henry (2013), in a qualitative investigation of intellectual capital in the engineering industry (with respect to SMEs) in the UK within the context of a recession, conducts ten interviews on the companies chosen. He concludes that there is a greater need to address the practical implications and barriers to the implementation of intellectual capital management through the Innovative Potential, Collaborative Potential and Operating Efficiency sectors in the industry.

To understand how the measurement of intellectual capital can favour intellectual capital mobilization, (Chiucchi, 2013) examines the role of those who design and implement intellectual capital practices. Using the Kolb's experiential learning theory model, she

opines that actors must complete an experiential learning cycle so as to enable them appreciate fully the contribution of intellectual capital in their organisations. The experiential learning theory model is an alternative way of understanding how intellectual capital measurement produces effects and how such effects can contribute to the mobilisation of intellectual capital in the industry. In addition, Corcoles (2013) analyses the importance of intellectual capital management as instruments to face the new challenges in European universities by providing assistance in the process of developing their ability to identify, measure and manage their intangible assets. The study concludes that a basis for the understanding of how European universities measure and manage their intellectual capital can now be assessed through the definition and diffusion of the organisation's strategic objectives by identifying the critical intangibles related to these objectives and the causal network of relationship among them.

Demartini and Paoloni (2013) analyse the transition from measurement to management in relation to intellectual capital with particular reference to operational activities, strategies and context. The study highlights the process leading to the implementation of intellectual capital framework in the electronic and defence industries and concludes that such a framework will impact positively and create value in the organisation.

d) Empirical Framework of Performance

Financial performance in relation to intellectual capital connotes notable actions or achievements which accrue to an enterprise as a result of intellectual capital measurement and application.

In an empirical study of intellectual capital performance and its impact on the financial performance of Pakistani insurance companies, Rehman, Ilyas & Rehman (2011) found that human capital efficiency (HCE) plays a significant role in IC performance of both life and non-life insurance sectors of Pakistan. They concluded that an insurance company with a high HCE and SCE invariably will have a better financial performance.

Using a sample of 32 audited financial statements of quoted companies in Nigeria, Uadiale & Uwuigbe (2011) examine the impact of intellectual capital components on business performance measured with Return on Equity (ROE) and Return on Assets (ROA). Their results show that intellectual capital has a positive and significant relationship with the performance of business organizations in Nigeria.

Salman & Mahamad (2012) review some of the available measurement tools that can be applied to evaluate the knowledge-based assets using management model and market model in the Malaysian economy. They found and agreed that the motive behind the development of intellectual capital

measurement is to allow managers to evaluate their investments in intellectual capital assets as well as their contribution to the company's performance. They discovered that most organizations have only a vague understanding of how much they have invested in intellectual capital let alone what they receive from those investments.

Using the VAIC model, Javornik, Tekavcic & Marc (2012) studied more than 12,000 Slovenian companies between 1995 and 2008 and found a high degree of correspondence between the improvement in the rank of a company's IC investment efficiency and the improvement in rank of its financial performance in the peer group.

Clarke, Seng & Whiting (2010) using Pulic's VAIC examine the effect of intellectual capital on firms' performance in Australian listed companies between 2004 and 2008. The results suggest that there is a direct relationship between IC and the performance of Australian publicly listed firms, particularly with capital employed efficiency and to a lesser extent, human capital efficiency. They further found a positive relationship between human and structural capital components in the prior and current years' performance of the firms. Their findings also suggest the possibility of a moderating relationship between IC components and physical and financial capital which impact on a firm's performance.

Using the Sveiby's Intangible Assets Monitor, Cuganesan, Carlin & Finch (2007) examine the reporting of human capital performance in the Australian banking sector. Their findings suggest that there is diversity in human capital reporting levels; the co-existence of intellectual capital and corporate social responsibility and stakeholder concerns in reporting on human capital as well as variations in the value creation-focus of organisations when reporting their performance in managing intellectual capital.

Using the Balanced Score Card (BSC) strategy, Bose & Keith (2007), examine the development of a framework for the measurement of an organisation's performance. Measuring performance in relation to a major Australian company, they studied how the newly appointed CEO of the Fosters' Brewing Group reversed a decline in performance by adopting, among other initiatives, the balanced scorecard approach to management and turned the organisation's fortunes around.

Using 14 banks as sample size, Zou & Huan (2011) carried out a study on the impact of intellectual capital on the performance of listed banks in China. They opined that capital employed efficiency (CEE) and structural capital efficiency (SCE) have a negative correlation with the technical efficiency (TE) using the Data Envelopment Analysis (DEA), while human capital efficiency (HCE) has a positive correlation with TE. However, they conclude that the correlations between

capital employed efficiency (CEE) and TE, human capital efficiency (HCE) and TE are not statistically significant.

Kamath, (2007) suggests a positive relationship between intellectual capital and performance. In a study of 98 Indian banks, the result of his study showed that foreign banks out-performed the local banks because they made the best use of their intellectual capital in their operations.

Also, El-Bannany (2008) in his investigation of the determinants of intellectual capital performance in UK banks over the period 1999-2005, asserts that the standard variables of bank profitability and bank risk is important in the determination of banks' performance. The results also show that investment in information technology (IT) systems, bank efficiency, barriers to entry and efficiency of investment in intellectual capital variables, which have not been considered in previous studies, have a significant impact on intellectual capital performance.

According to the result of a study conducted by Kujansivu (2006) on 20,000 Finnish companies between 2001 and 2003 using VAIC, companies in the electricity, gas and water supply sector were most efficient in utilising their intellectual capital. The study provides an empirical evidence of the implementation of intellectual capital management tools for the enhancement of performance in Finnish companies. The VAIC method used in the study was based on the premise that value creation is derived from physical and intellectual capital. Rafiei, Ghaffari & Parsapur (2012) investigate the role of intellectual capital in the improvement of the performance and social and technological economy of Iranian hospitals and concluded that there are some correlations between intellectual capital components and performance. In the empirical study of Mohammad & Ismail (2009) on the efficiency of intellectual capital (human capital, structural capital and capital employed) in the performance of 18 listed financial companies in Malaysia also assert that the banking sector relied more on intellectual capital followed by insurance companies and brokerage firms. The findings of the study are consistent with that of Goh (2005), who examines the intellectual capital performance of commercial banks in Malaysia for the period 2001 to 2003.

Rehman, Rehman & Zahid (2011) examine intellectual capital and its impact on corporate performance in 12 modaraba companies in Pakistan using the VAIC components of human capital, capital employed and structural capital. The empirical result showed that one of the most important components of intellectual capital performance is Human Capital Efficiency which helps to boost financial performance of firms. However, in a study of the relationship between intellectual capital and innovation capital with financial performance and value of companies in the Tehran Stock Exchange (Besharati, Kamali, Mazhari & Mahdavi,

2012) found that there is no significant relationship between intellectual capital and corporate value. But they observed that there seemed to be a significant relationship between intellectual capital and financial performance. Concluding, they remarked that there was a significant but negative relationship between innovation capital and financial performance in the listed companies.

In a related study of the effect of performance on listed Jordanian insurance companies, Almajali, Alamro & El-Soub (2012) found out that leverage, liquidity, size and management competence indices have a positive statistical effect on the financial performance of those insurance companies and suggested the need to have highly qualified employees in the top managerial staff. Confirming the positive relationship between intellectual capital and firm performance, Wang (2011) in his study of Taiwanese firms in 2001, using customer capital, human resource capital and structural capital as independent variables over return on asset, market price to book value and total productivity found that the relationship between structural capital and firm performance was insignificant. But the paper concludes that the firms achieve positive performance when they emphasise on human training, customer related management and research and development. Abdulai, Kwon & Moon (2012) investigate factors instrumental to the success of software industries in India, Ireland and Israel in relation to the performance of software firms in West Africa. Focusing on the influence of top management commitment and transformational leadership on intellectual capital and its relationship with firms' performance, they proposed a second level model on the software industry. To validate this model, they conducted a field survey involving 83 software firms in the West African region. The result of their investigation showed a significant relationship between the elements of intellectual capital and competitive capabilities of firms and between competitive capabilities and firm performance. Their study showed among other factors, that the intellectual capital of these nations is said to have contributed significantly to their success in the software industry. From their study, there is therefore a general consensus that management of intellectual capital constitutes the most important source of competitive advantage for organizations.

In a study to explore the relationships between intellectual capital and business performance in Iraqi industries, Ahmad & Mushraf (2011) investigate whether intellectual capital has a direct effect on business performance. They affirm that intellectual capital is becoming the pre-eminent resource for creating economic wealth. Tangible assets such as property, plants, and equipment continue to be important factors in the production of goods and services though however, their relative important has decreased over

time as the importance of intangible assets become more robust. Intellectual based assets have increased in terms of their importance and relevance in the financial performance of firms globally.

Volkov & Garanina (2007) examine the importance of Intangible Assets in knowledge-based economy. They confirm the statement that the workforce is the main asset of a company and more so in knowledge-based companies. In their study of 43 Russian companies between 2001 to 2005 using econometric models, their surveys showed that the value of companies is now mostly generated by intangible assets. Brymer, Molloy & Gilbert (2014) highlight input, output and process contingencies as a pipeline hiring mechanism adopted by firms in the engagement of human capital in the modern economy. Pipelines, according to the authors, refer to repeated inter organizational hiring system and practice which firms use to differentially acquire and accumulate intellectual capital and mitigate intellectual capital risks particularly in the knowledge-based firms.

III. Methodology

Ex-post facto research design was adopted in the selection of data modes. Primary and secondary data were employed. A targeted sample size of 150 workers was used. The target population consisted of 150 workers in the 3 strategic departments of human resources, accounts and marketing of the 18 insurance companies using the purposive sampling technique. 150 questionnaires were distributed to respondents and a response rate of 74% was recorded. Face validity, content validity and pilot tests were used to validate the instruments. The Cronbach's Alpha reliability test gave a result of (r=0.806) and (r=0.800). Regression was used for data analyses at 5% levels of significance.

IV. Data Presentation, Analyses and Discussion of Findings

a) Research Objective

Evaluate the impact of Intellectual Capital in insurance companies in relation to their Return on Assets.

b) Research Question

How can Intellectual Capital measurement contribute positively to the Return on Assets performance of insurance firms?

c) Research Hypothesis

H_0: There is no significant relationship between intellectual capital and the Return on Assets (ROA) of insurance firms.

d) Test of Hypothesis

A test of hypothesis was carried out in line with the research objective for the purpose of finding the relationship between intellectual capital and return on assets. The regression coefficient was given as: $Y = a + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \mu$. Where, Y = Return on Assets

a = constant
β_1 = coefficient of human capital
β_2 = coefficient of structural capital
β_3 = coefficient of relational capital
μ = error level incorporating omitted variables

Table 4.1 : Hypothesis

Variable	Coefficient	Std. Error	t-statistic	P value (Sig.)
Constant	-.139	.113	-1.238	.236
HC	.008	.013	2.809	.014
SC	.009	.013	.701	.495
RC	.010	.004	2.600	.021
R	.716			
R^2	.513			
Adj. R^2	.409			
F-stat.	4.920			
P value (F-stat)	.015			

Significant at $\alpha = 0.05$

Source: Researcher's regression output (2014)

From table 4.1, the probability values were given as: $P(x_1 = 0.014 < 0.05)$; $P(x_2 = 0.495 > 0.05)$ and $P(x_3 = 0.021 > 0.05)$ respectively. The results show that structural capital had statistically insignificant impact on return on assets of the insurance companies under review whereas human capital and relational capital had statistically significant impacts on the return on assets of the companies under review. The above result is in line with a priori expectation that intellectual capital will positively affect the financial performance of insurance firms.

From of the result displayed above, the probabilities connected with model x_2 is higher than the specified level of significance, that is, $P(x_2 = 0.495 > 0.05)$. Therefore null hypothesis is accepted for model x_2 which represents structural capital while null hypothesis for models x_1, $P(x_1 = 0.014 < 0.05)$ and x_3, $P(x_3 = 0.021 < 0.05)$ with lower

P values than the stipulated level is rejected. The combined effect of the independent variables on ROA was however significant at (F=.015<0.05). This implies that Research question is answered and its objective has been achieved. The R^2(.513) which is a measure of good-fit shows the rate of change in the Return on Assets which was accounted for by insurance firms' ability to effectively apply human, structural and relational capital in their operations. This result indicates that a change in the firms' application of intellectual capital accounted for only 51.3% of the change in the return on assets by the insurance companies under review. The slope coefficients of the B values of 0.008, 0.009 and 0.010 respectively from Table 4.1 for human capital, structural capital and relational capital when substituted for the original equation models of α, β_1, β_2 and β_3 will give the following equations: Y = -.139+0.008 (human capital) + 0.009 (structural capital) + 0.010 (relational capital) + μ. The result of table 4.1 also show that relational capital had a statistically significant impact at P=021<0.05. This result shows that relational capital has the capacity to increase the financial performance of firms. Soumet (2007) affirms that a firm must exhibit a high sense of salesmanship and marketability with its sales team so as to positively impact on the financial performance of a firm. This same view was also confirmed through the works of Bataineh & Zoabi (2011).

V. Effect of Intellectual Capital on Return on Assets

Primary data result indicated that human capital and relational capital had statistically insignificant effects on return on assets of the firms whereas structural capital had a significant effect on ROA. The null hypothesis was therefore accepted in respect of human capital and relational capital. The same null hypothesis was rejected in respect of structural capital because the effect was statistically significant on return on assets. Aggregate effect of HC, SC and RC was significant at (F=.000<.05). The hypothesis was rejected on this model. This position was in line with a study carried out by Soumet (2007); Namvar, Fathian, Gholamin, & Akhavan (2011). Their conclusion was that structural capital as a management method had the capacity to achieve corporate goals or positive financial performance

In another study on the effect of intellectual capital on organizational competitive advantage in Jordanian commercial banks in the Irbid district of Jordan carried out by Bataineh & Zoabi (2011) they further confirmed that there was a strong significant and positive influence between structural capital and the competitive advantage of the organisations.

The secondary data analysis had a reverse effect on the relationship between the dependent and independent variables. Whereas human capital and relational capital had statistically significant effects on the return on assets, structural capital had statistically insignificant effect on return on assets. The null hypothesis was therefore rejected in respect of human capital and relational capital, and accepted in respect of structural capital. The f-statistic was significant at (F=.015<.05) as a result of the combined effect of the independent variables. The hypothesis was also rejected in this respect.

This result showed that relational capital had the capacity to increase the financial performance of firms. Soumet (2007); Bataineh & Zoabi (2011) affirm that firms must exhibit a high sense of salesmanship and marketability with its sales team so as to positively impact on the financial performance of a firm.

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APPENDIX

Key: 1=Strongly Disagree, 2=Disagree, 3=Fairly Disagree, 4=Fairly Agree, 5=Agree, 6=Strongly Agree

1	**Return on Assets (ROA)** Benefits arising from the assets of the firm can be associated with the ability of the workers to come up with profitable investment plans in their organisations.						
2	Management need not border about returns as long as adequate tangible assets have been invested in the company.						
3	Prudent financial management by managers brings about high financial performance.						
4	A company's financial growth may not necessarily be reflected in the fixed asset growth.						
5	The financial intelligence of workers in an organisation does not contribute to a high return on assets.						

Source: Researcher's field survey (2015)

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Impact of Liquidity on Profitability of Commercial Banks in Pakistan: An Analysis on Banking Sector in Pakistan

By Rizwan Ali Khan & Mutahhar Ali

Quaid-i-Azam University, Pakistan

Abstract- This study aims at investigating the relationship between liquidity and profitability of commercial banks in Pakistan. The main objective of the study is to find the nature of relationship and the strength of relationship exist between the variables. Correlation and regression are used respectively to find the nature of the relationship and extent of relationship between dependent and independent variables. Secondary data was used for analysis which was extracted from the last five years (2008-2014) annual accounts of Habib Bank Limited. After conducting correlation and regression analysis it was found that there as significant positive relationship between liquidity with profitability of the banks. Since, the data of the banking sector was used, hence the results cannot be generalized to other sectors.

Keywords: liquidity, profitability, current ratio, quick ratio, gross profit margin, net profit margin.

GJMBR - C Classification : JEL Code : G21

IMPACTOFLIQUIDITYONPROFITABILITYOFCOMMERCIALBANKSINPAKISTANANANALYSISONBANKINGSECTORINPAKISTAN

Strictly as per the compliance and regulations of:

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Rizwan Ali Khan [α] & Mutahhar Ali [σ]

*Abstract-*This study aims at investigating the relationship between liquidity and profitability of commercial banks in Pakistan. The main objective of the study is to find the nature of relationship and the strength of relationship exist between the variables. Correlation and regression are used respectively to find the nature of the relationship and extent of relationship between dependent and independent variables. Secondary data was used for analysis which was extracted from the last five years (2008-2014) annual accounts of Habib Bank Limited. After conducting correlation and regression analysis it was found that there as significant positive relationship between liquidity with profitability of the banks. Since, the data of the banking sector was used, hence the results cannot be generalized to other sectors.

Keywords: liquidity, profitability, current ratio, quick ratio, gross profit margin, net profit margin.

I. Introduction

Liquidity and profitability has got tremendous importance in the corporate world. Liquidity refers to the management of current assets and current liabilities of a company. It plays key role in defining, whether a firm is able to effectively manage it short term obligations. Due to its dire importance it is important for firms to maintain a reasonable amount their assets in the form of cash in order to meet their short term obligations. Balanced liquidity level is necessary for the effectiveness and profitability of a firm. Therefore, firms need to determine the optimum level of the liquidity in order to ensure high profitability. Liquidity, should neither be too low nor too high. Rather, it should maintain a reasonable level. Whereas, profitability refers to the revenues earned by firms, against their operations and incurred expenses. In order to find the profitability level of firms, Profitability ratios are used, whereby it can clearly be examined that where the firm stands in terms of profitability. Enhancement of profitability is the ultimate purpose of every firm, and each of them strives to achieve optimum profitability. Since, there is a significant relationship between liquidity and profitability of the firm, so the firm is required to maintain optimum level of liquidity.

In today's developing and competitive world, banking sector has emerged as key player, and contributing its best to create employment, and improving the financial sector of the country. With the growing trend, it has become a challenge for the sector to earn maximum profitability. It has become necessary for firms to take dynamic decisions to effectively manage their assets. Due to this challenge followed by the growing trend, it has become necessary, that research based study should be conducted to investigate and recommend solutions that would help firms companies improve their profitability. With the same cited objective we are conducting this research.

Moreover, I have selected HBL for research, because of the fact that it is the largest commercial bank in Pakistan. Conducting research on this corporate giant, we would be able to deduce much. Authentic results that would easily be applicable on other commercial banks in Pakistan. It has largest number of employees and it requires high level of analysis to maintain optimum level of liquidity, in order to ensure high profitability. Moreover, the data of the bank are easily available and it publishes its annual reports on consistent bases. So, it is easy yet effective to choose this typical bank for our research.

II. Literature Review

Liquidity plays vital role in determining the effectiveness of firms. Thus it is necessary for firms to maintain a balanced liquidity ratio in order to meet their short term liabilities. Due to its relationship with the day to day operations it is imperative for both internal and external analysts to study liquidity. (Bhunia, 2010). The purpose of liquidity management is maintain tradeoff between liquidity and profitability. (Rahemanet all, 2007).

Velnampy (2013) in his investigation on corporate governance and firms performance taking twenty eight companies sample for four years from 2007–2011 stated that the determinants corporate governance have no relation with the firm's performance. After applying regression the result showed that ROE and ROA were not affected by corporate governance. Thus the findings revealed that corporate governance measures have no relation with performance measures.

Walt (2009) through his research reveals due to convertibility into liquidity profitability is more important,

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he also adds that importance of profitability does not mean that company the company that more liquidity is profitable. Don (2009), while comparing relative importance of both states that liquidity is more important than profitability, because it determines the survival of the company.

Eljelly, 2004) found that there is significant negative relationship between the firm's profitability and liquidity when it is measured by current ratio. The study also found that at industry level, however, cash gap is important to measure the liquidity than current ratio that affects profitability.

A research study conducted by Bardia (2004) and Sur and Ganguly (2001) on steel giants SAIL and aluminum producing industry reveal that liquidity and profitability are positively related with each other.

Qasim Saleem & Ramiz Ur Rehman (2011) by taking five years data of twenty six enterprises examined the relationship between liquidity of firm and profitability, found that there is positive relationship between firm's liquidity and profitability.

A research conducted by Wang (2002) reveals that there is a positive relationship between liquidity and operating performance. Seventeen years data of sample firms was taken. They examined the association between profitability and the information system taking

the sample. Mean while the research also reveals that there is positive relationship between liquidity and profitability. A research undertaken by (Zhang, 2011) suggests that there is significant positive relationship between firm's liquidity and profitability.

III. Methology

a) Data Source

The data for this research has been collected from the annual financial reports of the respective companies. The required ratios were extracted from the consolidated financial statements of the bank.

b) Sample size

Data of a prominent commercial bank in Pakistan has been taken as sample, and five years data of the respective banks have been used for analysis.

c) Mode of analysis

Standard regression and correlation were run on Statistical Package for Social Sciences (SPSS), to find the nature and strength of relationship between the two variables. In the analysis liquidity was taken as independent variable whereas profitability was taken as dependent variable.

Conceptual Framework
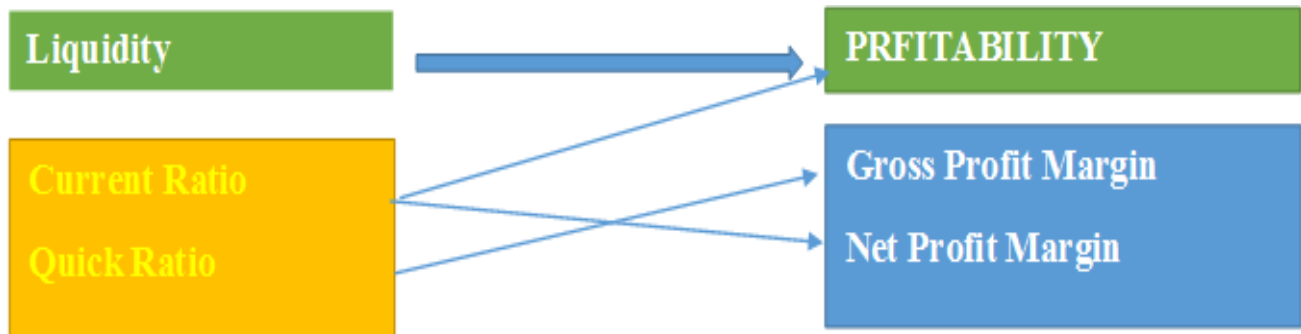
d) Hypothesis

Following hypothesis are taken as base for the analysis, in find the relationship between liquidity and profitability.

First hypothesis

H0: There is no relationship between liquidity and profitability

H1: There is a relationship between liquidity and profitability

Second Hypothesis

H0: Liquidity and profitability does not affect each other

H1: Liquidity and profitability affect each other

In order to test the first hypothesis correlation will be used, whereas to test the second hypothesis we will use standard regression

Third Hypothesis

H0: there is a positive relationship between current ratio and overall profitability.

H1: There is a negative relationship between current ratio and overall profitability.

Fourth Hypothesis

H0: There is a positive relationship between quick ratio and profitability.

H1: There is a negative relationship between quick ratio and profitability

Fifth Hypothesis

H0: There is a positive relationship between current ratio and Net Profit Margin

H1: There is a negative relationship between current ratio and Net Profit Margin

Sixth Hypothesis

H0: There is a positive relationship between quick ratio and Net Profit Margin.

H1: There is a negative relationship between quick ratio and Net Profit Margin.

Seventh Hypothesis

H0: There is a positive relationship between current ratio and Gross Profit Margin

H1: There is a negative relationship between current ratio and Gross Profit Margin

Eighth Hypothesis

H0: There is a positive relationship between quick ratio and Gross Profit Margin

H1: There is a negative relationship between quick ratio and Gross Profit Margin

IV. ANALYSIS

a) *Discriptive Statistics*

Table 1 : Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Current Ratio	5	.88	1.35	1.0460	.21267
Quick Ratio	5	1.15	2.25	1.5360	.49531
GPM	5	4.70	17.38	9.1160	5.00421
NPM	5	.86	8.90	3.3080	3.27085
Profitability	5	7.27	26.28	12.4240	7.85017
Liquidity	5	2.03	3.44	2.5820	.68445
Valid N (listwise)	5				

The descriptive statistics of the research show that gross profit margin and profitability has highest average value, where as current ratio has the lowest average value. Moreover, it also shows that the difference between the minimum and maximum values of profitability stood at highest thus giving it the highest. Whereas lowest range was of gross profit margin. Moreover, Standard deviation of profitability is also highest among all other, showing the maximum deviation of the data from its mean.

Table 2 : Hypothesis Testing

NO	HYPOTHESIS	RESULT	TOOL
H0	H0: *There is no relationship between liquidity and profitability*	Rejected	Correlation
H1	*There is a relationship between liquidity and profitability*	Accepted	Correlation
H0	*Liquidity and profitability does not affect each other*	Rejected	Regression
H1	*Liquidity and profitability affect teach other*	Accepted	Regression
H0	*There is a positive relationship between current ratio and overall profitability*	Accepted	Correlation
H1	*There is a negative relationship between current ratio and overall profitability*	Rejected	Correlation
H0	*There is a positive relationship between quick ratio and profitability*	Accepted	Correlation
H1	*There is a negative relationship between quick ratio and profitability*	Rejected	Correlation
H0	*There is a positive relationship between current ratio and Net Profit Margin*	Accepted	Correlation
H1	*There is a negative relationship between current ratio and Net Profit Margin*	Rejected	Correlation
H0	*There is a positive relationship between quick ratio and Net Profit Margin*	Accepted	Correlation
H1	*There is a negative relationship between quick ratio and Net Profit Margin*	Rejected	Correlation
H0	*There is a positive relationship between current ratio and Gross Profit Margin*	Accepted	Correlation
H1	*There is a negative relationship between current ratio and Gross Profit Margin*	Rejected	Correlation

Table 3 : Correlations

	Current Ratio	Quick Ratio	NPM	GPM	Profitability	Liquidity
Current Ratio Pearson Correlation	1	.844	.749	.620	.707	.922*
Sig. (2-		.072	.145	.265	.182	.026
tailed)N	5	5	5	5	5	5
Quick Ratio Pearson Correlation	.844	1	.283	.206	.250	.986**
	.072		.644	.739	.686	.002
Sig. (2-	5	5	5	5	5	5
tailed)N						
NPM Pearson Correlation	.749	.283	1	.791	.921*	.438
Sig. (2-tailed)	.145	.644		.111	.026	.461
N	5	5	5	5	5	5
GPM Pearson Correlation	.620	.206	.791	1	.967**	.342
Sig. (2-tailed)	.265	.739	.111		.007	.573
N	5	5	5	5	5	5
Profitability Pearson Correlation	.707	.250	.921*	.967**	1	.400
	.182	.686	.026	.007		.504
Sig. (2-	5	5	5	5	5	5
tailed)N						
Liquidity Pearson Correlation	.922*	.986**	.438	.342	.400	1
Sig. (2-tailed)	.026	.002	.461	.573	.504	
N	5	5	5	5	5	5

*. Correlation is significant at the 0.05 level (2-tailed)

Table 3 : Correlations

	Current Ratio	Quick Ratio	NPM	GPM	Profitability	Liquidity
Current Ratio Pearson Correlation	1	.844	.749	.620	.707	.922*
Sig. (2-		.072	.145	.265	.182	.026
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N	5	5	5	5	5	5

GPM	Pearson Correlation Sig. (2-tailed) N	.620	.206	.791	1	.967**	.342
		.265	.739	.111		.007	.573
		5	5	5	5	5	5
Profitability	Pearson Correlation	.707	.250	.921*	.967**	1	.400
	Sig. (2-tailed)N	.182	.686	.026	.007		.504
		5	5	5	5	5	5
Liquidity	Pearson Correlation Sig. (2-tailed) N	.922*	.986**	.438	.342	.400	1
		.026	.002	.461	.573	.504	
		5	5	5	5	5	5

**. Correlation is significant at the 0.1 level(2-tailed).

The above correlation table shows that there is a positive relationship between, all the independent variable; current ratio, quick ratio, and over all liquidity have positive relationship with profitability. As the table reveals that none of the figure shows negative relationship with any of the dependent variable, including gross profit margin, net profit margin and profitability.

b) *Regression*

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	1.000	1.000	1.000	.00000

The above model summary of regression analysis shows that liquidity significantly affects the profitability of the commercial bank. It also reveals that there is a very strong direct relationship between liquidity and profitability.

Profitability
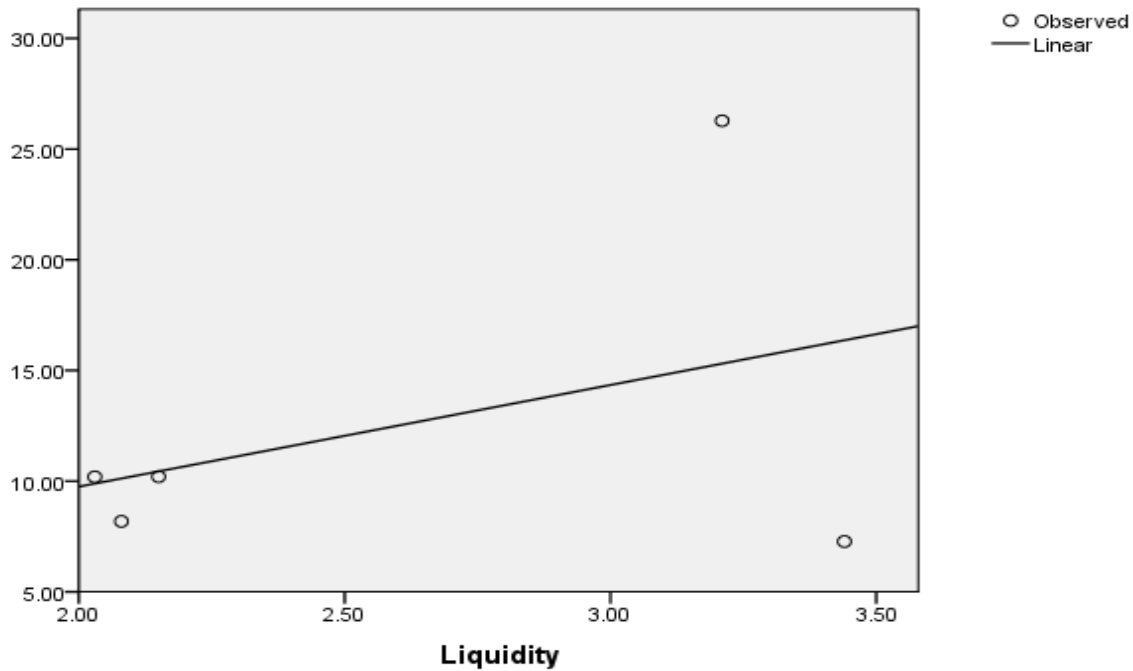
Figure 1 : Curve Estimtion

The above curve drawn to show relationship between profitability and liquidity shows that there is a positive relationship between Liquidity and profitability. As shown the graph with increase in Liquidity, profitability also increases.

V. Conclusion & Recommendations

It has been empirically proved through analysis that liquidity has positive relationship with profitability, and has considerable impact on the profitability of commercial banks in Pakistan. With the growing liquidity level to acertain limit the profitability also increases. None of the variable shows negative relationship. Every ratio of liquidity shows positive relation with all the ratios of liquidity. Hence, this research indicates that liquidity has positive relationship with profitability. Therefore, it is suggested that banks should keep considerable amount of their liquid assets in order to get higher rate of profit.

VI. Limitations

This research has been conducted, only by getting five years data of a popular commercial bank (Habib Bank Limited) in Pakistan. Hence it cannot be generalized to other smaller sized banks like DFIs. Moreover, to make the findings more generalizable, the sample size can be increased and the numbers of years for data collection may also be increased. Moreover to make the research more reliable data of some other leading commercial banks can also be brought to analysis, so that the findings will be reliable coupled with

being generalizable. Since, in this research only regression and correlation analysis has been used.

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Impact of Capital Structure on the Profitability of Firm's Evidence from Automobilesector of Pakistan

By Muhammad Nauman Sadiq & Fateh Sher

Abstract- In finance literature capital structure received considerable attention as factor affecting the profitability of firms. The aim of this paper is to contributes to literature on this factor (Capital structure) and evaluate its impact and nature of relationship with the profitability of Automobile companies listed in Karachi stock exchange.19 companies were selected as sample. Data is extracted from the publications of the relevant companies and website of stat bank of Pakistan from 2006-2012.Regression analysis and correlation test is used with the help of statistical package SPSS in order to predict the result.

Study concludes that capital structure (Debt/Equity) is negatively associated with the profitability, which implies that an increase in debt capital caused a decrease in the profitability of the firms and vice versa. These results are supportive for the business companies during the financing of capital.

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Impact of Capital Structure on the Profitability of Firm's Evidence from Automobilesector of Pakistan

Muhammad Nauman Sadiq [α] & Fateh Sher [σ]

Abstract- In finance literature capital structure received considerable attention as factor affecting the profitability of firms. The aim of this paper is to contributes to literature on this factor (Capital structure) and evaluate its impact and nature of relationship with the profitability of Automobile companies listed in Karachi stock exchange.19 companies were selected as sample. Data is extracted from the publications of the relevant companies and website of stat bank of Pakistan from 2006-2012.Regression analysis and correlation test is used with the help of statistical package SPSS in order to predict the result.

Study concludes that capital structure (Debt/Equity) is negatively associated with the profitability, which implies that an increase in debt capital caused a decrease in the profitability of the firms and vice versa. These results are supportive for the business companies during the financing of capital.

I. Introduction

Automobile sector is a hurriedly growing and active sector in Pakistan but due to high competition it did not conquer its due place in international market. Automobile sector started its operation in 1953 with the assembling of Bedfordat the NML (National motors limited) in Karachi. Later on this plant assembled many other vehicles.

Auto mobile sector in Pakistan observed very ups and down since 1953 till now. Before 1990 this sector was highly regulated. After 1990 the competition was created in the sector after the entrance of foreign manufacturues. At the beginning of 21 century tragedy of 9/11 caused an increase in home remittances in Pakistan which makes the markets more liquid resulting an increase in the demand of vehicles.

During 2006 and 2007 car industry acquired loan of 70-80%of its total capital for expanding their production level to meets the demand .Due to this financing car industry reached at peak level of his life.

During 2008-2009 world financial crises also affect the performance of the automobile sector and caused a decrease in the units of production however firms recovered themselves very soon. Now motorcycle producing companies also growing very fastly due to high demand in the country. During 2010 - 2011 motor-cycle producing companies reached at the boom by producing 1.5 million units.

Auto mobile industry in Pakistan playing an important role in the development of the economy, after petroleum sectors, it pays higher indirect taxes. And employed about 192,000 people directly and 1.2 million people indirectly.

In finance literature capital structure acknowledged significant consideration as factor affecting the profitability of firms. Profitability of a firm is a key performance measuring and reputation enhancing factor. It also increases stakeholders and investor's value. However Profitability of the firm is influenced by many internal and external factors. Capital structure is also included in these factors which significantly influenced the profitability of firms.

The term "Capital structure" represents the proportion of capital used by the company during its operation. Companies either used equity or debt capital or the mixture of both in order to finance assets. Work on capital structure initially presented by the Modigliani & miller (MM) (1958). Later on different research papers are conducted to identify the effect of capital structure on financial performance of companies and shown contradictory results. But a comprehensive and detailed study has not been conducted in Pakistan, especially in automobile sector. Present study is based on the secondary data extracted from the automobile companies listed in Karachi stock exchange in order to determine the effect of capital structure on the profitability of these companies.

II. Literature Review

Capital structure received considerable attention in finance literature as factor affecting the value of firms. This debate is started by researchers after the work of (Modigliani and Miller (1958).Different studies have been conducted to shown how capital structure is irrelevant or relevant to the financial performance of companies under different conditions. The aim of all these studies is to find the better capital structure which generates maximum profit.

Research explored that proportion of equity and debt financing used by the company can affect its value and rate of returns (Lara & Mesquita 2003). Debt

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financing has negative and positive effects on the firm value; it depends upon the investment opportunities that firms avail in future (Stulz 1990). Frangouli & ventoura concluded that firms using more debt financing are earning less profit as compare to the firms having equity finance. Debt finance caused the payment of interest which reduces the profit (Frangouli & ventoura, 2011). Further studies also examine that debt ratio has negative impact on the profitability of the firm. (Onaolapo, 2010).

Contradictory results shown that companies using only equity financing having weak financial position and low credit rating Coyle (2000).This reveals that negative correlation is exist between equity financing and profitability (Efobi, 2008).

Study conducted on the impact of capital structure on profitability of manufacturing companies of Sri Lanka shown that debt equity ratio is positively correlated with the profitability (Nimalathasan and Valeriu 2010).

Research conducted on the Business companies of CSE Sri Lanka explore that negative association is existed between the capital structure and financial performance(Pratheepkanth 2011). Further a research on the petroleum sector of Pakistan explored that there is significant positive impact of capital structure on the profitability of the companies (Ali et al 2012).

Research conducted on the Indian manufacturing companies listed in BSE shows that strong relationship is exist between capital structure and firm profitability, more and more use of debt capital caused the reduction in the net profit of companies (Singh 2013).

Study conducted on the sugar companies listed in KSE explored that long term debts have positive impact on the performance of the firms and short term debts have negative impact on the performance of the firms. They further suggested that firms should use long term debt capital in order to increase the profitability (Roy et al, 2013).

III. Objectives of the Study

Primary objective of the present study is to contributes to literature on this factor(Capital structure) and analyze its effect and nature of relationship with the profitability of Automobile companies listed in Karachi stock exchange and provide necessary suggestions in order to increase their profitability.

Conceptual Framework
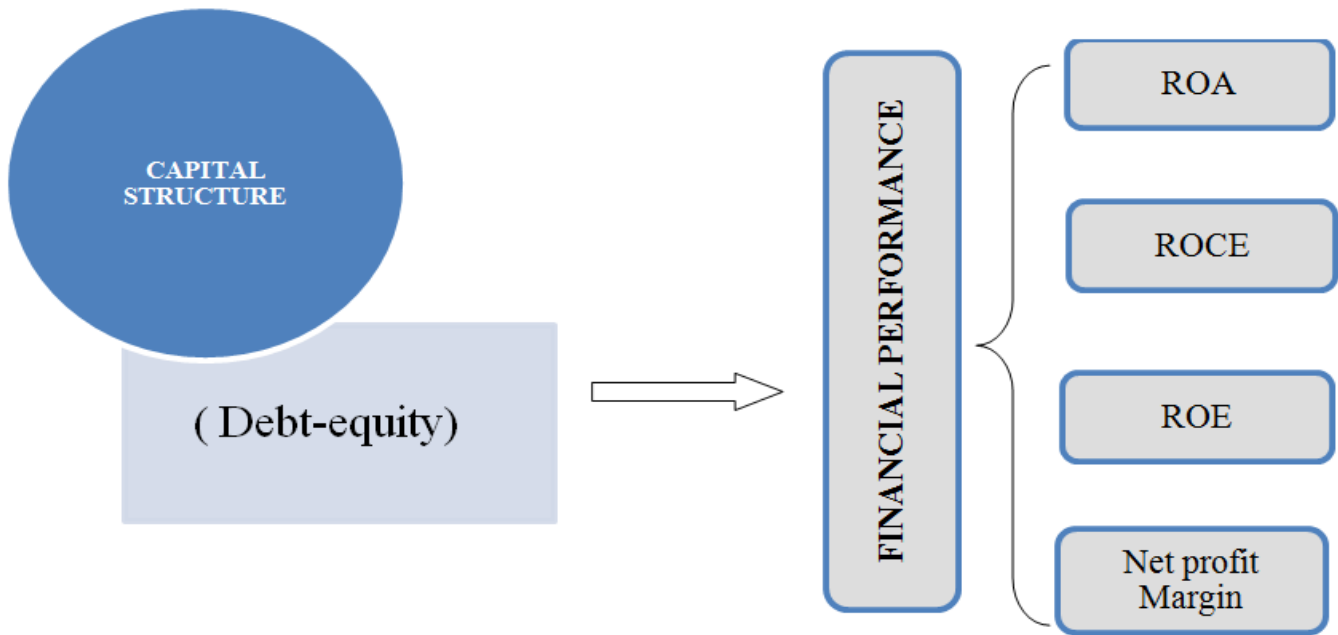
IV. Hypotheses

Following hypothesis is framed for the present study:

H0:- There is no significant association between capital structure and the profitability of firms.

H1:- There is significant association between capital structure and the profitability of firms.

V. Methodology

The aim of the study is to determine the impact of the capital structure on the profitability in the automobile sector of Pakistan. The number of total companies is 22, out of which19 companies are selected as sample. Other 3 companies are excluded due to continuous loss.

Capital structure (Debt to equity ratio) is used as dependent variable while profitability ratios return on assets; return on capital employed, return on equity and net profit is used as dependent variable

Data is extracted from the publications of the relevant companies and website of stat bank of Pakistan from2006-2012.

In order to statistically check the significance of the study and to predict the nature of association between dependent and independent variables regression analysis and correlation test is used with the help of statistical package SPSS.

Relationship between Capital Structure and Return on Assets

Table 1 : Correlations

		ROA	Capital structure
ROA	Pearson Correlation	1	-.344**
	Sig. (2-tailed)		.000
	N	114	114
Capital structure	Pearson Correlation	-.344**	1
	Sig. (2-tailed)	.000	
	N	114	114

**. Correlation is significant at the 0.01 level (2-tailed).

Table 1: shows Correlation results between the Capital structure and Return on assets .The coefficient is Negative and highly significant (at 0.01 level of significant) which shows significant and Negative relationship between ROA and Capital structure.

Table 2 : Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.344a	.119	.111	12.93774

Table 2 Presents the Model Summary, Which shows the value of R, R Square and the adjusted R square. R Square value shows that11.9 % impact on profitability is caused by Capital structure and other 89% is caused by other variables.

Table 3 : Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	18.689	2.108		8.864	.000
	Capital structure	-5.717	1.472	-.344	-3.883	.000

a. Dependent Variable: ROA

In table 3 t value also show the significant negative impact of capital structure on the Return on the assets.

Relationship between Capital Structure and Return on Capital Employed

Table 4 : Correlations

		Capital structure	ROCE
Capital structure	Pearson Correlation	1	-.231*
	Sig. (2-tailed)		.013
	N	114	114
ROCE	Pearson Correlation	-.231*	1
	Sig. (2-tailed)	.013	
	N	114	114

*. Correlation is significant at the 0.05 level (2-tailed).

Table 4: shows Correlation results between the Capital structure and Return on capital employed .The coefficient is Negative and highly significant which shows significant and negative relationship between return on capital employed and Capital structure. Which means an increase in debt to equity ratio caused a decrease in the return on capital employed.

Table 5 : Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.231ᵃ	.053	.045	25.28898

Table 5 Presents the Model Summary, which shows the value of R, R Square and the adjusted R square. R Square value shows that5.3% impact on profitability is caused by Capital structure and other 94.7 % is caused by other variables.

Table 6 : Coefficient

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	30.353	4.121		7.365	.000
Capital structure	-7.229	2.878	-.231	-2.512	.013

Above table shows the significant negative relationship between capital structure and the Return on capital employed.

Relationship between Capital Structure and Return on Equity

Table 7 : Correlations

		Capital structure	ROE
Capital structure	Pearson Correlation	1	-.227*
	Sig. (2-tailed)		.015
	N	114	114
ROE	Pearson Correlation	-.227*	1
	Sig. (2-tailed)	.015	
	N	114	114

*. Correlation is significant at the 0.05 level (2-tailed).

Table 7: shows Correlation results between the Capital structure and Return on equity .The coefficient is Negative and highly significant which shows significant and negative relationship between return on equity and Capital structure. Which means an increase in debt to equity ratio caused a decrease in the return on equity.

Table 8 : Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.227a	.052	.043	26.55655

Table 8 Presents the Model Summary. Which shows the value of R, R Square and the adjusted R square. R Square value shows that5.2% impact on profitability is caused by Capital structure and other is caused by other variables

Table 9 : Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	32.047	4.328		7.405	.000
	Capital structure	-7.470	3.022	-.227	-2.472	.015

Above table shows the significant negative relationship between capital structure and the Return on equity.

Relationship between Capital Structure and Net Profit Margin

Table 10 : Correlations

		Capital structure	NPM
Capital structure	Pearson Correlation	1	-.327**
	Sig. (2-tailed)		.000
	N	114	114
NPM	Pearson Correlation	-.327**	1
	Sig. (2-tailed)	.000	
	N	114	114

**. Correlation is significant at the 0.01 level (2-tailed).

Table 7: shows Correlation results between the Capital structure and Net profit margin .The coefficient is Negative and highly significant which shows significant and negative relationship between return on equity and Capital structure. Which means an increase in debt to equity ratio caused a decrease in the Net profit margin.

Table 11 : Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.327ᵃ	.107	.099	7.83629

Table 11 Presents the Model Summary. Which shows the value of R, R Square and the adjusted R square. R Square value shows that10.7% impact on profitability is caused by Capital structure and other is caused by other variables

Table 12 : Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.612	1.277		7.527	.000
	Capital structure	-3.263	.892	-.327	-3.660	.000

Above table shows the significant negative relationship between capital structure and the Net profit margin.

VI. Conclusion

This study involves determining the relationship between capital structure (Debt/equity) and profitability of the automobile companies listed in Karachi stock exchange. Capital structure shows a significant negative relationship with all profit measuring ratios (return on assets; return on capital employed, return on equity and net profit margin).

So we reject our null hypothesis in all cases and conclude that debt capital is negatively associated with the profitability. An increase in debt capital caused a decrease in the profitability of the firms and vice versa. These results are similar with the results of Onaolapo, 2010: Pratheepkanth 2011: Singh :2013).

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The Impact of Financial Integration on Growth-Volatility Relationship – A Reappraisal

By John Dogbey & James Dogbey

University of Nebraska, United States

Abstract- A plethora of studies have been done on the effect of trade and financial integration on growth-volatility relationship. One of the key findings has been that, trade integration and financial integration weaken growth-volatility relationship. Trade integration is empirically found to positively affect growth significantly but results were less robust for financial integration. This paper finds that, by controlling for some key variables in addition to the variables used in the literature, as well as using alternate classifications and extending the data slightly the coefficient of financial integration is also positive and robust and hence weakens growth-volatility relationship. However, results for trade integration become insignificant after controlling for these crucial variables.

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Keywords: financial integration, trade integration, volatility, growth, and openness.

I. Introduction

Financial integration and trade openness have been given ample attention by researches, particularly in the role they play in economic growth. Levine (2001) shows that financial integration positively impacts economic growth by improving financial markets and banks. Henry (2000) employs event study techniques to investigate the effect of stock market liberalization on investment and found that stock market liberalization do matter for investment. He also finds that developing countries in the sample of his study experience abnormally high growth private investment but could not conclude whether this was due to stock market liberalization since several factors can lead to this outcome.

Prasad et al., (2003) report that consumption-output volatility decreases as financial integration increases. Bekaert and Harvey (2000) observe that capital market liberalization leads a decrease in the cost of capital. Moreover, their results suggest that countries with higher levels of foreign ownership experience much larger decrease in the cost of capital and that the reduction continues in the post liberalization period. On the other hand, Obstfeld (1994) points out that financial globalization leads to large steady-state welfare gains for most countries and that the mechanism of linking global diversification to growth is the shift of world portfolios from low yield capital to high yield capital.

A report by Boyd and Bruce (1992) on the other hand, show that financial integration leads to capital outflows from countries with weak institutions to those with strong institutions. Similarly, Arteta, Eichengreen and Wyplosz (2001) indicate that while trade openness promotes economic growth, financial integration can promote or hurt economic growth regardless of trade openness. They show that financial integration can hurt an economy if black markets or macroeconomic imbalances exit, or help in the absence of these imbalances.

Kose, Prasad and Terrons (2006) explore the relationship between trade and financial integration and their effect on growth- volatility relationship using a sample of 85 countries comprising of 21 industrial countries and 64 developing countries. The developing countries were sub-divided into MFI's (more financially integrated) countries and LFI's (less financially integrated countries).

Using both cross sectional and panel data analytical techniques, the researchers found that the relationship between growth and volatility is positive for developed countries, and negative for developing countries. Among the different groups of the developing countries, the relationship for LFI's is negative whiles that for MFI's was positive for the entire period. Specifically however, the relationship was strongly negative before trade and financial integration, strongly positive after trade and financial integration and less obvious in between these periods.

This paper employs cross sectional analysis to re-examine how trade and financial integration affect growth-volatility relationship. We exclude some extreme values from the data used by previous studies as well use an alternate index for some of variables in our study to see if result are similar.

In the following section, we outline our methodology. The next section focuses on unearthing the stylized facts established from cross-sectional scatter diagrams. Section 3 comprises of formal regression analysis to expound these stylized facts. Section 4 follows with explanations for the outcome of the study, and the final section presents the concluding remarks.

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II.   Methodology

a)   Data

All data are taken from Penn World Table and World Bank databases. Time period for this study is 1960-2004; a total of 45 years; which is an extension by 4 years of Kose et al., (2006). Also, contrary to the sample of 85 countries used in their study, data used in this analysis consist of a total of 83 countries, and this excludes Ghana because it has an extremely high volatility, which could bias the results of the study. The countries in the study are grouped into industrial and developing countries. Developing countries are then sub-divided into MFI's and LFI. By using the Morgan Stanley Capital International (MSCI) world index, we find 23 industrial countries (including Portugal and Singapore) and 23 emerging markets (including Czech Republic) classified as MFI's. The rest are LFI countries. Contrary to other classifications in the literature, we exclude Singapore and Portugal from MFI's in our analysis using the MSCI world index. Singapore in particular seems to have influenced the results of other papers and its reclassification could be one of the major differences in this article study.

In Kose et al., (2006) and other related literature, different measures of trade and financial integration are employed. These include binary measures (using dates of regulation or deregulation) and continuous measures. In this study however, only the continuous measure (also referred to as de facto measure) of these variables are used since they depict more clearly how the degree of trade and financial integration change over time.

b)   Model

To test the relationship between trade openness, financial integration and the growth-volatility relationship the following ordinary least squares (OLS) model is estimated:

$$Growth = \alpha_0 + \alpha_1 Volatility + \alpha_2 Income + \alpha_3 \mathrm{P}rimeduc + \alpha_4 Popgrowth + \alpha_5 Invest + \alpha_6 Openess + \alpha_7 F \mathrm{int} + \alpha_8 ICT + \varepsilon$$

where, Growth is the annual growth rate of real GDP per capita, Volatility is the standard deviation of growth, Income is log of initial income (GDP per capita), Primeduc is primary education, Popgrowth is population growth, Invest is investment share of GDP, Openess is trade integration (measured as the ratio of volume of trade to GDP), Fint is the continuous measure of financial integration as the ratio of capital flows to GDP, ICT is the ratio of expenditure on information and communication technology to GDP, and ε is iid error term. The dependent variable is growth, and the independent variable is volatility. The control variables are income, investment, and primary education. Data is taken from the World Bank databases and Penn World Tables. Country names are in Appendix 1.

III. Stylized Facts from Cross-Sectional Plots of Growth and Volatility

It is to be expected that the average growth rate of GDP decrease as we move from industrial countries to MFI's and LFI's respectively. However, the same cannot be said of volatility. Ghana for example has a volatility rate higher than most countries (MFI's and industrialized countries). A cross sectional plot of these variables could help identify if there are any stylized facts about the relationship between growth and volatility.

Scatter plots are presented in Fig.1-Fig.6 for each category as well as the full sample. It is apparent from the information in Fig.1-Fig.4 that for the full sample, developing countries and MFI's in particular, there exists a negative relationship between growth and volatility as also reported in related literature such as Kose et al., (2006). However for industrial countries and LFI's, the relationship is positive. The scatter plots in Fig.5-Fig.6 also show a positive relationship between growth and ICT for the full sample and for developing countries.

IV.   Results

Table 1 reports two sets of regressions for each category. The first regression for each category is a regression of volatility of on growth without the other independent variables whereas the second includes the some of the other independent variables.

In the first set of regressions in Table 1, the coefficient of volatility was positive and significant for industrial countries. The coefficient is 0.59, a little higher than 0.42 of Kose et al., (2006). For MFI's the coefficient on volatility is -0.36 and is not significant. Also, the coefficient on volatility is 0.034 (positive) but not significant for LFI's.

For the second set of regressions in Table 1, log level of initial income, average population growth rate, fraction of population with primary education and investment share of GDP were controlled for. The coefficient of volatility is still positive (0.67) and significant for industrial countries, negative (-0.51) but now significant for MFI's and negative but still not significant for LFI's.

Table 2 reports the results for the full sample. In the first regression, the coefficient on volatility is -0.19 and is significantly at one percent level. Thus, a unit increase in volatility leads to a 19 percent decrease in growth. This result however contradicts the findings of Kormendi and Meguire (1985) that growth and volatility are positively related. In order to see how the continuous measures of trade integration (openness) and financial integration weaken or strengthen this relationship for the full sample, they were introduced in the next two regressions. First openness was added as the second

regressor and the result shows that the coefficient on openness is positive (0.007) and is significant at 1 percent level.

Now, we regress growth on volatility and financial integration separately. From the results, as displayed in Table 2, the coefficient (-0.016) on financial integration is positive and significant just as openness. This implies that financial integration positively impacts growth and seems to weaken the growth-volatility relationship.

Having found all the separate effects of financial integration and trade openness on growth, we now include both of them together with the other explanatory variables use by Kose et al., (2006). The result shows that the coefficient of financial integration is not significant just as their paper reports. The fifth regression in Table 2 displays this regression results. The coefficients of financial integration (0.010) and trade integration (0.003) are both positive but not significant. The coefficient of volatility (-0.062) is also negative but not significant, suggesting the weakening effect of the openness and trade integration on the relationship between growth and volatility.

In addition to the variables controlled for in the literature, this paper attempts to find other important variables that are not accounted for by the other papers. From macro-economic theory, growth should closely relate to technology. Solow growth model and other macro models emphasize the role of technology in explaining growth. Scatter plots (Fig. 5 and Fig. 6) suggest that ICT positively impacts growth. Consequently this paper uses the ratio of expenditure on information and communication to GDP as a proxy for technology as an additional control variable.

The result in Table 2 reports a positive coefficient for trade integration (0.003), but it is not significant. Financial integration has both a higher coefficient (0.130) and is significant (at 5 percent level), against the coefficient (0.010) obtained by excluding ICT, which was significant only at the 10 percent level.

It is noteworthy that, financial integration in practice interacts positively with ICT because capital mobility requires much use of ICT. This positive interaction means that the growth volatility relationship should also be weakened as we can see from the sixth regression in Table 2. The coefficient (-0.109) of volatility is smaller and insignificant when these control variables were added than the case when they are excluded in earlier regressions.

V.   Conclusion

This paper attempts to find the impact of financial integration on growth volatility relationship. We find that by accounting for the key control variables, financial integration positively affects growth. We also establish that growth and volatility are negatively related

and come out with a result that implies that financial integration weakens the negative growth-volatility relationship. This is accentuated after accounting for information and communication technology, distinguishing this paper from previous literature.

In addition, the results suggest that in countries where the degree of financial integration is high, high fluctuations in output (volatility) does not adversely affect growth rate. This may be due to the fact that countries with high degrees of financial integration are also deeply rooted in information and communication technology, which helps them easily and quickly, offset any output shocks using their highly developed stock and capital markets. We have also found a positive and significant relationship between trade integration and growth. However, like Fatas (2002) our results indicate that the positive impact of trade integration on growth volatility relationship is not significant, once other key variables are controlled for.

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Table 1 : Sub Division Regressions
Dependent Variable: Growth

Independent Variables	IND	MFI	LFI	IND	MFI	LFI
Constant	1.078*	4.085***	1.176*	2.510	14.314***	-2.426
	(1.86)	(3.59)	(1.78)	(0.24)	(4.78)	(-1.14)
Volatility	0.591***	-0.360	0.033	0.673**	-0.511**	0.057
	(3.09)	(-1.45)	(0.32)	(2.79)	(-3.530)	(0.62)
Openess						
Income				-0.232	-1.490***	0.515**
				(-0.23)	(-4.23)	(2.18)
Financial Integration						
Population Growth				-0.051	0.039	-0.423
				(-0.114)	(0.073)	(-1.39)
Investment				0.023	0.225***	0.045*
				(0.566)	(5.32)	(1.82)
Education				0.024	-0.062	-0.001
				(0.26)	(-0.77)	(-0.02)
Information Technology						
R-Squared	0.31	0.09	0.003	0.59	0.74	0.41
Number of Observations	23	23	38	23	23	38

Notes: t-statistics in parentheses; asterisks indicate significance as follows: ***=1%, **=5%, *=10%.

Table 2 : Full Sample Regressions
Dependent Variable: Growth

Independent Variables	I	II	III	IV	V	VI
Constant	3.028***	2.584***	2.679***	0.961	1.474	0.227
	(8.12)	(6.25)	(6.95)	(0.51)	(0.79)	(0.12)
Volatility	-0.194***	-0.202***	-0.175***	-0.043	-0.062	-0.109
	(-2.72)	(-2.91)	(2.53)	(-0.55)	(-0.80)	(-1.40)
Openess		0.007**			0.003	0.003
		(2.26)			(1.11)	(1.13)
Income				0.086	-0.006	0.188
				(0.43)	(-0.04)	(0.90)
Financial Integration			0.016***		0.010*	0.0130**
			(2.56)		(1.69)	(2.17)
Population Growth				-0.089	-0.182	-0.144
				(-0.36)	(-0.74)	(-0.60)
Investment				0.069**	0.067***	0.082***
				(3.63)	(3.58)	(4.26)
Education				-0.062	-0.014	-0.025
				(-0.77)	(-0.48)	(-0.85)
Information Technology						-0.001**
						(-2.39)
R-Squared	0.08	0.33	0.15	0.14	0.38	0.42
Number of Observations	84	84	84	84	84	84

Notes: t-statistics in parentheses; asterisks indicate significance as follows: ***=1%, **=5%, *=10%.
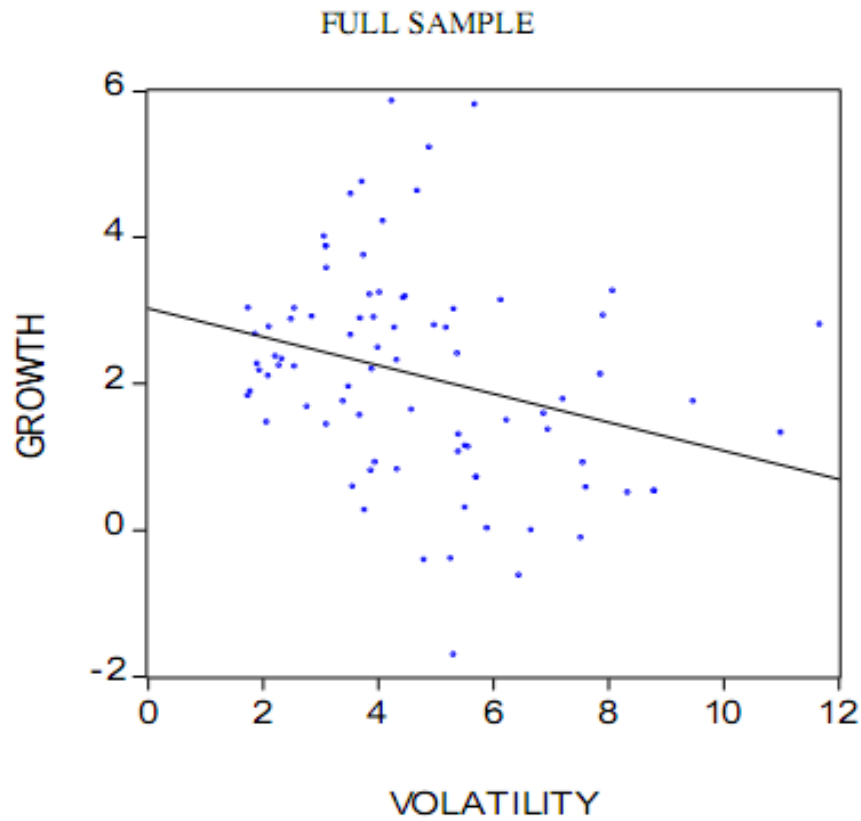
FULL SAMPLE

Fig 1 : Scatter diagrams of Growth and Volatility with regression line (1960-2004)
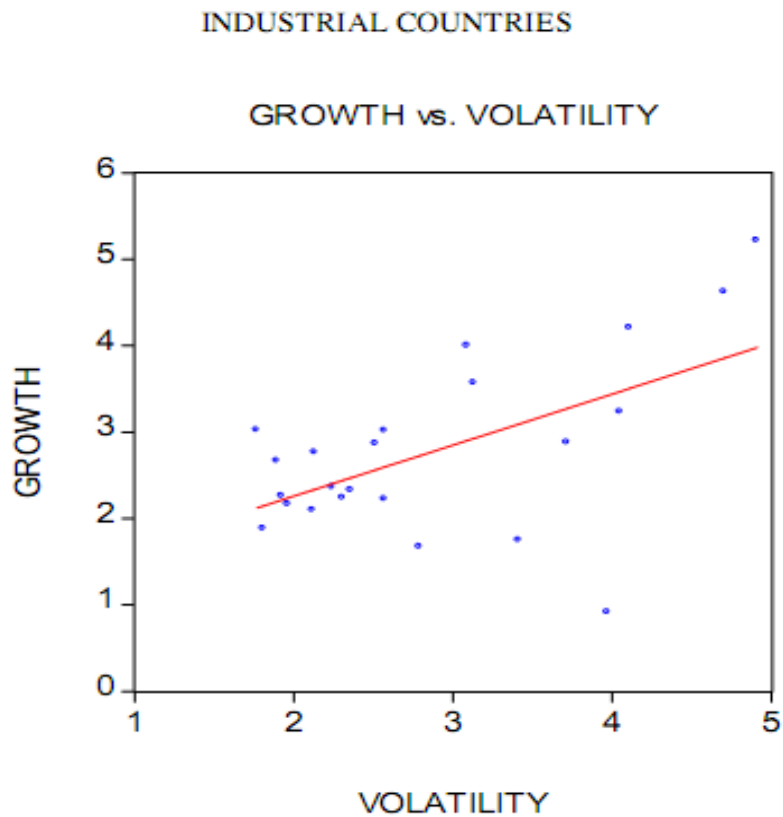
INDUSTRIAL COUNTRIES

GROWTH vs. VOLATILITY

Fig 2 : Scatter diagrams of Growth and Volatility with regression line (1960-2004)

74

LFI's

GROWTH vs. VOLATILITY
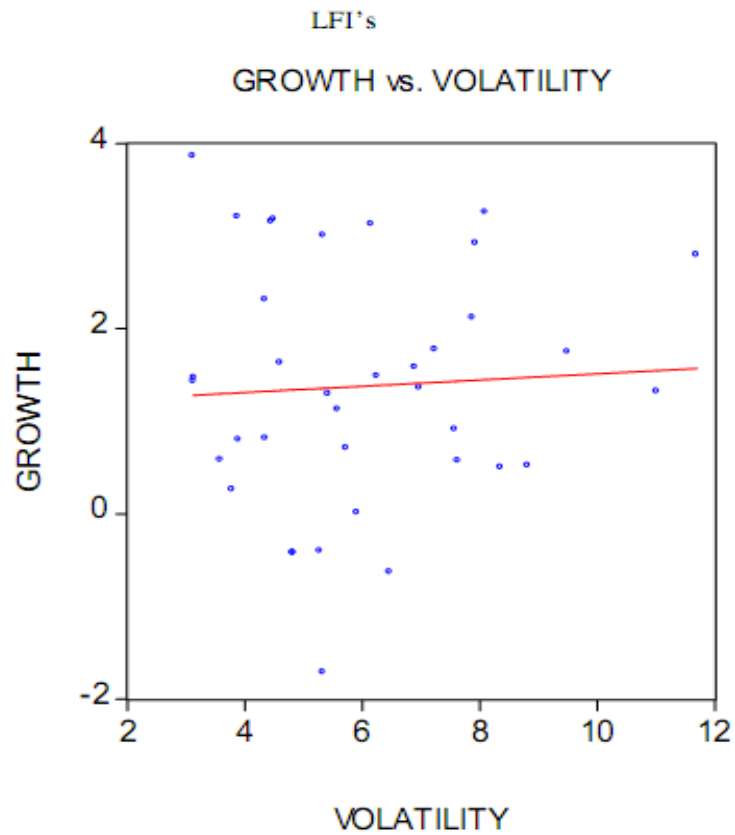
Fig 3 : Scatter diagrams of Growth and Volatility with regression line (1960-2004)

MFI's
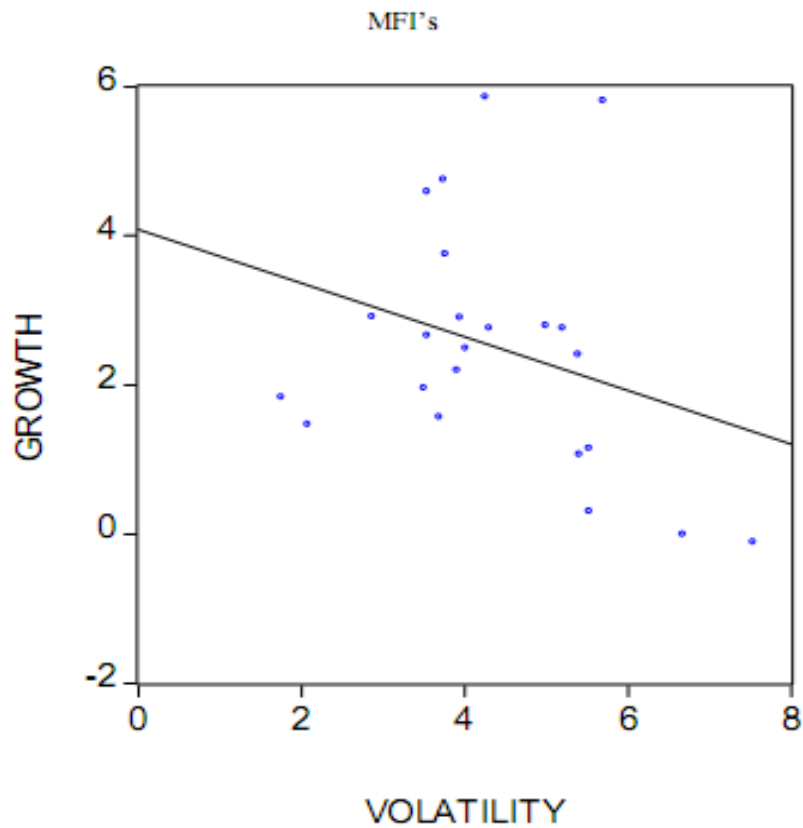
Fig 4 : Scatter diagrams of Growth and Volatility with regression line (1960-2004)

FULL SAMPLE
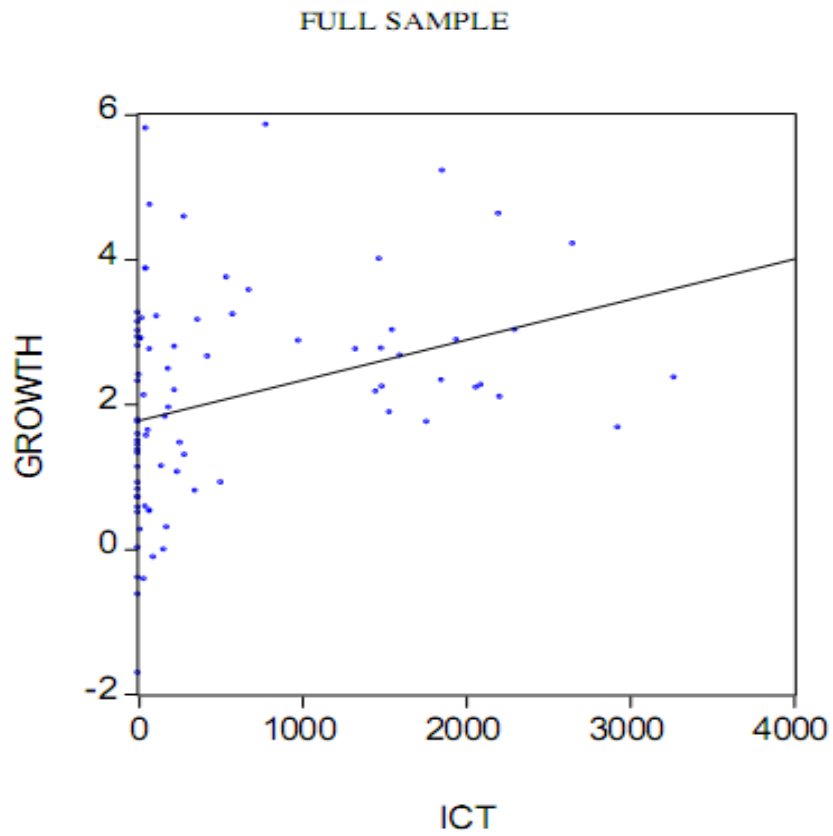
Fig 5 : Scatter diagrams of Growth and ICT with regression line (1960-2004)

DEVELOPING COUNTRIES
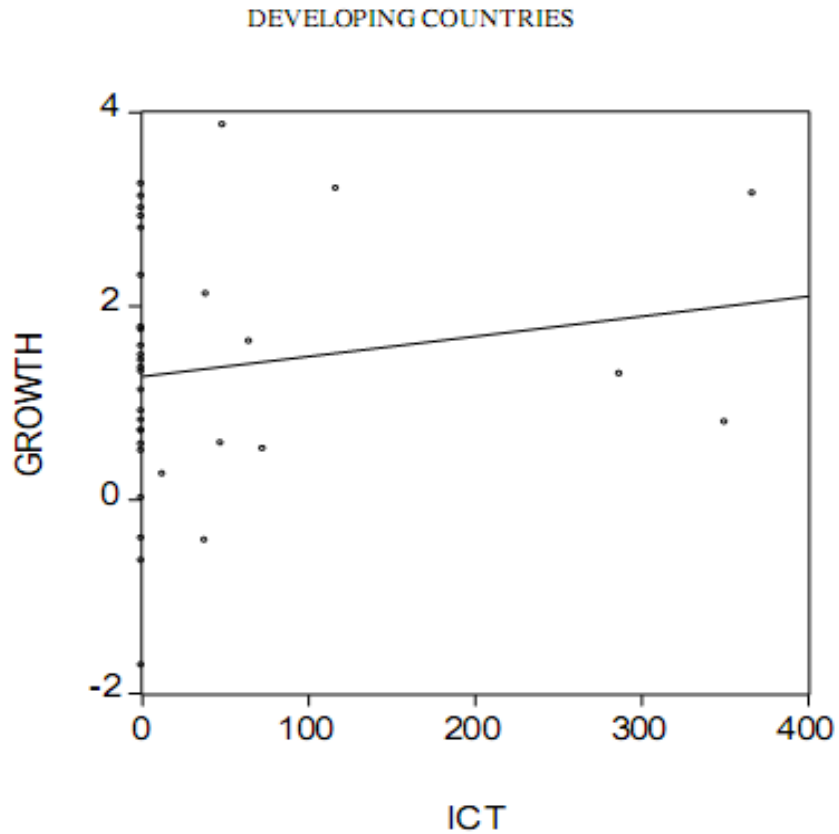
Fig 6 : Scatter diagrams of Growth and ICT with regression line (1960-2004)

Appendix 1 : Country Names

Argentina	Denmark	India	Morocco	Philippines	Thailand
Australia		Indonesia	Mozambique	Poland	
Austria	Dominican Republic	Iran	Nepal	Portugal	Togo
Belgium	Ecuador	Ireland	Netherlands	Russia	Trinidad &Tobago
Bolivia	Egypt	Israel	New Zealand	Seirra Leon	Tunisia
Brazil	Eritrea	Italy	Nicaragua	Senegal	Turkey
Burkina Faso	Fiji	Jamaica	Niger	Singapore	United Kingdom
Burundi	Finland	Japan	Nigeria	Slovenia	United States
Canada	France	Jordan	Norway	South Africa	Uruguay
Chile	Gabon	Kenya	Oman	Spain	Uruguay
China	Germany	Korea	Panama	Sri Lanka	Venezuela
Colombia	Greece	Lesotho	Papua New Guinea	Sweden	Zambia
Cote d`Ivoire	Haiti	Malaysia		Switzerland	Zimbabwe
	Hong Kong	Mauritius	Paraguay	Tanzania	
Czec Rep.	Hungary	Mexico	Peru		

A Study of Relationship between Liquidity and Profitability of Standard Charterd Bank Pakistan: Analysis of Financial Statement Approach

By Rafiq Ahmad

Quaid.i.Azam University, Pakistan

Abstract- The purpose of this research paper is to know the relationship between two ratios of the financial statements i.e. profitability and liquidity. The study is focused on the banking sector. The relation is measured by current ratio, quick ratio, and net-working capital. The bank under study is standard chartered bank Pakistan. From the findings of this study we came to conclusion that there is weak positive relation between liquidity and profitability. Quantitative research design is used as tool for the study. To find the relation and strength of the relation correlation and regression are used. So companies need to focus on liquidity management which has a positive relation with the company's profitability.

Keywords: profitability, liquidity, liquidity management.

GJMBR - C Classification : JEL Code : G21

ASTUDYOFRELATIONSHIPBETWEENLIQUIDITYANDPROFITABILITYOFSTANDARDCHARTERD BANKPAKISTANANALYSISOFFINANCIALSTATEMENTAPPROACH

Strictly as per the compliance and regulations of:

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Keywords: profitability, liquidity, liquidity management.

I. Introduction

Profitability and liquidity are two important variables which give information about the performance of any business entity. For long-term survival and healthy growth both profitability and liquidity should go parallel to each other .Profitability is one of the major goals of any business. Without being profitable it is not possible for a business to survive and the business growth is difficult. To generate profit a business need short-term funds to fulfill its day to day needs in operations and other requirements. Business will be more profitable when this short- term need of funds is generated by business operation not through external debts. So the liquidity tells about the business capability to meet short-terms need of funds by the business and profitability tells about the profit generated from the operations of business.

The reason to choose this title is that many studied have been conducted in past to find the tradeoff between profitability and liquidity and there is a huge variation in the results. As Pakistan's economy is different from other economies this study will put light on relation of these two variables in context of banking sector in Pakistan. Pakistan economy is different from other economies due to some its unique natures.

For the study banking sector is selected and standard chartered bank Pakistan is the main focus of the study. The reason to choose standard chartered bank is that it is the largest and oldest international bank in Pakistan. It is first international bank to get the license

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of Islamic banking and. It has a huge market share in Pakistan and it has 116 branches in Pakistan.

II. Literature Review

Profitability helps in taking decisions and constructing policies according to Osiegbu and Nwakanma (2008). Liquidity tells about the firm's ability to meet short-term need of funds says Ibenta (2005). Performance of any business entity is judged by its liquidity management (Bardia 2007). Efficient liquidity management has a great significance for a business to run smoothly (Valrshney, 2008).According to Samilogu and Dermirgunes (2008) the relationship of working capital management to profitability is negative. Decisions related to liquidity have no impact on profitability but the use of forecasting of liquidity and short-term financing during crisis effects profitability positively Lambery and Valming (2009). According to Amit et al (2005) there is no any relation between profitability and liquidity. Narware (2004) in his study on NFL concluded that; there is both negative and positive relationship between profitability and liquidity. According to Sur et al (2001), Bardia (2007), Bardia (2004) and Sur and Ganguly (2001) the relationship between profitability and liquidity is positive. As liquidity has a close relation with day to day activities so the study of liquidity is important for the internal analysts as well as external analysis in their study (Bhunia, 2010).

By taking Current ratio as tool to find the relation between profitability and liquidity found that there is negative relation between the business's liquidity and its profitability Abuzarand Eljelly (2004).Working capital management is important due to its direct relation with the firm's profitability and liquidity Singh and Pandey (2008). According to Walt (2009) Profitability can be turned into liquid asset that's why it is more important but this never means that company is profitable if its liquidity is high. Liquidity is more important than profitability because it has impact on the survival of the company Don (2009).According to Dong (2010) Working capital management affects the liquidity and profitability of any firm. Fixed and current assets are important for the successful running of any business and these both have direct impact on liquidity and profitability Saswata Chatterjee (2010) .According to Deloof (2003) and Wang

(2002) the working capital management increases profitability by reducing average collection period and inventories. According to Afza and Nazir (2007) there is a negative relation between the profitability and business's working capital investment and the financing policies.

Mahmood and Qayyum, (2010) argue that the liquidity and profitability are important to achieve two main objectives profitability is related to the wealth maximization goal of the shareholders and liquidity is important for the continuity of business. Correlation and regression study of Eljelly (2004) founded that Current ratio is more important to measure profitability and cash conversion cycle is more important to measure liquidity. According to Shim and Siegel (2000) Liquidity is business capacity to pay short- term debts means their maturity is less than one year. Economic success achieved by any business by investing capital in it is said to be its profitability and it is determined by the net profit margin (Pimentel et al, 2005). High financial cost and business's inability to pay its obligations are the results of low liquidity (Maness & Zietlow 2005).Liquidity tells about the firm's degree of independence against the creditors and it also tells about the difficulties and crises face by the company Matarazzo (2003). Financial strength of a business is measure of it liquidity Chandra (2001). Profitability will be lower the more funds are invested in current assets Assaf Neto (2003).The relation of profitability to liquidity is inverse according to Marques and Braga (1995) and Renato Schwambach Vieira (2010).Liquidity is commonly measured by current ratio and profitability is commonly measured by ROI Vishnani and Shah (2007).

III. Measurement

a) *Operational definitions*
  i. *Accounting Liquidity*

It measures the company's ability to meet its short-term obligations using its most liquid assets. That is, accounting liquidity is the ease with which a company can pays its bills and liabilities over the next year, especially if it must convert its assets into cash in order to do so. Two common ways to measure accounting liquidity are the current ratio and the quick ratio. (financial- dictionary.thefreedictionary.com, 2010)

  ii. *Profitability Ratios*

A class of financial metrics that are used to assess a business's ability to generate earnings as compared to its expenses and other relevant costs incurred during a specific period of time. For most of these ratios, having a higher value relative to a competitor's ratio or the same ratio from a previous period is indicative that the company is doing well. (www.investopedia.com, 2010).

IV. Hypothesis

For the study seven hypotheses have been constructed:

Ho: No relation exists between the liquidity and profitability.

H1: There is significant relationship between liquidity and profitability

H2: There is a positive relation between current ratio and profitability.

H3: There is a negative relation between current ratio and profitability.

*H4:* There is a positive relation between quick ratio and profitability.

H5: There is a negative relation between quick ratio and profitability.

H6: There is a positive relation between Net-working capital and profitability.

H7: There is a negative relation between Net-working capital and profitability

V. Conceptual Framework

LIQUIDITY

PROFITABILITY

| Current |
| Quick |
| Net-working |

| Gross profit |
| Net Profit |
| Return on |

Return on
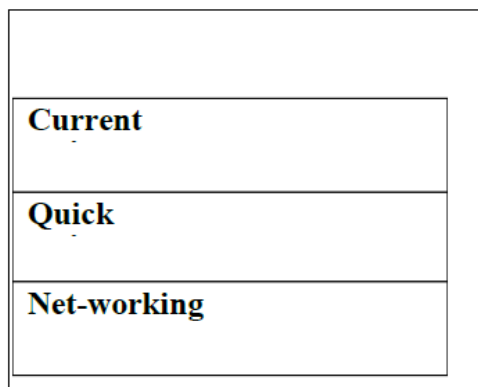
VI. Methodology

a) Research Design

The purpose of this research paper is to know the relationship between two important ratios of the financial statements the profitability and liquidity. The study is conducted on the basis of actual data available in the financial statements of the standard chartered bank, so our interference in this study is low. The study is done on a real business scenario so this study is non-contrived study. No artificial data is used actual data is used for the study purpose. The unit of analysis for this study is organization that is standard chartered bank Pakistan. Standard chartered bank Pakistan is largest international bank in Pakistan with 116 branches. The study is conducted on the basis of the financial statements of standard chartered bank from 2004 to 2013.The data of last ten years of standard chartered bank is taken as a sample for the study. The data to find the relation is not collected of just one specific point but it is collected at ten different points from the year 2004 to 2013.So the study is longitudinal. For this study the secondary data collection method is used. The data is collected from the annual reports of standard chartered bank Pakistan.

VII. Findings and Results

a) Descriptive statistics

Table 1.1 : Descriptive Statistics

	Mean	Std. Deviation	N
Liquidity	-2.1217	7.36167	10
Profitability	1.0480	.39384	10

From the descriptive statistic table 1.1 its can be concluded that the mean of liquidity is negative that is mainly due to the large negative figure of net-working capital .The negative figure of net- working capital is due to access of current liabilities to the current assets. The mean of profitability is positive because all the four ratios are positive. The standard deviation of profitability is low that is due less variation in the ratios. The standard deviation of liquidity is high due to the large variation in the figures of the liquidity ratio.

Table 1.2 : Correlations

		Profitability	Current ratio	Quick Ratio	NWC
Pearson Correlation	Profitability	1.000	-.207	.423	.094
	Current ratio	-.207	1.000	.176	.815
	Quick Ratio	.423	.176	1.000	.657
		.094	.815	.657	1.000
Sig. (1-tailed)	Profitability	.	.283	.112	.398
	Current ratio	.283	.	.314	.002
	Quick Ratio	.112	.314	.	.020
		.398	.002	.020	.
N	Profitability	10	10	10	10
	Current ratio	10	10	10	10
		10	10	10	10
	Quick Ratio	10	10	10	10

Table 1.3 : Correlation

		profitability	Liquidity
Pearson Correlation	profitability	1.000	.094
	Liquidity	.094	1.000
Sig. (1-tailed)	profitability	.	.398
	Liquidity	.398	.
N	Profitability	10	10
	Liquidity	10	10

b) Correlation

From the correlation table 1.2 and 1.3 we can conclude that the relation between profitability and liquidity is very weak positive. The relation between current ratio and profitability is weak negative relation. The relation between quick ratio and profitability is moderate and the relation between Net-working capital and profitability is positive and very weak. So we can say that profitability has a positive relation with the majority of liquidity ratios. The relation between quick ratio and profitability has the highest intensity and the intensity of relation between net- working capital and profitability is lowest. The value of F is also an evident for the weak relation between profitability and liquidity.

a. Dependent Variable: profitability

Table 1.4 : Coefficients

Mod		Unstandardized		Standardiz Coefficie	T	Sig
		B	Std.	Bet		
1	(Constan	1.34	1.84		.73	.49
	Current ratio	-	1.17	-	-	.64
	Quick	1.15	3.02	.31	.38	.71
	NW	1.626-	.00	.30	.21	.83

a. Dependent Variable: profitability
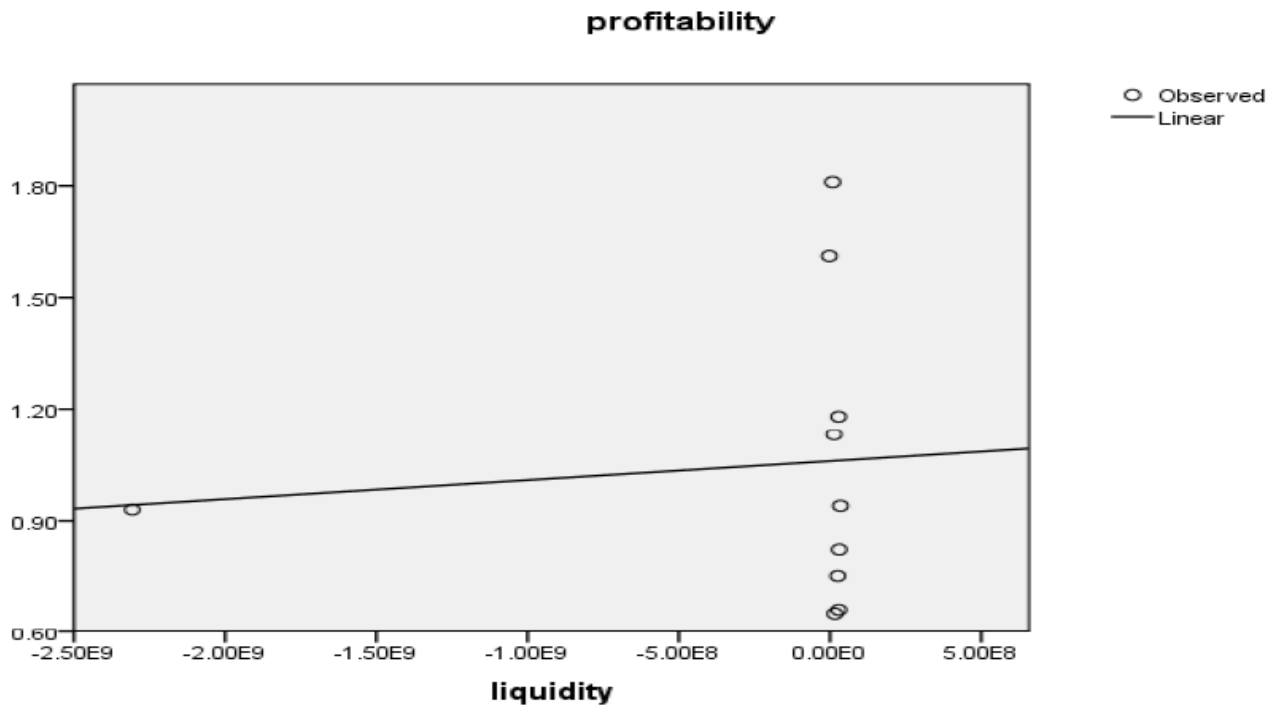
profitability

ANOVA [b]

Mod		Sum of	Df	Mean Square	F	Sig.
1	Regressi	.012	1	012	072	.795
	on	1.384	8	.173		
		1.396	9			

a. Predictors: (Constant), liquidity
b. Dependent Variable: profitability

VIII. CONCLUSION

From the findings and results of the study we can conclude that there a positive relation between profitability and liquidity .So the null hypothesis is rejected and alternate hypothesis 1 is accepted. There is negative relation between current ratio and profitability so the alternate hypothesis 2 is rejected and alternate hypothesis 3 is accepted. There is positive relationship between quick ratio so the alternate hypothesis 4 is accepted and alternate hypothesis 5 is rejected. There is positive relation between net-working capital and profitability so alternate hypothesis 6 is accepted and alternate hypothesis 7 is rejected.

IX. LIMITATIONS

The study is concentrated to only banking sector. The results and findings of this study is based on the financial statement of standard chartered bank Pakistan. Only past ten years data is taken under consideration for the study.

X. FUTURE RESEARCH IMPLICATIONS

- The study results can be well generalized if the study is also focused to other sectors not only banking.
- The study can be more accurate and generalizable if the study takes under consideration multiple banks of Pakistan.
- This study is done with reference to Pakistan only. Considering other countries will result in more reliable and accurate results, findings and relation between the variables.

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Efficacité De La Réglementation Prudentielle Des Banques: Validation Empirique

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Abstract- To ensure stability of the banking sector at the international level, the Basel Committee has established prudential regulation. The main objective of this article is to study the effectiveness of this regulation by analyzing the relationship between risk and the level of bank capital. The model developed by Shrieves and Dahl (1992) provides a solid framework and adequate analysis to the objectives of the research. Thus, it is modified and tested empirically on a sample of 255 banks of the G8 countries using the 2SLS method (the interrelation between risk and capital). The results show a positive relationship between risk taking and capital level of banks studied. Overall, a strict regulatory environment improves the solvency of banks with a difference in behaviour between undercapitalized banks and well-capitalized banks.

Keywords: bank, capital, risk, prudential regulation.

GJMBR - C Classification : JEL Code : F65, G21

EFFICACITEDELAREGLEMENTATIONPRUDENTIELLEDESBANQUESVALIDATIONEMPIRIQUE

Strictly as per the compliance and regulations of:

Efficacité De La Réglementation Prudentielle Des Banques: Validation Empirique

Ait Bihi Abdelhamid

Abstract- To ensure stability of the banking sector at the international level, the Basel Committee has established prudential regulation. The main objective of this article is to study the effectiveness of this regulation by analyzing the relationship between risk and the level of bank capital. The model developed by Shrieves and Dahl (1992) provides a solid framework and adequate analysis to the objectives of the research. Thus, it is modified and tested empirically on a sample of 255 banks of the G8 countries using the 2SLS method (the interrelation between risk and capital). The results show a positive relationship between risk taking and capital level of banks studied. Overall, a strict regulatory environment improves the solvency of banks with a difference in behaviour between undercapitalized banks and well-capitalized banks. However, the practice of regulatory arbitrage limits the scope of the results.

Keywords: bank, capital, risk, prudential regulation.

Résumé- Pour assurer la stabilité du secteur bancaire au niveau international, le comité de Bâle a mis en place la réglementation prudentielle. L'objectif principal de cet article est d'étudier l'efficacité de cette réglementation en analysant la relation entre le risque et le niveau des fonds propres bancaires. Le modèle de Shrieves et Dahl (1992) donne un cadre d'analyse solide et adéquat par rapport aux objectifs de la recherche. Il est ainsi modifié et testé empiriquement sur un échantillon de 255 banques des pays du G8 en utilisant la méthode des doubles moindres carrées (interrelation entre le risque et le capital). Les résultats obtenus montrent une relation positive entre la prise de risque et le niveau des fonds propres des banques étudiées. Globalement, un environnement réglementaire strict améliore la solvabilité des banques avec une différence de comportement entre les banques sous-capitalisées et les banques bien capitalisées.

Motsclés: banque, capital, risque, réglementation prudentielle.

I. Introduction

Selon la théorie de l'intermédiation, le rôle des banques dans l'économie consiste principalement à collecter les dépôts et à distribuer les crédits. Les ressources d'une banque sont ainsi majoritairement composées de dettes (les dépôts principalement) puisque celles-ci permettent de financer son activité, Gurley et Shaw (1960). Les besoins en fonds propres sont moins importants que dans les entreprises industrielles et ont, par conséquent, un rôle très précis. Il s'agit de garantir la solvabilité de la banque en cas de difficultés et d'instaurer la confiance des investisseurs et des déposants, Berger et al. (1995). Dans la pratique, les banques essayent de réduire au maximum leur capitalisation. Un niveau de fonds propres élevé augmente le coût du capital étant donné que leur coût est généralement supérieur au coût des dépôts. Globalement, le ratio de capital, qui est mesuré par le rapport entre le capital bancaire et le total des actifs, ne dépasse que rarement 10 % dans la majorité des banques du monde entier, Bichsel et Blum (2004). Dans le cas des grandes banques mondiales ce ratio tombe jusqu'à 4 %.

Quand la banque est bien capitalisée, elle a tendance à augmenter le risque de son portefeuille pour améliorer sa rentabilité. Pour prévoir ce comportement opportuniste, le régulateur a mis en place une réglementation prudentielle basée sur un ratio de capital pondéré aux risques. Le niveau minimum de capital que doit détenir une banque dépend de la composition de son portefeuille et du risque qui y est lié. L'objectif principal du ratio réglementaire[1] est de pousser les banques à augmenter leur niveau de capitalisation quand leur risque de portefeuille augmente. Les niveaux des fonds propres et des risques sont par conséquent inter-reliés et évoluent dans le même sens, Jaques et Nigro (1997).

L'objectif principal de la recherche est d'analyser la spécificité de la détermination du niveau des fonds propres dans le secteur bancaire et l'impact de l'environnement réglementaire sur la décision des banques en la matière. Le modèle de Shrieves et Dahl (1992) donne un cadre d'analyse solide et adéquat par rapport aux objectifs de la recherche. Un système à double équations est ainsi mobilisé et testé empiriquement par la méthode des doubles moindres carrées pour analyser la relation entre le capital et le risque. Au modèle de base ont été intégrés des facteurs supplémentaires tels que la liquidité et la pression du marché, Marcus (1983).

La période traitée est celle d'avant crise, 2000-2007, ce qui permet d'analyser le comportement des banques sans externalités négatives exceptionnelles liées aux fluctuations des marchés et à la dégradation

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[1] Selon les directives du comité de Bâle en 1988. Il s'agit du ratio Cooke qui a été remplacé par le ratio Mc-Dounough. Voir les publications de Bank for International Settlements (BIS) dont les références sont dans la bibliographie.

subite des actifs bancaires. Par ailleurs, la période de la crise a connu des recapitalisations importantes suite aux interventions des autorités publiques dans le sauvetage des banques. Ces fluctuations dans les niveaux du risque et du capital liées à la crise pourraient fausser l'analyse. C'est pour cela que la période au-delà de 2007 n'a pas été intégrée dans l'étude.

Dans le cadre de cet article nous commencerons tout d'abord par une revue de la littérature sur la capitalisation des banques et l'impact de la réglementation prudentielle, puis nous présenterons notre cadre méthodologique et enfin nous analyserons nos résultats à la lumière du cadre théorique et des validations empiriques antérieures.

II. La Revue De Littérature

L'analyse de la revue de la littérature sur la structure de capital des banques montre que le choix des sources de financement n'est pas neutre et que les banques essayent d'optimiser le niveau des fonds propres. Le rejet du modèle de Modigliani et Miller (1958)[2] se justifie par le fait que l'existence même du secteur bancaire résulte de l'existence des asymétries d'information. Globalement, les travaux qui ont porté sur le capital bancaire peuvent être classés en deux types.

D'une part, une série d'études a essayé d'appliquer aux banques la théorie financière en matière de structure financière des entreprises sans prendre en considération la réglementation prudentielle. Il s'agit surtout des travaux qui ont appliqué la théorie du compromis[3] Harris et Raviv (1991), pour optimiser l'allocation des fonds propres en intégrant aussi bien les déterminants identiques à toutes les types d'organisation (les coûts des sources de financement, risque de faillite, asymétries d'information,…), notamment les travaux de Berger et al. (1995), de Demirgüç-Kunt et Huizing (2000), et de Baltensperger (1973), que les déterminants spécifiques au secteur bancaire (liquidité, solvabilité, prêts interbancaires, assurance dépôt,…) comme dans le cadre des travaux de Diamond et Rajan (2000) et de Dietrich et Vollmer (2004).

D'autre part, une autre série d'études a essayé d'étudier l'impact de l'introduction de la réglementation prudentielle en matière des fonds propres sur la structure de capital des banques. Ce type de travaux, s'intéresse globalement à trois problématiques. Tout d'abord, la détention par les banques d'un niveau de capital supérieur au minimum réglementaire ou la théorie du capital réserve initiée par Wall et Peterson (1995) et reprise par Berger et al. (2008) et Flannery et

rangan, (2008). Puis l'impact de l'imposition d'un ratio de type réglementaire (pondéré aux risques) sur les fonds propres des banques et leur prise de risque, modélisé grâce à Shrieves et Dahl (1992). Et enfin, l'impact de la sévérité de l'environnement réglementaire global (restriction des activités, compléments du ratio de capital,…) sur le niveau des fonds propres bancaires, (Booth et al. 2001).

Mis à part le cadre théorique, notre contribution s'inspire des méthodologies initialement utilisées dans les travaux sur les banques américaines notamment ceux de Aggarwal et Jacques (1997), Freixas et al (2004, 2008), De Bondt et Prast (1999) et Estrella et Al. (2000). Par ailleurs, plus récemment, plusieurs études empiriques ont étudié le ratio du capital des banques, notamment Lindquist (2004), Nier et Bauman (2006), Jokipii et Milne (2008) et ont montré comment les banques ajustent leur ratio de capital, Flannery et ragan (2008). Plusieurs facteurs ont été identifiés: des facteurs internes, la pression réglementaire, la concurrence, la pression du marché, et le comportement cyclique du capital bancaire…

Le modèle de base de notre étude est celui de Shrieves et Dahl (1992), sur lequel on va intégrer des variables spécifiques à la banque (liquidité, profitabilité, …), et des variables de l'environnement bancaire tel qu'il a été défini par Barth, Caprio et Levine, dans leur base de données constituée en 2001. (Voir l'annexe 1).

Plusieurs travaux ont étudié l'impact de la réglementation des fonds propres en s'inspirant des travaux de Shrieves et Dahl (1992). Ils se sont concentrés sur la relation qui existe entre le niveau du capital et le risque. Les travaux les plus importants sont sur les banques américaines, notamment ceux Jacques et Nigro (1997) et Aggarwal et Jaques (1997), ainsi que sur le secteur bancaire suisse par Rime (2001). Ils semblent confirmer cette relation positive entre le risque et le ratio de capital. Heid et al. (2008), en mettant l'accent sur les caisses d'épargne allemandes, ont, toutefois, trouvé des résultats peu importants qui ne donnent aucune conclusion sur la nature de la relation.

Jusqu'à présent, l'étude de l'ensemble des systèmes bancaires des pays du G8 n'existe pas, malgré qu'une telle étude revêt un intérêt particulier vu que le ratio de capital est obligatoire dans ces pays (pour les banques cotées) et que l'on est incapable, jusqu'à présent, de préciser l'impact d'une telle obligation sur la capitalisation des banques.

A l'instar des travaux de Shrieves et Dahl, la théorie du capital réserve (Buffer theory) de Wall et Peterson (1995), permet d'expliquer la relation entre le capital et le risque suite à l'imposition d'une réglementation prudentielle du capital bancaire. En effet, les banques, en fixant leur ratio de capital, souhaitent détenir un certain excédent de capital au-dessus du minimum réglementaire. Le raisonnement qui sous-tend derrière la volonté de maintenir un certain capital de

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[2] Selon le modèle de modigliani et miller, la structure financière d'une entreprise n'a pas d'impact sur sa valeur. Voir Harris et Raviv (1991).

[3] La structure financière d'une entreprise résulte d'un arbitrage entre les avantages et les inconvénients des différentes sources de financement.

réserve est l'existence des coûts explicites et implicites de la réglementation, qui résulteraient de la baisse du ratio de capital à des niveaux très proches ou au-dessous du minimum réglementaire. En conséquence, les changements dans le risque du portefeuille des banques qui ont un excédent de capital et le ratio de capital sont positivement liés afin d'éviter les coûts de la réglementation.

Pour les banques faiblement capitalisées, la relation entre le capital et le risque est négative. En effet, pour respecter la réglementation ces banques baissent le risque de portefeuille et augmentent leur capitalisation d'une manière simultanée. Par contre, les changements dans le risque du portefeuille et le ratio de capital ne sont pas liés dans le cas de banques fortement capitalisées pour qui la théorie du capital réserve ne s'applique pas.

III. Méthodologie De Recherche

Il est important de mettre en évidence les spécificités méthodologiques de notre étude empirique, car l'objectif est d'étudier l'impact de la réglementation en matière de capitalisation et la prise de risque par les banques. En effet, en se basant sur le modèle Shrieves et Dhal (1992), l'accent est mis sur l'interrelation entre le risque et le ratio de capital, tout en introduisant dans le modèle d'autres variables réglementaires.

a) Modélisation économétrique et statistiques descriptive

i. *Présentation du modèle de base*

D'un point de vue réglementaire, les fonds propres doivent garantir la solvabilité de la banque en couvrant les pertes potentielles. Ainsi, quand le risque augmente le niveau des fonds propres doit augmenter aussi afin d'éviter les difficultés financières liées à une sous-capitalisation.

D'un point de vue de l'actionnaire, la relation est considérée dans l'autre sens. Toute augmentation du capital devrait être accompagnée d'une augmentation de l'activité et par conséquent du risque. L'objectif des actionnaires étant d'améliorer la rentabilité des fonds propres, la relation est positive entre le risque et le capital.

Cette interrelation entre le risque et le niveau des fonds propres est modélisée par Shrieves et Dhal (1992) en utilisant un système à deux équations simultanées. A l'instar de beaucoup d'études précédentes (Jacques et Nigro (1997), Aggarwal et Jacques (1997), Rime (2000), Heid et al. (2004)), notre étude empirique se base sur ce modèle.

ii. *Le modèle de Shrieves et Dhal*

Les théories qui traitent la relation entre le capital et le risque préconisent que ces deux décisions sont corrélées et varient simultanément. Dans le modèle de Shrieves et Dhal (1992), les changements observés

dans le ratio du capital bancaire et dans le risque résultent principalement de deux composants : un ajustement discrétionnaire et des facteurs externes. Ainsi, le modèle de base présente les équations de capital et de risque comme suite :

$$\Delta CP_{i,t} = \Delta^d CP_{i,t} + B_{i,t} \qquad (eq.1)$$

$$\Delta RSK_{i,t} = \Delta^d RSK_{i,t} + D_{i,t} \qquad (eq.2)$$

Où $\Delta CP_{i,t}$ et $\Delta RSK_{i,t}$, correspondent à la variation des capitaux propres et à la variation du niveau du risque, de la banque i à l'instant t.

L'utilisation que nous faisons du modèle de Shrieves et Dhal (1992) est principalement inspirée de la méthodologie utilisée dans le travail de Rime (2001) sur les banques suisses. Les ajustements discrétionnaires du capital et du risque sont représentés par les variables $\Delta^d CP$ et $\Delta^d RSK$. L'utilisation d'un cadre d'ajustement partiel se justifie par l'incapacité des banques à atteindre le niveau désiré de capital ou de risque sans un certain délai. Ainsi, les variations discrétionnaires du capital est du risque sont proportionnelles à la différence entre les niveaux (du capital et du risque) désirés et les niveaux observés l'année précédente (t-1) :

$$\Delta^d CP_{i,t} = \alpha (CP^*_{i,t} - CP_{i,t-1}) \qquad (eq.3)$$

$$\Delta^d RSK_{i,t} = \beta (RSK^*_{i,t} - RSK_{i,t-1}) \qquad (eq.4)$$

Avec $CP^*_{i,t}$ et $RSK^*_{i,t}$ sont respectivement les niveaux désirés du capital et du risque. En substituant les équations (eq.3) et (eq.4) dans (eq.1) et (eq.2), les équations des variations observées du capital et du risque peuvent être écrites comme suit :

$$\Delta CP_{i,t} = \alpha (CP^*_{i,t} - CP_{i,t-1}) + B_{i,t} \qquad (eq.5)$$

$$\Delta RSK_{i,t} = \beta (RSK^*_{i,t} - RSK_{i,t-1}) + D_{i,t} \qquad (eq.6)$$

Globalement, les variations du capital dépendent du niveau objectif du capital ($CP^*_{i,t}$), du niveau de capitalisation de la période précédente ($CP_{i,t-1}$), et d'autres facteurs exogènes. De même les variations du risque dépendent du niveau du risque désiré $RSK^*_{i,t}$, du niveau du risque à la période précédente ($RSK_{i,t-1}$), et d'autres facteurs exogènes.

Les niveaux de capitalisation et du risque désirés ne sont pas observables, mais ils peuvent être estimés puisqu'ils dépendent d'un ensemble de facteurs. Concernant le niveau du capital désiré, nous reprendrons les principales variables testées dans d'autres études empiriques[4], notamment la profitabilité (PROF), la taille (TAI) et le risque (RSK) auxquelles nous ajoutons les variables réglementaires (REGL) et le niveau de capital de l'année précédente. Ces variables ont été utilisées dans le modèle de base de Shrieves

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[4] Il s'agit surtout des travaux de Berger et al. (1995), de Demirgüç-Kunt et Huizing (2000), de Baltensperger (1973), de Diamond et Rajan (2000) et de Dietrich et Vollmer (2004).

and Dahl (1992), à l'exception de la profitabilité qui a été introduite au modèle par Aggarwal et Jacques (1997), et la pression réglementaire introduite par Ediz et al. (1998). Contrairement à Rime (2000) nous n'allons pas inclure des variables macro-économiques.

La particularité de notre étude empirique réside dans l'intégration de la liquidité (LIQ) parmi les variables explicatives. Par ailleurs, la mesure de la variable réglementaire que nous utilisant intègre tout l'environnement réglementaire tel qu'il a été mesuré par Barth et al. dans leur base constituée à cet effet (annexe 1). Cette mesure est différente de celle utilisée dans d'autres études.

Le niveau désiré du risque dépends aussi d'un ensemble de facteurs. Les déterminants les plus testés dans la littérature sur les banques sont : la taille, les provisions (PROV: mesurée par provisions nouvelles/ total actif), le capital et la réglementation. Sachant que la théorie préconise qu'il existe une relation positive entre le capital et le risque, et que les deux décisions sont interdépendants, les variables ($\Delta CP_{i,t}$) et ($\Delta RSK_{i,t}$) ont été intégrées aux équations du modèle. Sous la pression réglementaire, les banques augmentent le capital suite à une augmentation du risque pour garder leur solvabilité à un niveau acceptable par les autorités.

En se basant sur les spécifications qu'on vient de préciser, le modèle est transformé de la façon suivante :

$$\Delta CP_{i,t} = \alpha 0 + \alpha 1\, TAI_{i,t} + \alpha 2\, PROF_{i,t} + \alpha 3\, REGL_{i,t-1} + \alpha 4\, \Delta RSK_{i,t} + \alpha 5\, CP_{i,t-1} + \alpha 6\, LIQ_{i,t} + B_{i,t} \qquad (eq.7)$$

$$\Delta RSK_{i,t} = \beta 0 + \beta 1\, TAI_{i,t} + \beta 2\, PROV_{i,t} + \beta 3\, REGL_{i,t-1} + \beta 4\, \Delta CP_{i,t} + \beta 5\, RSK_{i,t-1} \qquad + D_{i,t} \qquad (eq.8)$$

iii. *Méthode d'estimation économétrique*

L'estimation de notre modèle à équations simultanées (2 équations) a été réalisée par la méthode des Doubles Moindres Carrés. Cette méthode est utilisée lorsqu'une ou plusieurs variables sont endogènes aux modèles. Il existe trois sources principales de l'endogénéité : les erreurs de mesures sur les variables explicatives, la double causalité : lorsque la variable explicative agit sur la variable dépendante et inversement, et le biais de variable omise lorsqu'une variable non incluse dans le modèle est corrélée avec au moins une des variables explicatives.

Dans le cadre de notre étude, on peut penser que, dans le modèle testé, la variable RSK est endogène parce que mesurée avec des erreurs (impossibilité d'intégrer la totalité des risques), ou parce qu'il peut y avoir une interrelation entre cette variable et la variable à expliquer CP. Le risque est une variable explicative dans l'équation du capital et le capital est une variable explicative dans l'équation du risque. La méthode des doubles moindres carrés permet de contrôler l'impact de ces sources d'endogénéité, ce qui améliore ainsi la qualité des estimateurs trouvés.

iv. *Spécification du modèle retenu*

Comme on l'a décrit dans les équations eq.7 et eq.8, notre modèle s'écrit comme suite :

$$\Delta CP_{i,t} = \alpha 0 + \alpha 1\, TAI_{i,t} + \alpha 2\, PROF_{i,t} + \alpha 3\, REGL_{i,t-1} + \alpha 4\, \Delta RSK_{i,t} + \alpha 5\, CP_{i,t-1} + \alpha 6\, LIQ_{i,t} + B_{i,t}$$

$$\Delta RSK_{i,t} = \beta 0 + \beta 1\, TAI_{i,t} + \beta 2\, PROV_{i,t} + \beta 3\, REGL_{i,t-1} + \beta 4\, \Delta CP_{i,t} + \beta 5\, RSK_{i,t-1} \qquad + D_{i,t}$$

– Variables expliquées :

$CP_{i,t}$ = capitaux propres / total actifs de la banque i à l'instant t

$$RSK_{i,t} = RWA / A_{i,t}$$

La variable expliquée est mesurée de deux manières : CP se mesure par les fonds propres totaux et CP1 se mesure aux fonds propres de base (Tier one).

RWA (Risk-Weighted Assets) est la mesure réglementaire du risque. Pour chaque actif, RWA est obtenu en multipliant l'encours par un coefficient de pondération (entre 0 et 100%) dont les modalités de calcul sont dictées par le régulateur. La variable RSK va donc prendre une valeur de 0 en absence totale de risque et une valeur de l'encours dans le cas d'une prise extrême de risque.

– Variables explicatives spécifiques à la banque :

Dans la première équation, la relation est d'abord négative entre la variable dépendante et les variables suivantes : la taille, la liquidité et le niveau de capitalisation de l'année précédente. Puis elle est positive entre la variable dépendante et le risque, la profitabilité, et la réglementation.

Le niveau des provisions désigné par (PROV) est intégré dans l'équation du risque pour prendre en considération le degré de prudence de la banque par rapport à son profil de risque. On s'attend à une relation négative entre cette variable et le risque.

Par ailleurs, suite aux raisonnements précédents, la capitalisation des banques et la prise de risque sont des choix interdépendants, ce qui suggère l'inclusion de ΔRSK dans l'équation du capital et de ΔCP dans l'équation du risque. Si l'on examine l'équation du risque, un coefficient positif et significatif de ΔCP semble indiquer que les banques du G-8 ont augmenté leur ratio de capital et leur ratio de risque de crédit en même temps, un résultat compatible avec les effets non désirés de l'imposition aux banques de l'application stricte des exigences de fonds propres. Toutefois un coefficient négatif et significatif semble indiquer qu'un niveau élevé de capital des banques inciterait celles-ci à

diminuer leur niveau de risque de crédit. Il serait intéressant aussi, en matière de prise de risque, de comparer les banques disposant d'une réserve de capital élevée et celle dont cette réserve est faible.

– Les variables explicatives de l'environnement réglementaire (REGL)

Les variables mesurant l'effet réglementaire du pays sont incluses dans le modèle pour tenir compte des facteurs qui ne sont pas reflétés par les variables spécifiques à la banque, tels que les différences nationales dans la prise et l'aversion au risque. En effet, il existe des différences entre les pays au niveau de l'intégration des directives de Bâle dans les lois bancaires nationales. Certains pays qui faisaient partie de l'accord de 1988 ont en effet complété les directives initiales avec des exigences supplémentaires ou de nouveaux ratios réglementaires qui étaient légèrement différents des seuils de capital (par exemple FDICIA aux Etats-Unis). Les variables réglementaires permettent d'introduire dans le modèle l'impact de la pression réglementaire sur les banques du pays du G-8.

Conformément à la plupart des études, la pression réglementaire (PRESS) est mesurée par une variable fictive qui prend la valeur de l'unité si le ratio d'adéquation des fonds propres réglementaires est au dessous de l'exigence minimale et zéro autrement.
Par ailleurs, d'autres variables peuvent être retenues pour tenir en compte l'impact de l'environnement réglementaire et sont les suivantes :

Restriction activités (REST): Indice élaboré par Barth, Caprio et Levine (2001). Il mesure la nature des permissions données aux banques par les autorités de réglementation en matière de la diversification des activités (assurance, marché, immobilier..). Plus l'indice est élevé plus les restrictions sont nombreuses.

Réglementation du capital (REGC): cette variable mesure la rigueur des normes de capital de chaque pays par rapport aux préconisations du comité de Bâle. L'indice constitué, à la suite d'un certain nombre de questions sur les modalités de calcul imposées aux banques, permet d'apprécier le niveau de la contrainte réglementaire sur le capital (une valeur élevé indique une grande rigueur), Barth, Caprio et Levine (2001).

Supervision (SUPER): cette variable exprime le degré d'implication des autorités dans la vérification et le contrôle des activités des banques. L'indice est calculé suite aux réponses de 16 questions. Un indice élevé montre que les autorités de surveillance ont le pouvoir de prendre des mesures concrètes pour prévenir et corriger les problèmes. Barth, Caprio et Levine (2001).

Monitoring privé (PRIVE): Cet indice permet de distinguer l'effet de la pression réglementaire de celui de la pression du marché. Un indice élevé montre que la discipline de marché joue un rôle important dans le cadre réglementaire. En effet, les notations et les audits

externes aident à discipliner les banques qui s'engagent dans des activités risquées. L'indice est calculé grâce aux réponses de 7 questions (Barth, Caprio et Levine (2001)).

b)   Critères de choix des données

Conformément à la plupart des études sur l'impact des exigences de Bâle, il est important de restreindre l'échantillon aux seules banques commerciales au cours de la période 2000-07. Toutes les variables utilisées dans l'étude ont été disponibles sur BANKSCOPE

L'échantillon servant de base à notre étude, est constitué de l'ensemble des banques commerciales des pays du G8, soit au total 255 banques. Toutefois, quelques modifications ont été effectuées sur l'échantillon pour pouvoir prendre la spécificité de quelques variables explicatives impliquées par l'introduction de la réglementation. En effet, les banques qui n'ont pas indiqué leur ratio Tier 1 ou leur niveau de provisionnement pour au moins 2 années consécutives ont été supprimées dans l'ensemble des données. Sans surprise, les institutions bancaires américaines et Japonaises constituent la grande majorité des banques de l'échantillon. (voir annexe 2)

c)   Description de la relation entre la capitalisation et le risque

Dans l'annexe 3, les tableaux A à C montrent la moyenne du ratio du capital total, du ratio Tier1 et du ratio du risque (non pondérés aux risques) de chaque pays entre 2000 et 2007.

Quelques remarques préliminaires peuvent être faites. Tout d'abord, de la première lecture des tableaux A et B, on remarque que le ratio de capital total des banques de chaque pays n'a pas de tendance déterminée pendant la période de l'étude, alors que le ratio Tier1 à une tendance à la hausse pendant les quatre premières années (entre 2000 et 2004), puis la tendance s'est renversée à la baisse entre 2005 et 2007. Puis, en analysant le tableau C, comme dans le cadre du ratio de capital, le niveau du risque ne connait pas une tendance particulière, il change d'une année à l'autre. L'année la plus risquée reste 2004, alors qu'on remarque une baisse à la fin de la période (les valeurs les plus faibles sont en 2006 et 2007). Les banques allemandes et françaises semblent être les moins risquées (respectivement 39 et 41 % en moyenne des années), avec une forte baisse en 2005. Les banques américaines sont considérées comme les plus risquées malgré les diminutions en 2006 et 2007 (84 % en moyenne des années) avec un pic de prise de risque en 2004.

Les autres pays, avec une moyenne de risque variant entre 43% et 60% (Canada, Italie, Japon et Royaume-Uni) sont considérés comme moyennement risqués. Globalement, le risque et le ratio de capital varient dans le même sens. L'année 2004 semble

partager la période de notre recherche en deux sous-périodes : avant 2004 on assiste à une augmentation conjointe du risque et du ratio de capital. Après 2004, les deux ratios baissent d'une manière significative. A première vue, la réglementation est efficace parce qu'il existerait une relation positive entre le risque et le niveau de capitalisation des banques des pays du G8. L'année 2004 correspond aussi à l'année de l'adoption de Bâle II (qui n'est applicable qu'en 2008) qui élargit l'accord de base en intégrant, notamment, le risque opérationnel dans le calcul du ratio réglementaire et en affinant le calcul des autres risques. Les banques, en se préparant à l'adoption de Bâle II, anticipent une plus forte corrélation entre leurs risques et le capital requis, et préfèrent ainsi réduire les risques. Cette réduction des risques (des actifs risqués) est accompagnée d'une réduction du niveau de capitalisation afin d'éviter une sous utilisation du capital.

Par ailleurs, les tableaux D et E de l'annexe 4, montrent les niveaux du capital pondéré aux risques (réglementaire) des banques des pays du G8 pendant la période de l'étude. Globalement, qu'il s'agisse du ratio de capital global ou du ratio Tier1, les banques disposent d'un ratio de capital réglementaire supérieur au minimum requis (8% et 4%). A priori, ces observations confirment la théorie du « capital réserve » selon laquelle les banques préfèrent soigner leur réputation et avoir un niveau de capitalisation supérieur au minimum obligatoire afin d'avoir une marge de sécurité face à la volatilité du capital et d'éviter, ainsi, les coûts du non respect de la réglementation. En terme du ratio Tier1, les banques canadiennes restent les plus solvables avec des niveaux élevés des fonds propres de base, tandis qu'en terme du ratio total de capital les banques américaines semblent être les plus solvables.

En résumé, malgré des évolutions proches, on n'est pas en mesure de dire que l'augmentation des ratios de capital réglementaires qui ont eues lieu pendant la période de l'étude ont été dues à la pression de la réglementation des fonds propres. Par ailleurs, l'augmentation du ratio de capital réglementaire par rapport au minimum requis n'est pas seulement connue que par les banques du G-8, mais aussi par les banques qui ne font pas partie de ce groupe de pays et même par les banques provenant des pays où les règles de l'adéquation des fonds propres n'ont pas été mises en place.

Ainsi, pour déterminer si l'accord de Bâle a causé des changements dans le ratio de capital (K / A) et le ratio du risque de crédit (RWA / A) des banques du G-8 et si ces changements sont liés, il est important de faire recours à une analyse économétrique plus complexe que les statistiques descriptives.

IV. LES RÉSULTATS

Afin de mettre en évidence l'impact de l'introduction de la réglementation prudentielle des fonds propres, à travers la mise en relation des modifications du risque avec les modifications du capital, nous allons, tout d'abord, étudier l'effet du niveau de capitalisation des banques sur cette relation, avant d'étudier les effets des restrictions réglementaires spécifiques à chaque pays.

a) Les résultats sur l'échantillon global

L'annexe 5A présente les estimations des coefficients des facteurs sur l'échantillon global. Concernant la première équation de notre système (ΔCP), les résultats sont plus significatifs quand le niveau de capitalisation est mesuré par CP1 (le ratio : capital Tier1 sur l'actif total) avec un R2 important de 0,87[5].

Les résultats sur l'échantillon global montrent que la relation est positive et statistiquement significative entre ΔRSK (variable explicative instrumentalisée) et ΔCP (Variable à expliquer). Trois facteurs expliquent ce résultat :

Tout d'abord, les actifs risqués sont plus demandeurs en matière du capital réglementaire. Toute augmentation de la part de ces actifs, augmenterait en même temps le niveau de capitalisation requis pour respecter le ratio réglementaire de capital. La relation positive entre le risque et le capital confirme les conclusions du modèle de Shrieves et Dahl, (1992). La réglementation bancaire, en matière de la pondération du capital aux risques bancaires, est ainsi efficace dans la mesure où elle pousse les banques à augmenter leur capitalisation quand leurs risques augmentent. Ces résultats sont conformes aussi avec ceux d'Aggarawal et Jacques (1998), qui ont étudié le ratio de capital des grandes banques américaines pendant les années quatre-vingt-dix, suite à l'imposition du ratio Cooke. Le signe positif des coefficients des variables réglementaires suivantes (REST, REGL, SUPER) confirme l'impact de la réglementation (on reviendra sur ce point en le détaillant dans l'analyse de l'environnement réglementaire).

Puis, cette relation confirme l'idée selon laquelle l'augmentation du risque dans les banques, pousse celles-ci à augmenter leur capital (soit par intégration des résultats positifs, soit en émettant de nouvelles actions) afin de garantir un bon équilibre de leur bilan et de préserver leur solvabilité. Ce comportement résulterait d'une aversion au risque accrue au niveau des banques du G8. En effet, les dirigeants des banques sont sensibles à l'augmentation du risque et estiment que les coûts d'une détresse financière qui

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[5] Sachant que R2 dans le cas de ΔCAP est très faible, nous n'analyserons que les résultats des régressions avec CAP1.

résulterait d'une sous-capitalisation sont plus importants que les bénéfices retirés de l'augmentation des actifs risqués dans le portefeuille.

Enfin, la période de notre étude correspond globalement à une période de croissance (voir l'évolution des actifs des banques à l'annexe 4). Ainsi, les banques vont préférer l'augmentation des fonds propres, notamment le capital de catégorie 1 (Ediz et al., 1998) afin de pouvoir bénéficier des opportunités du marché. La relation entre le ratio de capital et le risque est positive, dans la mesure où, en période de croissance, les banques augmentent aussi leur risque en octroyant plus de crédits. En effet, la baisse des taux d'intérêt pourrait motiver des emprunteurs risqués à demander des financements malgré une augmentation résiduelle de leurs coûts de financement par rapport aux emprunteurs de bonne qualité. Donc, la qualité des actifs bancaires dépend de la part des actifs risqués et de la capacité des banques à bien évaluer les risques qui y sont attachés. Par conséquent, afin d'éviter les difficultés liées à la réalisation des risques, l'augmentation des actifs risqués dans le portefeuille bancaire est compensée par une augmentation de capital (en période de crise les banques préféreraient la baisse du risque (contraction du crédit) plutôt que l'augmentation des capitaux propres qui est plus couteuse).

Concernant la deuxième équation où le risque est la variable à expliquer et le capital est la variable explicative (instrumentalisée), ΔCP influence positivement ΔRSK. La relation est statistiquement significative. Les banques semblent avoir augmenté leur capital et leur risque simultanément, un résultat compatible avec ceux de Koehn et Santomero (1980) qui prétendent qu'une réglementation de capital stricte incitera la banque à augmenter le risque de son portefeuille d'actifs afin de maximiser son utilité.

La relation entre la Taille et le niveau des capitaux propres (mesuré par CP1) est négative. Les grandes banques ont des niveaux de capitalisation faibles. Elles ont plus de facilités à attirer les dépôts et à contracter des emprunts (obligataires, interbancaires ou auprès de la banque centrale) parce qu'elles sont considérées comme moins risquées. L'existence de l'assurance dépôt facilite aussi l'accès aux dépôts qui sont préférés par rapport aux capitaux propres puisqu'ils sont moins assujettis aux coûts d'agence. Les grandes banques augmentent leur levier car la pression réglementaire est moins contraignante dans la mesure où le régulateur les protège « Too Big Too Fail ». Par ailleurs, la taille a un effet négatif sur le risque des banques. Les grandes banques sont les moins risquées grâce à leur capacité à diversifier leurs activités et à maîtriser leurs risques. En effet, les grandes banques disposent généralement des modèles internes de gestion des risques qui sont sophistiqués. Leur capacité à détecter les mauvais actifs est plus importante dans la

mesure où elles bénéficient d'une information abondante sur les emprunteurs ce qui réduit les coûts liés à l'asymétrie d'information. Cependant, il faut noter que la baisse du risque pourrait être la conséquence des arbitrages effectués par ces banques pour améliorer artificiellement leur ratio de capital réglementaire.

Contrairement aux résultats de Diamond et Rajan (2001), les résultats montrent une relation positive entre la liquidité et le niveau de capital. Le fait que cette relation n'est pas significative statistiquement montre l'ambiguïté de l'impact du niveau de liquidité des banques sur leur niveau de capitalisation. Les banques ne considèrent pas la détention des actifs liquides comme une alternative aux fonds propres, et supposent que bien que le ratio de liquidité soit supérieur à 1, rien ne garantit les changements de ce ratio à moyen ou à long terme. Elles préfèrent détenir des fonds propres qui donnent plus de garanties malgré le coût élevé.

Par ailleurs, les banques les plus rentables préfèrent distribuer les bénéfices pour satisfaire leurs actionnaires. Elles font recours à l'endettement pour financer leurs activités. Ainsi, l'exercice par les banques de l'intermédiation (le cœur de leur métier) confirme cette relation négative entre la profitabilité et le niveau de capitalisation. Quand les banques octroient des crédits à la clientèle, elles financent cette activité principalement par le recours à la collecte des dépôts. Toute augmentation de l'activité de la banque (d'où une augmentation de la profitabilité) est financée ainsi par l'endettement, ce qui baisse le ratio de capital.

Les banques des pays du G8 ajustent rapidement leur niveau de capitalisation et du risque, d'où la relation négative entre les variables CP -1, RSK -1 et respectivement $\Delta CP1$ et ΔRSK. Quand les banques jugent leur niveau de capitalisation comme élevé (faible), elles préfèrent le réduire (augmenter) rapidement pour éviter les inconvénients d'une surcapitalisation (sous-capitalisation). De même, les banques des pays du G8 sont sensibles au niveau du risque de portefeuille, en l'ajustant rapidement à des niveaux qu'elles jugent acceptables sans qu'ils soient très faibles.

En résumé, les résultats de la régression sur l'échantillon global permettent de vérifier l'impact de la réglementation sur la relation entre le capital et le risque. La réglementation pousse les banques à augmenter simultanément le risque et le ratio de capital. La relation est positive entre la variation du risque et la variation du capital, d'où l'efficacité de l'imposition d'un ratio minimum de capital. Cependant toute augmentation de capital entraîne aussi une augmentation du risque. Nos résultats confirment l'interrelation qui existerait entre le risque et le ratio de capital.

Il faut prendre ce résultat avec précaution car la pratique de l'innovation financière relativise cette relation entre le risque et le ratio de capital dans la mesure où la

pratique de l'arbitrage dit réglementaire permet aux banques de varier artificiellement leur niveau de risque. Benston et al. (2000). Le recours aux fonds propres complémentaires et sur complémentaires permet aux banques d'ajuster plus rapidement leur niveau de capitalisation. C'est pour cela que les signes de quelques relations changent selon la mesure du capital utilisée (CP ou CP1).

b) L'impact du niveau de la capitalisation sur la relation

Le comportement des banques en matière de la capitalisation et de la prise de risque devrait différer selon leur niveau de capitalisation. On partage ainsi notre échantillon, selon leur ratio réglementaire, en trois groupes de banques à savoir les banques faiblement capitalisées (entre 0 et 10 %), les banques bien capitalisées (entre 10 et 20 %) et les banques extraordinairement capitalisées (au-delà de 20%).

L'annexe 5B présente les résultats de l'estimation des coefficients selon le niveau de capitalisation des banques. Globalement, les résultats ne sont pas concordants avec les relations prédites par la théorie et confirmées par les études empiriques aux niveaux des banques américaines. Dans le cas des banques faiblement capitalisées, la relation est positive entre le risque et le niveau de capitalisation des banques des pays du G8. L'hypothèse selon laquelle les banques sous capitalisées ajustent rapidement leur ratio de capital pour respecter le ratio minimum en augmentant le capital tout en diminuant le risque, n'est pas vérifiée. Ce résultat confirme encore l'ambiguïté de la relation entre le risque et le capital bancaire. Ces banques, bien qu'elles soient sous capitalisées d'un point de vue réglementaire, préfèrent accompagner toute augmentation du capital d'une augmentation du risque. La recherche de la profitabilité et de l'efficacité constituent l'objectif principal au détriment de la solvabilité.

Par ailleurs, dans cette étude, l'impact de l'Accord de Bâle sur le capital bancaire et le risque de crédit est mesurée aussi à travers une variable fictive (PRESS) qui est égale à l'unité si le ratio d'adéquation des fonds propres tombe au-dessous du minimum requis et à zéro sinon. Les banques sous capitalisées détiennent un ratio réglementaire inférieur au minimum. Sachant que la réglementation exerce des pressions sur les banques par les normes des fonds propres, elle est efficace dans le cas où les banques sous capitalisées augmentent leur ratio de capital et diminuent leur risque de crédit plus que les banques suffisamment capitalisées. En regardant le comportement des institutions sous capitalisées, les banques sous capitalisées ne se sont pas comportées de manière différente par rapport aux banques suffisamment capitalisées. Ainsi, la variable de la pression réglementaire, inter reliée avec le niveau de capitalisation, est non significative dans les deux

équations du capital total et du capital Tier1. Cela signifie que la pression de la réglementation n'a pas d'impact sur le ratio de capital des banques sous capitalisées. Cette constatation est compatible avec les travaux d'Aggarwal et Jacques (1997) qui mettent l'accent sur la période 1990-96. Par contre, ces résultats contrastent avec ceux des travaux de Heid et al. (2004) sur les banques allemandes, qui ont trouvé une relation positive entre ΔCP et ΔRSK pour des banques bien capitalisées et une relation négative entre ces deux variables pour les banques sous capitalisées.

Quand les banques sont suffisamment capitalisées (ratio réglementaire entre 10 et 20 %), les résultats confirment la théorie et les évidences empiriques. La relation est positive entre le risque et le niveau de capitalisation. Ces banques qui disposent d'un ratio de capital supérieur au minimum réglementaire, préfèrent garder cette marge pour plusieurs raisons. Tout d'abord, le respect de la réglementation leur permet d'éviter les coûts liés aux sanctions de non conformité. Puis, avoir une marge de capital leur permet d'éponger les pertes improbables qu'elles peuvent subir et de profiter des opportunités de croissance non programmées sans pour autant voir leur ratio réglementaire descendre au dessous du minimum requis. Enfin, la détention d'un niveau de capital supérieur au minimum permet de séduire les actionnaires potentiels, d'attirer les dépôts et de faciliter ainsi le refinancement de la banque. Ces résultats sont compatibles avec ceux d'Illing et Paulin (2004) sur les banques canadiennes, et avec ceux d'Ediz et al. (1998) sur les banques anglaises. Il est donc évident que la réglementation, sous la forme d'un ratio minimum, permet d'améliorer la solvabilité de ses banques qui maintiennent leur ratio de capital à des niveaux jugés acceptables. Cela montre l'efficacité de la réglementation dans le cadre de ces banques.

Cependant, les résultats dans le cadre des banques extraordinairement capitalisées montrent des coefficients qui ne sont pas statistiquement significatifs. La pression réglementaire dans ce cas ne joue pas son rôle dans la mesure où elle n'influence pas la relation entre le risque et le ratio de capital. Ce résultat corrobore la théorie et confirme les résultats de Rime (2001), par exemple, sur les banques suisses. Par conséquent, pour ces banques, la relation pourrait être négative, dans le cas où elles adoptent un comportement opportuniste quand la banque centrale joue le rôle du prêteur de dernier ressort « Too Big Too Fail ». Bien que le nombre des banques qui adoptent ce comportement puisse être considéré comme faible, l'existence des mécanismes de contagion vers les autres banques (marché interbancaire) et par la suite vers l'économie réelle, pourrait causer une crise financière sévère si les Etats n'interviennent pas.

Les résultats de l'impact du niveau de capitalisation sur la relation entre le capital et le risque,

tels qu'ils sont présentés ci-dessus, sont à relativiser dans la mesure où le pouvoir explicatif de notre modèle a baissé quand on a divisé l'échantillon (sauf pour les banques bien capitalisées où R2 reste important). Cela pourrait être expliqué par la baisse du nombre des banques surtout dans le cas des banques extraordinairement capitalisé (seulement 13 banques ont un ratio de capital pondéré aux risques supérieur à 20 %).

c) *Analyse de l'impact des variables réglementaires*

La variable REST permet d'apprécier la liberté des banques dans l'exercice des activités variées (activités de marché, assurance, immobilier…). Les résultats montrent que dans le cas des banques du G8, il existe une relation positive entre cette variable et le ratio de capital que ce dernier soit mesuré par CP ou par CP1. Les autorités, afin de garantir la solvabilité, ont réussi à élever le niveau de capitalisation des banques par rapport aux risques en restreignant les activités de ces dernières. Plus ces restrictions sont fortes plus les ratios de capital sont élevés. La restriction des activités bancaires permettrait ainsi de palier aux faiblesses du ratio réglementaire, dans la mesure où ce dernier ne prend en considération que le risque de crédit et que sommairement le risque de marché. Quand la restriction est forte, les banques ne peuvent pas augmenter les risques (en s'aventurant dans d'autres activités) sans s'exposer à des sanctions réglementaires. L'arbitrage qui consisterait à faire recours plus aux activités de marché (par exemple) qu'aux activités de crédit car les premières sont moins demandeuses de capitaux propres, est limité avec l'existence des restrictions des activités.

Par ailleurs, dans l'équation du risque, la restriction des activités est négativement corrélée à la variation du risque. La réglementation à ce niveau est efficace dans la mesure où la restriction permet de réduire les risques bancaires. En effet, dans les pays où les restrictions des activités bancaires sont fortes (généralement les pays en voie de développement)[6], les banques devraient disposer d'un ratio de capital réglementaire (ratio de capital pondéré aux risques) élevé car la pression réglementaire (en termes de la restriction des activités) les pousse à augmenter le capital et baisser le risque simultanément.

Dans les pays du G8, globalement l'ouverture des activités bancaires permet de garantir la compétitivité internationale des banques. En France par exemple, les banques proposent des produits très diversifiés qui vont de la gestion du patrimoine et l'investissement en bourse à l'assurance ou le conseil immobilier (même les services de la téléphonie mobile sont proposés par certaines banques). Cette diversification des activités permet aux banques, surtout les plus grandes d'entre elles, de baisser leur niveau capitalisation (par rapport aux actifs) sans pour autant que leur ratio réglementaire qui est lui pondéré au risque de crédit descende au dessous du minimum requis. L'ouverture de l'activité bancaire (ou la diminution des restrictions) explique ainsi la diminution du ratio de capital bancaire (CP), surtout dans le cas des banques d'une taille importante. Malgré cette diminution, ces banques restent solvables d'un point de vue réglementaire.

A notre avis, l'ouverture des activités bancaires a baissé le pouvoir disciplinaire du ratio réglementaire et a permis aux banques de contourner la réglementation en prenant des risques excessifs sur des métiers qui ne sont pas les leurs à la base. L'augmentation des activités de marché dans les bilans bancaires par exemple rend les banques plus sensibles aux évolutions des marchés financiers.

Les deux autres variables qui constituent l'environnement réglementaire donnent des résultats plus importants quand la variable à expliquer est mesurée par CP1. En effet ces deux variables présentent les mêmes signes que ceux de la variable REST. C'est-à-dire, positive avec le ratio de capital et négative avec le risque. On peut dire que plus les exigences des autorités en matière du ratio minimum de capital sont fortes plus les banques augmentent leur capital et baissent leur risques. Par ailleurs, la variable SUPER exprime le degré d'implication des autorités dans la vérification et le contrôle des activités des banques. L'existence de ce contrôle permet de discipliner les banques en les obligeant à se préoccuper plus de leur solvabilité.

Globalement, un environnement réglementaire (REST, SUPER et REGC) strict pousse les banques à augmenter leur ratio de capital et à réduire leurs risques. Les banques sont ainsi plus solvables ce qui garantie la stabilité du système bancaire et de l'économie entière. A un niveau macroéconomique, il est donc préférable que le secteur bancaire, qui est considéré comme un secteur clé, soit réglementé d'une manière à ce que toute incitation à des prises de risques démesurées, soit contrôlée par les autorités en imposant des niveaux de capital plus élevés et en sanctionnant les banques qui ne respectent pas les normes. Cependant, une réglementation contraignante pourrait empêcher les banques de jouer leur rôle dans le financement de l'activité ce qui aurait des conséquences néfastes sur le déroulement des affaires et sur le développement des entreprises surtout les PME. Les épisodes de réglementation-déréglementation qu'ont connu les secteurs bancaires des pays développés depuis la crise de 1929, montrent la difficulté des autorités à faire l'arbitrage entre l'efficacité des banques et leur solvabilité.

En observant l'annexe 5A, les résultats sont plus intéressants quand la variable à expliquer est

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[6] Voir la base constituée par Barth et al. (annexe 1)

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mesurée par CP. En effet la relation entre la variable PRIVE et la variation du capital est positive. On peut dire que, toutes choses égales par ailleurs, les banques qui ont connu la pression du marché ont augmenté leur ratio de capital plus que les banques qui n'ont pas l'expérience de cette forme de pression. Les banques prennent en considération les notations et les audits externes dans l'ajustement de leur ratio de capital. Par conséquent, la pression du marché a un pouvoir disciplinaire sur les banques. Ces dernières fixent leur ratio de capital et leur niveau de risque en fonction de la notation souhaitée.

Dans l'équation du risque, la relation entre la pression du marché et la variation du risque est négative. Comme le risque est pris en considération dans les modèles des agences de rating, l'existence des notations externes pousse les banques à réduire leur prise de risque pour améliorer leur évaluation. Globalement la pression de marché joue un rôle positif dans la discipline des banques.

V. Conclusion

Cette étude empirique présente le comportement des banques des pays du G-8 en matière du niveau des fonds propres et de la prise du risque, entre 2000 et 2007, en utilisant une version modifiée du modèle développé par Shrieves et Dahl (1992). Les travaux de recherche, à la fois théoriques et empiriques, indiquent que les banques peuvent répondre à une augmentation des exigences de fonds propres par une augmentation correspondante du risque de crédit de leur portefeuille. Une grande partie des études précédentes portent sur les banques d'un pays particulier. La plupart sont sur les banques américaines, allemandes, suisses ou espagnoles.

L'analyse de l'impact de la réglementation prudentielle passe par l'analyse de la relation entre la prise du risque et le ratio de capital. Le fait que les deux variables soient inter-reliées nous a poussés à utiliser la méthode statistique des doubles moindres carrés pour étudier cette relation.

Les résultats de notre étude sur les pays du G-8, présentés ci-dessus montrent que l'impact des normes de la réglementation sur le niveau du capital ou sur la prise du risque n'a pas été identique pour toutes les banques.

La relation est positive pour les banques sous-capitalisées et les banques moyennement capitalisées. Ces banques préfèrent se conformer à la réglementation prudentielle afin d'éviter les coûts qui peuvent en découler. A ce niveau la réglementation du capital est efficace dans la mesure où elle a poussé ces banques à augmenter leur capital quand elles augmentent leur risque.

Dans le cas des banques extraordinairement capitalisées, la relation n'est pas significative. La pression réglementaire n'a pas d'effet sur le comportement des banques dont le ratio réglementaire est supérieur à 20%.

Par ailleurs, parmi les apports importants de cette étude, est l'introduction sur le modèle des variables mesurant l'impact de l'environnement réglementaire (autres que le ratio minimum) sur le niveau du capital et celui du risque. Ainsi, c'est la pression réglementaire accompagnée de la discipline de marché qui ont été efficaces dans la sensibilisation des banques à l'importance de la détention d'une réserve de capital au-delà du minimum exigé dans l'ensemble du G-8. Plus l'environnement réglementaire est strict plus le ratio de capital des banques est élevé. La restriction des activités, la surveillance et le contrôle des banques permettent de discipliner celles-ci et de limiter leurs incitations aux arbitrages réglementaires. Ces compléments réglementaires permettent d'appuyer le pouvoir disciplinaire du ratio réglementaire.

Par ailleurs, deux mises en garde sont formulées par rapports aux résultats obtenus. Premièrement, ils devraient être interprétés avec prudence étant donné que la mise en œuvre des normes de l'Accord de Bâle peut coïncider avec des normes imposées au niveau national (les normes de FDICIA aux Etats Unis par exemple). Ainsi, il est difficile d'évaluer l'impact des normes de Bâle car la variable pression réglementaire utilisée dans cette étude devrait être interprétée, comme reflétant l'effet la réglementation du capital au sens large (Bâle et normes nationales en matière de capital).

Deuxièmement, comme on l'a mentionné plus haut, les banques peuvent être tentées de faire un arbitrage entre le capital économique et capital réglementaire, en renforçant leur ratio de capital d'une manière cosmétique qui ne correspond pas à la vraie prise de risque engagée par ces banques ou par des arrangements afin d'exploiter des lacunes dans la mesure du risque de crédit.

L'étendu de la pratique de l'innovation financière montre qu'un ensemble de techniques ont été utilisées par les banques pendant les années 2000-2007 (Bâle Commission, 2004). Il faut donc être conscient que les changements observés dans le capital et dans le risque ne reflètent que partiellement la réalité des changements réels dans le capital et le risque des banques des pays du G-8.

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Annexe 1 : Indices de la rigueur de la réglementation

Pour consulter le détail du questionnaire utilisé pour le calcul des indices de la rigueur bancaire, voir "Guide to Database on Bank Regulation and Supervision : Barth, Caprio et Levine (2001)"consultable sur le site de la banque mondiale à l'adresse suivante :

http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/0,contentMDK:20345037~pagePK:64214825~piPK:64214943~theSitePK:469382,00.html

Le questionnaire de Barth, Caprio et Levine (2001) comprend onze rubriques :

1. Les barrières à l'entrée au secteur bancaire –
2. Les structures de propriété
3. Le capital
4. Les restrictions sur les activités
5. Les exigences en matière des audits externes
6. Organisation et contrôle interne
7. Les exigences en matière de liquidité
8. Les structures de protection des déposants
9. Les exigences en matière de provisionnement
10. Les normes comptables
11. Les problèmes de discipline des institutions financières

Annexe 2 : l'échantillon

Echantillon des banques du G8

Pays	Nombre de banques	%
CANADA	11	4
France	16	6
GB	13	5
Allemagne	13	5
ITALY	14	5
JAPAN	61	24
RUSSIE	25	10
USA	102	40
Total	255	100

Annexe 3 : statistique descriptive du ratio de capital et du risque avec l'intégration de la réglementation

Tableau A : capital total/actif total (K/A)

Pays	2000	2001	2002	2003	2004	2005	2006	2007	Moyenne
Canada	0,048	0,049	0,039	0,071	0,077	0,049	0,032	0,034	0,050
France	0,056	0,046	0,038	0,057	0,048	0,036	0,046	0,051	0,047
Allemagne	0,07	0,071	0,075	0,079	0,077	0,075	0,073	0,057	0,072
Russie	0,038	0,042	0,041	0,039	0,039	0,045	0,043	0.038	0,041
Italie	0,052	0,054	0,082	0,055	0,051	0,068	0,061	0,057	0,060
Japon	0,059	0,05	0,05	0,054	0,057	0,054	0,052	0,055	0,054
Royaume Uni	0,057	0,065	0,054	0,049	0,048	0,117	0,059	0,094	0,068
Etats Unis	0,22	0,107	0,068	0,058	0,146	0,154	0,071	0,056	0,110
Moyenne	0,075	0,061	0,056	0,058	0,068	0,075	0,055	0,058	0,063

Tableau B : capital Tier 1/actif total (K /A)

Pays	2000	2001	2002	2003	2004	2005	2006	2007	Moyenne
Canada	0,036	0,039	0,067	0,0219	0,0298	0,084	0,082	0,067	0,053
France	0,042	0,034	0,055	0,051	0,073	0,038	0,06	0,039	0,049
Allemagne	0,028	0,009	0,018	0,029	0,044	-0,001	0,033	0,033	0,024
Russie	0,06	0,038	0,052	0,069	0,082	0,029	0,063	0,052	0,056
Italie	0,045	0,067	0,09	0,038	0,042	0,051	0,052	0,036	0,053
Japon	0,053	0,04	0,04	0,046	0,055	0,044	0,044	0,045	0,046
Royaume Uni	0,045	0,038	0,042	0,028	0,073	0,123	0,074	0,061	0,061
Etats Unis	0,097	0,038	0,028	0,034	0,14	0,139	0,058	0,047	0,073
Total	0,051	0,038	0,049	0,040	0,067	0,063	0,058	0,048	0,052

Tableau C : Ratio du risque de crédit (RWA/ A)

Pays	2000	2001	2002	2003	2004	2005	2006	2007	Moyenne
Canada	0,372	0,389	0,35	0,76	0,809	0,462	0,323	0,321	0,473
France	0,518	0,358	0,34	0,538	0,447	0,321	0,397	0,41	0,416
Allemagne	0,498	0,338	0,32	0,518	0,427	0,301	0,377	0,39	0,396
Russie	0,538	0,378	0,36	0,558	0,467	0,341	0,417	0,43	0,436
Italie	0,532	0,597	0,857	0,502	0,508	0,601	0,512	0,528	0,580
Japon	0,586	0,542	0,501	0,529	0,57	0,523	0,501	0,49	0,530
Royaume Uni	0,498	0,499	0,531	0,494	0,447	1,027	0,522	0,625	0,580
Etats Unis	1,558	0,723	0,504	0,594	1,351	0,893	0,528	0,573	0,841
Total	0,638	0,478	0,470	0,562	0,628	0,559	0,447	0,471	0,532

Tableau D : Ratio réglementaire total (K/RWA)

Pays	2000	2001	2002	2003	2004	2005	2006	2007	Moyenne
Canada	0,133	0,125	0,111	0,098	0,098	0,107	0,1	0,104	0,110
France	0,107	0,127	0,113	0,107	0,11	0,114	0,115	0,125	0,115
Allemagne	0,087	0,107	0,093	0,087	0,09	0,094	0,095	0,105	0,095
Russie	0,127	0,147	0,133	0,127	0,13	0,134	0,135	0,145	0,135
Italie	0,097	0,09	0,096	0,109	0,1	0,114	0,118	0,106	0,104
Japon	0,1	0,091	0,099	0,102	0,102	0,103	0,103	0,111	0,101
Royaume Uni	0,114	0,131	0,1	0,1	0,11	0,119	0,111	0,155	0,118
Etats Unis	0,174	0,162	0,124	0,096	0,192	0,187	0,131	0,096	0,145
Total	0,117	0,123	0,109	0,103	0,117	0,122	0,114	0,118	0,115

Tableau E : Ratio réglementaire Tier 1 (K/RWA)

Pays	2000	2001	2002	2003	2004	2005	2006	2007	Moyenne
Canada	0,094	0,099	0,193	0,281	0,371	0,203	0,251	0,209	0,213
France	0,084	0,095	0,159	0,098	0,151	0,117	0,154	0,096	0,119
Allemagne	0,064	0,075	0,139	0,078	0,131	0,097	0,134	0,076	0,099
Russie	0,104	0,115	0,179	0,118	0,171	0,137	0,174	0,116	0,139
Italie	0,084	0,11	0,099	0,077	0,084	0,085	0,101	0,068	0,089
Japon	0,089	0,074	0,08	0,084	0,092	0,083	0,088	0,089	0,085
Royaume Uni	0,09	0,076	0,08	0,056	0,151	0,119	0,141	0,093	0,101
Etats Unis	0,06	0,054	0,057	0,057	0,096	0,171	0,116	0,079	0,086
Total	0,084	0,087	0,123	0,106	0,156	0,127	0,145	0,103	0,116

Tableau F : Evolution du total des actifs

Pays	2000	2001	2002	2003	2004	2005	2006	2007	Moyenne
Canada	57923	88421	34123	25677	372206	4518	745051	348347	209533
France	6156	9572	13174	17693	43544	24475	30868	39228	23089
Allemagne	8156	11572	15174	19693	45544	26475	32868	41228	25089
Russie	7156	10572	14174	18693	44544	25475	31868	40228	24089
Italie	3459	3194	6897	12076	17368	24372	37960	101413	25842
Japon	4542	17363	160539	4185	4212	16719	169465	5014	47755
Royaume Uni	604556	211031	1735	4020	43544	12104	5222	2998	110651
Etats Unis	3730	73209	4726	80986	6762	87934	9857	106780	46748
Moyenne	86960	53117	31318	22878	72215	27759	132895	85655	64100

Annexe 4 : évolution des ratios de capital et de risque

Evolution des ratios de capitalisation des pays de G (moyenne)

RWA / A

Total actifs (en millions euros)
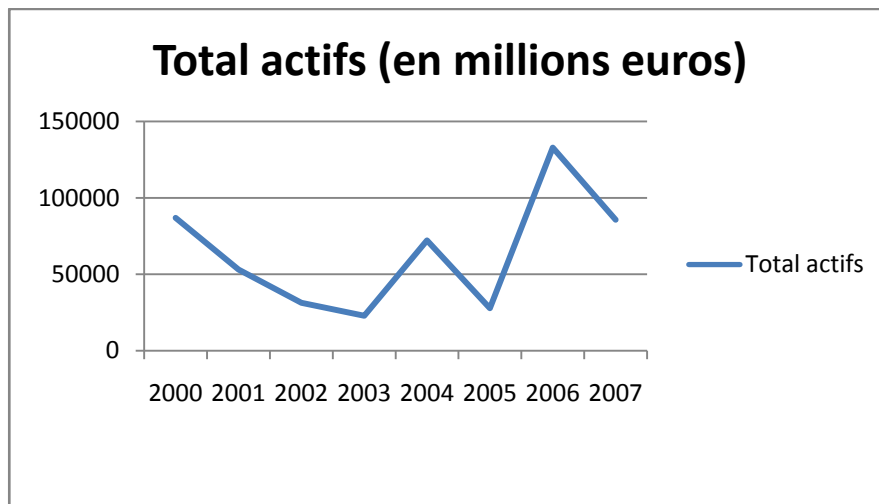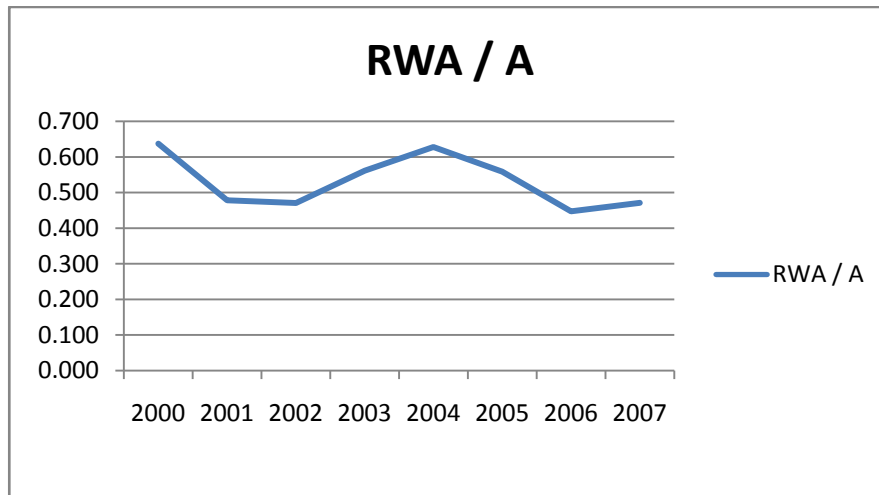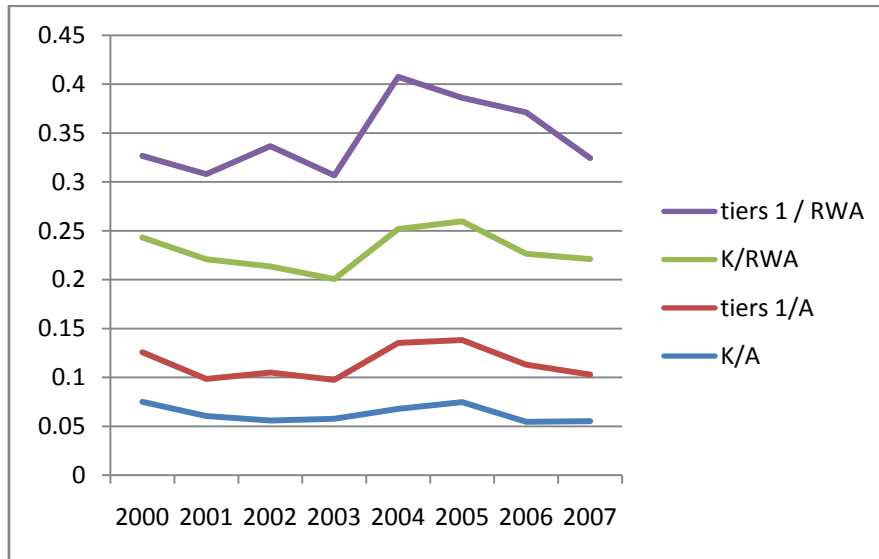
Annexe 5 A : Résultats des estimations sur l'échantillon global

Le tableau présente les coefficients des régressions ainsi que les t de student, reporté entre parenthèses. L'échantillon est constitué des banques commerciales des pays du G8, soit 255 banques. Deux variables expliquées : *RSK* correspond au niveau du risque mesuré par RWA (la méthode réglementaire) et CP qui est le niveau des fonds propres bancaires mesurée à partir de deux ratios: Total des fonds propres / Actif total et le ratio capital Tier 1 / total actif. *PROF* évalue la profitabilité (return on assets). LIQ évalue la liquidité de la banque mesurée par le ratio actifs liquides / dépôts de la clientèle et ressources interbancaires. TAI représente la taille de la banque, le logarithme naturel des actifs est retenu ici comme mesure. Les variables ΔRSK et ΔCP sont introduites pour déterminer l'interrelation entre le risque et le niveau de capital. Les valeurs des variables réglementaires (PRES, REST, REGC, SUPER, PRIVE) sont retirées de la base de Barth et al. (2001). Le modèle est estimé par la méthode des doubles moindres carrés.

Variables		*CP = Capital total / total actif*		*CP1 = Tier1 / total actif*	
		ΔCP	ΔRSK	ΔCP1	ΔRSK
Variables	ΔRSK	4.63196* (2.287977)		1.118892*** (0.06628)	
	ΔCP		0.4187651*** (0.0169234)		0.5635332*** (0.013562)
	RSK-1		0.1107062 (0.1085708)		-0.2918848** (0.0851214)
	CP -1	-6.183723 (5.080792)		-0.3393271* (0.1554108)	
	TAI	0.1899498 (0.1170027)	-0.0103887 (0.0069856)	0.0248313* (0.0134184)	-0.030751*** (0.005506)
	LIQ	0.008906 (0.0063796)		0.0002837 (0.0002584)	
	PROF	-0.347162 (0.1889616)		-0.0069266 (0.0077847)	
	PROV		-1.725419 (1.174055)		0.2929307 (0.9379408)
	PRESS	-0.2993422 (0.2011)	0.0947488*** (0.0244483)	-0.0759786* (0.0320063)	0.0616489** (0.0194531)
	REST	0.0221175 (0.1202308)	0.0013781 (0.0259135)	0.0356833 (0.0218265)	-0.0015693 (0.020706)
	REGC	-0.0711908 (0.1759382)	0.0025799 (0.0154976)	0.0401188* (0.01875)	-0.0169512 (0.012402)
	SUPER	0.0537573 (0.0810995)	0.0061077 (0.0115998)	0.0242229 (0.0196885)	-0.0106524 (0.009263)
	PRIVE	0.0982498 (0.4760071)	-0.0533746 (0.040201)	-0.1185425 (0.074899)	0.0180636 (0.032189)
	Const	-3.193946 2.988735	0.3481767 (0.2224235)	0.1376924 (0.1992237)	0.3581661* (0.1772134)
R2		-	0.32	0.87	0.56
Banques		255	255	255	255

*La statistique t entre parenthèses ; * significatif à 10% ; ** significatif à 5 % ; *** significatif à 1 %*

Annexe 5 B : Résultats des estimations selon capitalisation

Le tableau présente les coefficients des régressions ainsi que les t de student, reporté entre parenthèses. L'échantillon est constitué des banques commerciales des pays du G8, soit 255 banques. Deux variables expliquées : *RSK* correspond au niveau du risque mesuré par RWA (la méthode réglementaire) et CP qui est le niveau des fonds propres bancaires mesurée à partir de deux ratios : Total des fonds propres / Actif total et le ratio capital Tier1 / total actif. *PROF* évalue la profitabilité (return on assets). LIQ évalue la liquidité de la banque (ratio actifs liquides / dépôts de la clientèle et ressources interbancaires). TAI représente la taille de la banque (le logarithme naturel des actifs). Les variables ΔRSK et ΔCP sont introduites pour déterminer l'interrelation entre le risque et le niveau de capital. Les valeurs des variables réglementaires (PRES, REST, REGC, SUPER, PRIVE) sont retirées de la base de Barth et al. (2001). Le modèle est estimé par la méthode des doubles moindres carrés.

Capitalisation	CP = Ratio de capital total / total actif			CP1 = Ratio de capital Tier1 / total actif		
	Faible	Bonne	Extraordi.	Faible	Bonne	Extraordi.
ΔRSK	1.509623**	1.737279*	-10.4160	1.888647***	1.05084***	3.049697
	(0.450381)	(0.71715)	(3.0291)	(0.430713)	(0.03204)	(2.0661)
CP -1	-3.908672*	-3.58829*	-18.13***	-0.3875214	-0.343573*	2.067676
	(1.538379)	(1.91912)	(3.6684)	(0.597348)	(0.14342)	(2.34192)
TAI	0.0302409	0.0763329	0.583859	0.0570557	0.0204101	-0.091721
	(0.030890)	(0.04720)	(0.61452)	(0.0645787)	(0.01457)	(0.12329)
LIQ	-0.0015765	0.002452	0.0317215	-0.0016875	0.0000403	-0.0006782
	(0.0011915)	(0.00174)	(0.01413)	(0.0025814)	(0.00009)	(0.00210)
PROF	0.0156519	0.0344617	0.2248287	-0.0345243	0.0022451	-0.0435254
	(0.044434)	(0.04139)	(0.11077)	(0.0266811)	(0.00413)	(0.053045)
PRESS	0.424005***	0.0166117	-7.77902*	-0.2976812	-0.030380*	-0.6944349
	(0.098171)	(0.06379)	(4.44286)	(0.1187081)	(0.01775)	(1.16786)
REST	-0.1945949	0.280038	-3.73600	-0.1230134	0.040311	0.2046519
	(0.1996296)	(0.29565)	(2.5455)	(0.5677793)	(0.03584)	(0.699889)
REGC	-0.1330063	-0.094146	1.073056	-0.0329256	0.018213	-0.013954
	(0.1479763)	(0.15957)	1.565083	(0.4355063)	(0.02088)	(0.32234)
SUPER	-0.013333	0.101994	-3.151952	0.0238074	0.039883	-0.156094
	(0.025479)	(0.11377)	(5.77585)	(0.0659985)	(0.02516)	(1.25076)
PRIVE	0.1288246	-0.409952	57.62492	-0.0708529	-0.17370	-0.830704
	(0.142564)	(0.46052)	36.36791	(0.413474)	(0.09623)	7.502276
Const	0.0393117	0.620980		0.7109867	0.45136	
	(0.6836)	(1.75323)		(1.662507)	(0.29480)	
R2	-	0.58	0.15	0.21	0.94	-
Banques	102	138	15	102	138	15

*La statistique t entre parenthèses ; * significatif à 10% ; ** significatif à 5 % ; *** significatif à 1 %*

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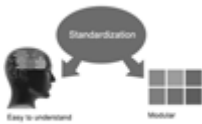
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"
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(f) Results should be presented concisely, by well-designed tables and/or figures; the same data may not be used in both; suitable statistical data should be given. All data must be obtained with attention to numerical detail in the planning stage. As reproduced design has been recognized to be important to experiments for a considerable time, the Editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned un-refereed;

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- One should avoid outdated words.

Keywords are the key that opens a door to research work sources. Keyword searching is an art in which researcher's skills are bound to improve with experience and time.

Numerical Methods: Numerical methods used should be clear and, where appropriate, supported by references.

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References follow the Harvard scheme of referencing. References in the text should cite the authors' names followed by the time of their publication, unless there are three or more authors when simply the first author's name is quoted followed by et al. unpublished work has to only be cited where necessary, and only in the text. Copies of references in press in other journals have to be supplied with submitted typescripts. It is necessary that all citations and references be carefully checked before submission, as mistakes or omissions will cause delays.

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