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CONSEQUENCES OF BASEL ACCORDS ON BANK RISK-TAKING AND PROFITABILITY: EVIDENCE FROM ASIAN COUNTRIES

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ABSTRACT

The main purpose of this paper is to examine the impact of Basel Accord II on bank profitability and risk-taking in three developing Asian countries; Philippines, Thailand and India over the period 2006–2015. Using panel data, the study methodology is to employ both One-way Analysis of Variance (ANOVA) and multiple regression techniques to explore these relationships. Our empirical results show that Basel II, represented by its three pillars; capital regulatory requirement, official supervisory power and private monitoring and market discipline indices all have a significant negative impact on profitability, which may imply that binding regulations have adverse impacts. Furthermore, capital regulatory requirement and private monitoring inversely impact risk-taking while official supervisory power shows a significantly positive effect on bank risk-taking levels. Concluding that bank regulators must insure that the banks in the three countries strengthen their corporate governance and private monitoring to reduce corruption and enhance performance. Same results are obtained when conducting additional analyses to ensure the validity of the results.

Contribution/ Originality: This study contributes in the existing literature by empirically examining the impact of Basel II pillars on bank profitability and risk-taking in lower-middle income Asian countries. The focus was on banks in three countries pooled over 10 years. Employing multivariate regression models aided in directly comparing results with previous studies.

1. INTRODUCTION

Banks are perceived to be a major financial intermediary worldwide. They represent the largest and oldest financial institutions today; channelling depositors' savings into investments (Myerson, 2014). The Basel Committee on Banking Supervision established by the Bank for International Settlements (BIS) was formed to harmonize banking regulation, promoting supervision and financial banking stability. As of July 1988, the Basel Committee consisting of eleven members agreed on the International Convergence of Capital Measurements and Capital Standards, known as "Basel I." (Balin, 2008; Ramessur and Polodoo, 2011; Yousuf and Felföldi, 2018).

Basel II was later initiated due to the increasing complexity of the financial markets and the criticisms on Basel Accord I (Chortareas *et al.*, 2012). The main objective of this framework, is to align regulatory capital requirements with economic risk and bank best practices while strengthening the international banking system stability through

superior risk management (Heid, 2007). Kandrac and Schlusche (2017) and Thangavelu and Findlay (2010) argue that the absence of strong supervisory control and empowered monitoring are the reasons behind bank financial distress that led to the worldwide banking crisis. The main contribution of this study is to empirically demonstrate and explore the significance of Basel II pillars across three emerging countries; Philippines, Thailand and India sharing common economic characteristics. To our knowledge, this is the first study to examine the direct impact of implementing capital requirements, strong supervision and high disclosure on bank's profitability and risk-taking in developing Asian countries, through providing empirical evidence. Also depending on bank level of compliance, the importance of such regulations will be highlighted. Consequently, the research question for this research paper will be: "What is the effect of Basel Accord's regulation on risk-taking and profitability in developing Asian countries?" An explanatory causal research is applied in order to resolve the research question along with the hypotheses of the study.

The remainder of the paper is organized as follows; section 2 reviews the relevant theoretical and empirical literature leading to the development of the literature. Section 3 describes the sample and the adopted methodology. Section 4 displays the findings and empirical results of the paper. Finally, section 5 concludes the study and discusses the implications.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1. Basel Accords: An Overview

The Basel Accord (Basel 1) is one of the major breakthroughs in banking regulation. In 1988, Basel Accord was set to determine a minimum capital requirement set by the Basel Committee for all banks. This was to certify bank soundness and creditworthiness, where capital as defined by the Committee acted as a cushion against risky assets (Hussain and Hassan, 2005; Bougatef and Mgadmi, 2016). The Accord has been instrumental in endorsing the international convergence of capital standards and its constant improvements. Bank regulations control the level of bank capital where capital serves two main functions: minimizing default and incurring losses and also curtailing propensity to take risk (Hull, 2012; Bougatef and Mgadmi, 2016).

The Basel I Accord is classified into four "pillars." The first pillar; 'The Constituents of Capital', identifies the types of capital that are considered as bank's reserves and determine bank holdings of each type. The second pillar is 'Risk Weighting'; where the risk-adjusted assets are the aggregated assets on and off-balance sheet. All banks' on-balance sheet assets are structured into five categories based on their risk-level. The third pillar is a Target Standard Ratio; stating that the international banks from the G10 countries are required to have 8% as a ratio of a bank's risk-weighted assets, that must be covered by the capital reserves met by tier 1 capital. This ratio, set as a global standard, shields deposit insurance-backed international banks against credit risk. The fourth pillar; Transitional and Implementing Agreements; central banks in each country are required to adopt strong supervision to ensure compliance of the accord (Balin, 2008; Chidoko and Mashavira, 2014; Fernando and Nimal, 2014; Manlagnit, 2015; Syadullah, 2018; Yamaguchi, 2018).

Basel I showed positive results on ensuring financial stability in the banking industry, however, the framework was criticized for having major limitations. The accord's framework assumed that Banks will consistently hold assets with relatively low risk. Due to the stipulated minimum capital (8%) required to support all loans regardless of their risk level, banks could undertake more risky assets while maintaining the same capital reserve. Therefore, the Basel 1 pillars failed to limit to the amount of risk exposure (Hussain and Hassan, 2005). With the increasing complexity of the financial markets and the criticisms on Basel I, the Basel Committee proposed a new Basel Accord; Basel II, which was enforced in 2006 (Chortareas *et al.*, 2012). The main objective of this framework is to strengthen the international banking system stability through superior risk management and aligning regulatory capital requirements with economic risk and bank best practices (Heid, 2007).

The first pillar in Basel II is to align the bank capital with the asset credit risk while considering the market and operational risks (Chortareas *et al.*, 2012; Tanda, 2015). Where the framework develops measures against the risk of failure due to fluctuations in asset prices (market risk), and aims to forecast the capital needed to mitigate failures in internal processes, the decision making of individuals, equipment, and other external events (operational risk) (Balin, 2008).

The second pillar imposes an improved supervisory reviewing role. It states that banks that are well-managed should perform an in-depth assessment of their individual risky assets to determine if they maintain sufficient capital (Heid, 2007; Balin, 2008; Chortareas *et al.*, 2012). Bank Supervisory function lacks the necessary independence and sound governance to carry out their key function (Barth *et al.*, 2007). Therefore, the central banks in all countries have a major role in managing the financial system of banks and are exclusively in charge of bank supervision (Gaganis and Pasiouras, 2013). The third pillar focuses on increasing banks provision of information disclosure, and through this transparency the Accord aspires for greater market discipline (Balin, 2008). Market discipline complements the first two pillars and proves to be beneficial as it reveals further information that is critical for supervisors (Decamps *et al.*, 2004).

The global financial crisis of 2008-2009 was a shock to financial institutions worldwide causing banks to become highly leveraged and incur colossal losses, indicating that Basel II framework was not enough to protect the financial systems from the damages of the crisis. Basel III has been proposed in 2010 and implemented accordingly in 2012. This accord enriches the three original pillars of Basel II; however, its main difference is the focus on bank-specific and systematic risk (Parcon-Santos and Bernabe, 2012; Manlagnit, 2015). Banks are required to hold a higher volume of better quality capital through retaining more of the profit as capital and to improve liquidity management. Moreover, a Capital Conservation Buffer (CCB) has been included as one of the new amendments which aids in preserving bank capital. The emphasis on maintaining a stronger bank capital, assuaging regulations and supervision and optimally managing risks, is to better prepare banks for facing any economic downturns and reduce probability of future crises (Prunea and Cosma, 2010; Hsing, 2014; Yuliansyah, 2015; Blundell-Wignall *et al.*, 2018).

2.2. Effect of Basel Accord II on Profitability and Risk-Taking

The following subsections reviews the studies that examine the consequences of the three pillars of Basel II on Banks' profitability and risk-taking, with empirical evidence being limited.

2.2.1. Capital Regulation (Pillar I)

The rational view of the impact of bank regulation is that higher capital requirements will positively influence banks and enhance their financial stability (Alam, 2012). However, several studies have conflicting results regarding the impact of capital on bank risk and profitability. Scholars argue that whether banks aim to maximize their value or utility impacts the effectiveness of capital regulations. Banks seeking to maximize their utility are inclined to accept risky assets while maintaining a low level of capital, hence increasing their leverage. Inferring that there is a relationship between the level of bank capital and the weight of risky assets and that it depends on risk preferences. Some studies stated that applying capital regulations to value maximizing banks show diverse results as it may reduce or increase risk; researchers therefore concluded that it does not prevent banks from being risk-takers (Blum, 1999; Hussain and Hassan, 2005).

The impact of strict capital requirements on the riskiness of bank asset portfolio has been speculated by many researchers. Banks complying with the Basel Accord can either increase their capital level or decrease the volume of assets or decrease the amount of risky assets, in order to raise their capital adequacy ratio. Imprudently, banks actually take higher risk to negate the decrease in their utility from increasing their capital (Hussain and Hassan, 2005; Ramessur and Polodoo, 2011). It has been argued that while strict capital requirements result in less non-

performing loans, it does not significantly improve banking industry's performance (Alam, 2012). Using a sample of Syrian banks, Yousuf and Felföldi (2018) found that banks' capital adequacy ratio is negatively associated with profitability, while reduces non-performing loans. This finding is consistent with Rahman *et al.* (2015) using a sample of Bangladesh banks and examine the effect of banks' capital regulation on risk-taking. Using generalized methods of moment (GMM), their findings reveal that increasing capital requirements significantly reduce risk-taking.

With conflicting views, Ramessur and Polodoo (2011) and Blum (1999) posit that there is a positive relationship between banks' capital and risk; that an increase in capital is projected to increase risk by promoting banks to increase their loans. Consequently, in a cyclical form, an increase in risk leads to higher profitability which in turn promotes banks to increase their capital ratios. Another strand of literature concentrates on the relationship between capital and profitability a cross-country study of 12 banks from Europe, Australia and North America, (1989) found that banks holding higher levels of capital are more profitable than banks with less capital. Similarly, Vong and Chan (2009) found a positive relationship between capital and bank profit while covering a 15-year sample period (Ozili, 2015).

Prior studies focusing on the relationship between capital and risk have diverse results. Theoretically, the higher the capital requirement held by a bank the greater the predicted losses the investors will face in the case of bank default, leading to a decrease in incentives for risk-taking behaviour; this would question the expected role of capital requirements in mitigating moral hazard problems (Agoraki *et al.*, 2011). While several studies explore the relationship between capital and risk, the relevant literature on the relationship between bank capital and profitability is scant. A comprehensive and recent study by Lee and Hsieh (2013) explored the impact of bank capital on profitability and risk in Asian Banks using Generalized Method of Moments technique for dynamic panels 42 Asian countries over the period 1994 to 2008. Clarifying banks by specialization, geographic location and different income levels, their study reveals that bank capital in Asian countries improves bank profitability and decreases their risk.

Another research in Asian countries by Thangavelu and Findlay (2011) examined the impact of bank regulations on bank efficiency covering almost 600 banks from 1990 to 2008, assuming return on assets (ROA) and return on Equity (ROE) as the measures of bank efficiency and profitability. These two measures also used to find the level of risk the bank is applying to affect the bank's profitability. With stringent capital regulation, ROA is found to increase in banks with high capital, as they are encouraged to diversify their portfolio with low risk assets. In contrast, ROE is expected to decrease as higher capital requirement would reduce risky activities carried out by the banks. Therefore, based on the previous discussion, the resultant research hypotheses are:

H1: *Capital requirement is positively associated with bank profitability.*

H2: *Capital requirement is negatively associated with bank risk-taking.*

2.2.2. Banking Supervision (Pillar II)

The second pillar in Basel II addresses the importance of supervisory power to encourage banks to produce complete and sound information on the bank's risk management activities (Barth *et al.*, 2013). A number of studies explored the effect of supervisory agencies on bank performance. Research conducted by Demirgüç-Kunt *et al.* (2008) on 39 countries found that abiding by Basel Core Principles for Effective Banking Supervision (BCPs) enhances bank trustworthiness. Conversely with regards to profitability, Gaganis and Pasiouras (2013) using a sample of 3886 commercial banks in 78 countries during the period from 2000-2006 used the stochastic frontier analysis and found that banks strictly supervised by the central bank decreases the bank's profit efficiency. Consistent with the study for Barth *et al.* (2006) and Caprio *et al.* (2007) that discovered empowering governmental regulators and supervisors lead to restrained banking activities and decreased performance.

In contrast, another research paper by Pasiouras *et al.* (2009) using stochastic frontier analysis (SFA) in 74 countries from 2000–2004 found that supervision impacts profit and cost efficiency favourably. This is further supported by Chortareas *et al.* (2012) empirical research that used Data Envelopment Analysis (DEA) on a sample of European banks; the study disclosed that banks submitting to supervisory power hinder bank's performance leading to low profits (Manlagnit, 2015). Furthermore, Pasiouras *et al.* (2009) using a stochastic frontier analysis covering 74 countries realised that strict supervisory framework negatively affected cost and profit efficiencies (Alam, 2012).

Many studies confer that hypothetically, the existence of powerful official supervision on banks should enhance bank governance, as they can independently control and prevent managers from increasing their risk-taking behaviour. This was proven by a research that showed that supervisory power has a negative and independent effect on risk-taking (Agoraki *et al.*, 2011; Kandrac and Schlusche, 2017). Several papers agreed that regulations and supervision does have an impact with regards to bank efficiency and risk-taking, however the level and stringency of supervision is what creates the variance in outcomes. For instance, Alam (2012) utilising the Data Envelopment Analysis (DEA) model in eleven countries with dual banking systems, presented empirical results that with powerful supervision and greater restrictions risk-taking activities are adversely affected in conventional banks but riskiness decreases in Islamic banks. The two conflicting outcomes as clarified by Barth *et al.* (2006) are depending on the country's government; if government interest is on public welfare then they would empower supervisory power by providing a positive regulatory environment to ensure bank efficiency. Therefore, based on the previous discussion, the following hypotheses were developed:

H3: *Supervision power is negatively associated with bank's profit.*

H4: *Supervisory power is negatively associated with banks' risk-taking activities.*

2.2.3. Market Discipline (Pillar III)

Barth *et al.* (2007) stated that enhancing bank supervisors' risk management skills through training (pillar one) and influencing bank behaviour through the practice of regulators' discretionary powers (pillar two) is imperative, however, there should be more focus on the disclosure of banking information to the public which aids the investors in monitoring and thus employing sound governance on banks. Since, dysfunctional banking systems are a significant concern faced by the financial industry; scholars assumed that competent and regular disclosure of data by the bank might give rise to banking stability and success (Alam, 2012).

Market discipline, the third pillar of Basel II ensures the importance of Banks disclosure of information regularly and accurately, and through this transparency the Accord seeks greater market discipline (Heid, 2007; Balin, 2008). Few studies research the role of market discipline framework on bank's profitability and risk-taking. Many studies claimed that market discipline improves cost efficiency; however, it has not shown empirical significance on bank's overall efficiency. For instance, Barth *et al.* (2012) use a sample of Philippines banks during the period from 1999 to 2009 and found that market discipline is insignificant in explaining bank efficiency (Manlagnit, 2015). Thangavelu and Findlay (2010) indicated that in developed countries established banks depend on the private monitoring to build depositors and investors' trust. In opposition, private monitoring might not have a positive effect in underdeveloped financial markets such as Southeast Asia as it is not as trustworthy. In contrast, a recent study in Indonesia using Stochastic Frontier Analysis (SFA) found that bank monitoring has a significantly positive effect profit (Rizqi and Faisal, 2017).

Furthermore, it was emphasized that low bank transparency hinders monitoring of banks and prevents excessive risk-taking. Corporate governance problems are predominant especially in emerging countries. Consequently, previous studies found evidence that improving market discipline through employing transparency and financial disclosures was effective in reducing risk (Agoraki *et al.*, 2011).

It is debated that official supervisors monitoring banks are more reliable and trustworthy to the public especially with regards to high risk-taking banks. Pillar II and III of Basel II are believed to support one another, where banks that abide by the Basel framework and have an effective supervisory structure would also have sound disclosure and transparency. Similarly, Fernández and Gonzalez (2005) contend that employing a powerful regulatory system that empowers monitoring will produce reliably high-quality information. Moreover, powerful supervisors have a hand in managerial decisions that controls risk-taking activities of the bank (Manlagnit, 2015). In contrast, Pasiouras *et al.* (2009) found that bank cost and profit efficiencies improved when there were strict requirements for disclosure of information, however there were adverse effect with high supervisory control (Alam, 2012). Therefore, based on the previous discussion, the research hypotheses are:

H5: *Private monitoring and market discipline is positively associated with profitability.*

H6: *Private monitoring and market discipline is negatively associated with bank risk-taking.*

2.3. An Overview on the Economic Characteristics of Asian Emerging Markets

Before presenting the empirical analysis, it may be important to display the sample characteristics of the Asian emerging markets. Appendix 1 provides an overview on the economic characteristics of the study sample. From Appendix 1, India records the highest GDP growth rate in comparison to the other countries, only drastically decreasing in 2008 but increasing again in 2009. Whereas, Philippines has high GDP growth rate over the years, slightly less than India, with a great decline occurring in 2008-2009. Thailand has the least GDP growth level, compared with the other two countries, with a great decline in 2008 and a negative growth rate in 2009 indicating that Thailand has been affected the most by the crisis. Appendix 1 shows that the inflation rate is highest in India in comparison to the other countries showing a steady increase until 2010 and then slight fluctuations until 2015. Inflation rate in Philippines ranges from 1.434 to 8.260 along the 10 years increasing and declining each year. Thailand holds lower inflation rates fluctuating every year with deflation occurring in 2009 and 2015.

Moreover, bank capital to assets ratio (%) illustrates that Philippines held capital significantly more than the minimum capital ratio. Thailand also complied with the minimum holding requirement except for years 2011 and 2012 where banks held a little less than the minimum. On the other hand, India did not comply with the minimum capital ratio, where the ratio recorded less than 8% along the 10 years, showing that regulators did not enforce the capital regulations in banks. Furthermore, India has the highest population density, while Thailand holds the lowest population density.

Regarding the corruption level in the three countries, Appendix 1 also includes Control of Corruption indicator collected from the World Bank over the period of 10 years. Control of Corruption is an indicator of corruption showing the extent to which public power is used for private gain. The units are of a standard normal distribution, ranging from -2.5 to 2.5. This shows that the three sampled countries had relatively high corruption rate across the years.

3. RESEARCH METHODOLOGY

The aim of this paper is to examine the direct impact of banks adhering to Basel II three pillars on bank's profitability and risk-taking in developing Asian countries. This section presents the research methodology employed to accomplish the purpose of this paper. As can be deduced from the literature review, empirically, the impact of Basel regulation in terms of the three pillars has shown to have mixed results on bank risk-taking and profitability. Most literature conveys the efficiency of banks attributable to Basel implementation with the focus on United States (US) and European financial institutions. Few researches has been done on emerging low-income countries, especially Asian countries; considering that countries with economic and political instabilities can be a factor that influences the effectiveness of Basel regulation. Advancement of bank regulation and supervision in developing countries are poor due to lack of expertise and weak governing body (Manlagnit, 2015). The three

countries in this study are chosen on the basis that they are three developing Asian countries that have completed all four bank regulation surveys and they have all stated that they complied with the 2nd Basel Accord. Moreover, they are classified as lower middle-income countries by the World Bank.

A significant number of studies agree that the success of the banking sector booms with increased financial and economic stability of a country. Barth *et al.* (2008) argue that even though many developing countries, especially in Asia, complied with the Basel framework since the financial crisis, there still is a substantial lack of evidence showing how noticeably this change has impacted banks. According to the World Bank surveys from 1999 to 2012, Philippines strongly advocates bank regulatory advancements and has the most stringent bank capital restrictions however current research is very limited (Thangavelu and Findlay, 2010; Barth *et al.*, 2012). Manlagnit (2015) studied the Philippine banking system with regards to impact of Basel II pillars on cost efficiency only. Therefore, our study aims to fill the gap in the literature and study the effect of Basel Accord on risk-taking and profitability in developing Asian countries, where the relative importance of both factors could be observed. Thus, this study focuses on the analysis of Basel II three pillars in depth from the perspective of three developing Asian countries in terms of profitability and risk-taking tendencies.

3.1. Sampling and Data Collection

This study uses a sample of all banks[1] operating in three Asian developing countries; Philippines, Thailand and India. The observations are pooled across banks and years, resulting in a number of 3070 observations from 307 banks, over a period of 10 years 2006–2015. Only banks with complete data for the required variables in each model are included in the observations. The distribution of banks among the three emerging countries in Asia are; Philippine (29%), Thailand (22%) and India (49%). The sample of 307 banks is classified into 16 different types of banks.

This study gathers the intended data from the World Bank's Bank regulation and Supervision Database, and Bankscope adopting the Multiple Regression Models for analysis to test each hypothesis. The Bank regulation and supervision database constitutes of four surveys sponsored by the World Bank. The dataset constructed by Barth *et al.* (2013) differs from the dataset provided by the World Bank as any inconsistency in the World Bank data set of survey responses is resolved by reviewing each of the four surveys individually. It also differs in the construction of indices, Barth *et al.* (2013) organize the data and aggregate the all surveys' responses into indices that summarize notable aspects of bank regulation and supervision. This study uses data gathered using Survey IV since it is the most recent survey and covers the period after the emergence of the global financial crisis, and also includes questions that were motivated by the global financial crisis. The indices used in this research are extracted from Barth *et al.* (2013) database. Moreover, the current survey covers data since 2008 which enables to examine the current state of bank regulation and supervision across countries and help to compare it to the pre-crisis situation (Worldbank).

3.2. Measurements of Variables

In order to test the study's hypotheses a quantitative method would be utilized, as it would help describe, explain and predict the results. To examine the impact of Basel II on the profitability and risk-taking behaviour of the banks, the three pillars are included as independent variables in the valuation; Capital Requirements (CAPRQ), Supervisory power (SPOWER) and Private monitoring and Market discipline (PRMON) and the dependent variables are the banks' profitability and risk. Appendix 2 gives definitions of the variables to be used in the empirical models and their measurements. Capital Requirements includes initial and overall capital stringency. It is calculated on the basis of 7 main questions with a few having sub questions and ranges in value from 0 to 10, with a

[1]All banks that provide their financial statements on Bank scope

higher value indicating greater stringency, which will indicate whether the bank actually adheres to the required capital adequacy ratio.

The supervisory power index is calculated on the basis of 7 main questions with a few having subbed questions and ranges in value from 0 to 14, with a higher value indicating greater power. Supervisory power measures the intensity of power the supervisory agencies have on the banks' managers and directors' decisions. This is in terms of the Bank's supervisors' strength, independence and experience. Finally, market discipline calculated on the basis of 13 main questions with a few having sub questions and ranges in value from 0 to 12. This index is used to capture the level of transparency and complete financial and non-financial information banks are forced disclose through private monitoring. The explained variables used in this study include a broad range of variables that are important in explaining the profitability and risk-taking tendencies of banks.

3.3. Econometric Models

In order to test the study hypotheses, a panel regression analysis is used. A quantitative approach using Ordinary Least Square (OLS) multivariate regression is used to test the effects of the regressor, Basel II variables, on the explained variables, banks' profitability and risk. To confirm using the OLS regression and obtaining unbiased estimates of coefficients in all models, several tests are used for this purpose. OLS regression assumes normality, linearity, homoscedasticity and the independence of errors to ensure that the coefficients resulted are unbiased. For instance, to ensure normality, homoscedasticity and linearity assumptions, Histograms and scatter plots are used. These tests verify that normality of distribution and homoscedasticity assumptions are valid. Further, the Durbin-Watson statistics is used to test if there is autocorrelation between the residuals and it suggests no presence of autocorrelation in the residuals and ensures the independence of errors. "A normally distributed error term implies an unrestricted range of variation in the dependent variable. "A severely restricted range of variation in the dependent variable tends to undermine the assumption of normally distributed error" (Aldrich and Cnudde, 1975). Finally, the study variables are continuous variables that take a greater range of scores. Therefore, these tests conducted confirm using OLS regression in all the study models as all the OLS assumptions are met (ElBannan, 2015).

To check the robustness of the study results, additional analysis is performed using lagged explanatory variables where the independent variables' values are in line with the dependent variables' values of the next year. Results obtained from the lagged regression remain qualitatively the same and unchanged under all specifications, which ensure result robustness. Results are not tabulated for the sake of brevity and space concerns.

In this study there are three alternative measures for bank profitability and two alternative measures for Bank risk-taking behaviour; the ROA, ROE, and NIP. In the equations i and t denote bank i and time t, respectively, α is the constant, β is the Beta coefficient and ε is the error in the observed values for the i^{th} case. To examine the first hypothesis (H1) and test the impact of Capital Regulatory Requirement, using Capital regulatory index as a proxy, on profitability the following general model used:

Profitability = ƒ (Capital Regulatory Requirement, control variables) …… (General Model)

Three equations are formulated for the three OLS regression models using different profitability measures. The general equation to be estimated is as follows:

$$Prof = \alpha + \beta 1\ CAPRQ + \beta 2\ CP_{it} + \beta 3\ SIZE_{it} + \beta 4\ TYPE_{i} + \beta 5\ LEND_{it} + \beta 6\ EFFIC_{it} + \beta 7\ DIV_{it} + \beta 8\ OPLEV_{it} + \beta 9\ LIQ_{it} + \beta 10\ CIR_{it} + \beta 11\ GDPt + \beta 12\ INFL_{t} + \beta 13 CRISIS_{t} + \varepsilon_{it} \quad (1)$$

To examine (H2) and test the impact of Capital regulatory Requirement on risk-taking the following is the general model used:

Risk-taking = ƒ (Capital Regulatory Requirement, control variables) …… (General Model)

Two models are formulated using different risk-taking measures; the LLR and NPL. The general equation to be estimated is as follows:

$$Risk = \alpha + \beta 1\ CAPRQ + \beta 2\ CPit + \beta 3\ SIZEit + \beta 4\ TYPEi + \beta 5\ LENDit + \beta 6\ EFFICit + \beta 7\ DIVit + \beta 8\ OPLEVit + \beta 9\ LIQit + \beta 10\ CIRit + \beta 11\ GDPt + \beta 12\ INFLt + \varepsilon it \quad (2)$$

To examine the third hypothesis (H3) and test the impact of Official Supervisory Power, using Supervisory power index, on profitability the following general model is used:

Profitability = ƒ (Official Supervisory Power, control variables) …… (General Model)

Three models are formulated using different profitability measures. The general equation to be estimated is as follows:

$$Prof = \alpha + \beta 1\ SPOWER + \beta 2\ CP_{it} + \beta 3\ SIZE_{it} + \beta 4\ TYPE_{i} + \beta 5\ LEND_{it} + \beta 6\ EFFIC_{it} + \beta 7\ DIV_{it} + \beta 8\ OPLEV_{it} + \beta 9\ LIQ_{it} + \beta 10\ CIR_{it} + \beta 11\ GDPt + \beta 12\ INFL_{t} + \beta 13 CRISIS_{t} + \varepsilon_{it} \quad (3)$$

To examine the fourth hypothesis (H4) and test the impact of Official supervisory power on risk-taking the following general model used:

Risk-taking = ƒ (Official supervisory power, control variables) …… (General Model)

Two models are formulated using different risk-taking measures. The general equation to be estimated is as follows:

$$Risk = \alpha + \beta 1\ SPOWER + \beta 2\ CPit + \beta 3\ SIZEit + \beta 4\ TYPEi + \beta 5\ LENDit + \beta 6\ EFFICit + \beta 7\ DIVit + \beta 8\ OPLEVit + \beta 9\ LIQit + \beta 10\ CIRit + \beta 11\ GDPt + \beta 12\ INFLt + \varepsilon it \quad (4)$$

To examine the fifth hypothesis (H5) and test the impact of Private Monitoring and Market Discipline, using private monitoring index, on profitability the following general model used:

Profitability = ƒ (Private Monitoring, control variables)…… (General Model)

Three models are formulated using different profitability measures. The general equation to be estimated is as follows:

$$Prof. = \alpha + \beta 1\ PRMON + \beta 2\ CP_{it} + \beta 3\ SIZE_{it} + \beta 4\ TYPE_{i} + \beta 5\ LEND_{it} + \beta 6\ EFFIC_{it} + \beta 7\ DIV_{it} + \beta 8\ OPLEV_{it} + \beta 9\ LIQ_{it} + \beta 10\ CIR_{it} + \beta 11\ GDPt + \beta 12\ INFL_{t} + \beta 13 CRISIS_{t} + \varepsilon_{it} \quad (5)$$

To examine the sixth hypothesis (H6) and test the impact of Private Monitoring and Market Discipline on risk-taking the following general model used:

Risk-taking = ƒ (Private Monitoring, control variables) …… (General Model)

Two models are formulated using different risk-taking measures. The general equation to be estimated is as follows:

$$Risk = \alpha + \beta 1\ PRMON + \beta 2\ CPit + \beta 3\ SIZEit + \beta 4\ TYPEi + \beta 5\ LENDit + \beta 6\ EFFICit + \beta 7\ DIVit + \beta 8\ OPLEVit + \beta 9\ LIQit + \beta 10\ CIRit + \beta 11\ GDPt + \beta 12\ INFLt + \varepsilon it \quad (6)$$

4. EMPIRICAL RESULTS

In order to analyse the impact of Basel Accords on banks' profitability and risk, descriptive analysis including the descriptive statistics table and Pearson correlation matrix are conducted. Regression models are estimated to estimate the study relationships and test the hypotheses. Further, a country comparison analysis is conducted as an additional analysis.

4.1. Descriptive Analysis and Pearson Correlation Matrix

Table 1 provides the descriptive statistics for the variables included in the study. In particular, it shows the mean, median, standard deviation, Skewness, Kurtosis, minimum and maximum variables. Table 2 provides Pearson correlation coefficients matrix between the main variables of the study. The correlation coefficients are quite small (less than 0.8 as indicated by Lee and Hsieh (2013) suggesting that there is weak correlation between variables except for some variables that have correlation however, using the VIF test indicates that multicollinearity is of no concern.

4.2. Regression Analysis

Table (3) illustrates the results of the regression analysis of the first three models testing Hypothesis 1 (H1) which demonstrates the impact of capital regulatory requirement on profitability. Capital regulatory requirement is measured by CAPRQ and profitability measured by NIP, ROA and ROE, taking into account all the control variables in this study (Appendix 2 shows definitions of all variables used).

The F-statistics of NIP, ROA and ROE (models 1 – 3) is equal to 23.255, 75.332 and 55.116 respectively, and are highly significant with p-value of 0.000. The goodness-of-fit of an OLS regression is measured by the R^2 which depicts the percentage of the change in the dependent caused by the independent variables in a model, the ROA for instance, shows that the independent variable accounts for 43.6% of the variation in the dependent variable. The average variance inflation factor (VIF) in all models ranges from 1.976 to 2.672 indicating that there is no multicollinearity problem existing (any value greater than 10 indicates a high multicollinearity problem).

The findings of the first three models reveal that Capital regulatory requirement has a significant negative impact on profitability using all measures. The results are statistically significant at 1% in those three variables in the model, the correlation coefficient between them individually amounts to -0.149, -0.185 and -0.193 respectively. These results contradict with most results found by previous studies but is consistent with the empirical results of Maraghni and Rajhi (2015) who studied the impact of changes in capital ratio on the risk-taking behaviour, under regulatory pressure, using a sample of ten local banks using panel data over a 23-year period 1990 to 2012 divided into two periods (the results are relevant to sub-period 2001-2012). This result indicated the ineffective use of available assets to generate profit due to an increase in stringent capital requirements. All the models show that there is a negative relationship between bank size (SIZE) and profitability significant with NIP (at 10%), and ROA (at 1%) this result is supported by Moussa (2015) and Rizqi and Faisal (2017).

Yousuf and Felföldi (2018) found that bank capital adequacy ratio in Syria affects profitability negatively as expressed by ROE they found that stricter capital requirements means better insurance for depositors, however, this leads to a decrease in the rate of return to shareholders. Moreover, Binh and Thomas (2014) studied 11 Vietnamese commercial banks from 2008- 2013 and found that return on equity had a significant negative relationship to increase in capital requirements. Furthermore, Fatnassi *et al.* (2014) examined the effect of capital on profitability and risk for 113 Islamic and conventional banks, from 2003–2011. They found that strictly capitalized banks generated low profit. The results are also consistent with Hussain and Hassan (2005); Pasiouras *et al.* (2009); Chortareas *et al.* (2012); Moh'd Al-Tamimi and Obeidat (2013) all supporting similar results. The first hypothesis tested, assumed that stringent capital regulatory requirement is positively associated with profitability is therefore rejected.

Table-1. Descriptive statistics of chosen sample

Variable	Mean	Median	Std. Deviation	Skew-ness	Kurtosis	Minimum	Maximum
Profitability variables							
ROA	1.23	1.26	8.022	-12.233	214.461	-174	51
ROE	13.34	11.61	41.932	10.622	175.954	-277	810
NIP	1.61	1.58	2.394	0.969	80.728	-29	33
Risk-Taking Variables							
LLR	5.7	2.27	13.965	5.388	30.08	0	100
NPL	5.97	2.98	11.546	5.599	36.554	0	101
Basel II Regulatory Variables							
CAPRQ	9.43	10	0.905	-0.944	-1.109	8	10
SPOWER	11.17	11	1.567	1.095	-0.497	10	14
PRMON	8.92	9	1.278	-0.673	-1.289	7	10
Bank-specific variables							
CP	16.77	12.41	18.396	7.851	95.639	0	327
SIZE	14.58	14.73	2.37	-0.593	0.483	2	20
LEND	56.03	59.41	24.658	-0.54	-0.123	0	101
EFFIC	1.790	1.289	9.3424	-4.425	139.861	-166.474	127.333
DIV	1.790	0.769	6.163	1.846	169.157	-97.567	102.667
OPLEV	408.65	87.44	3065.593	21.996	584.936	0	95720
LIQ	39.92	14.51	93.262	6.124	46.700	0	999
CIR	55.78	50.47	38.295	6.398	77.138	0	729
Macroeconomic Variables							
GDP	5.936	6.6	2.609	-0.64	-0.131	-0.7	10.3
INFL	5.915	5.9	3.302	0.101	-0.72	-0.9	12
CRISIS	0.2	0	0.4	1.501	0.252	0	1

Note: The table presents the distribution of variables by showing mean, median, standard deviation, Skewness, Kurtosis, minimum and maximum.

Table-2. Pearson correlation coefficients Matrix

	NIP	ROA	LLR	NPL	CAPRQ	SPOWER	PRMON	CP	SIZE	LEND	EFFIC	LIQ
NIP	1											
ROA	0.858*** (0.000)	1										
LLR	-0.091* (0.016)	-0.297*** (0.000)	1									
NPL	-0.145*** (0.000)	-0.336*** (0.000)	0.817*** (0.000)	1								
CAPRQ	-0.144*** (0.000)	0.068*** (0.003)	-0.063 (0.013)	-0.128*** (0.000)	1							
SPOWER	-0.042 (0.257)	0.059*** (0.009)	0.166*** (0.000)	0.174*** (0.000)	0.070*** (0.000)	1						
PRMON	-0.129*** (0.000)	0.043** (0.058)	-0.115*** (0.000)	-0.181*** (0.000)	0.952*** (0.000)	0.174*** (0.000)	1					
CP	0.079** (0.043)	0.030 (0.328)	0.447*** (0.000)	0.502*** (0.000)	-0.196*** (0.000)	0.035 (0.233)	-0.197*** (0.000)	1				
SIZE	-0.013 (0.727)	0.103*** (0.000)	-0.364*** (0.000)	-0.322*** (0.000)	0.216*** (0.000)	-0.123*** (0.000)	0.248*** (0.000)	-0.414*** (0.000)	1			
LEND	-0.108*** (0.003)	0.070*** (0.003)	-0.431*** (0.000)	-0.335*** (0.000)	0.253*** (0.000)	0.072*** (0.000)	0.218*** (0.000)	-0.234*** (0.000)	0.229*** (0.000)	1		
EFFIC	-0.022 (0.544)	0.026 (0.248)	-0.039* (0.125)	0.017 (0.541)	-0.056*** (0.014)	-0.042** (0.064)	-0.038** (0.095)	0.034 (0.263)	-0.075*** (0.001)	-0.02 (0.389)	1	
LIQ	0.205*** (0.000)	0.083*** (0.000)	0.279*** (0.000)	0.166*** (0.000)	-0.090*** (0.000)	0.084*** (0.000)	-0.114*** (0.000)	0.333*** (0.000)	-0.271*** (0.000)	-0.195*** (0.000)	-0.002 (0.924)	1

Note: The Table shows Pearson pairs-wise correlation matrix (2-tailed). Numbers in parentheses are the p-values the level of significance is divided by 2, values with ***, ** and * indicate the 1%, 5% and 10% significant levels,respectively. ROA: Return on assets, LLR: Loan loss reserve to total Loans ratio, NPL: Non-Performing loans to Total Loans ratio, CAPRQ: Capital Regulatory Requirement, SPOWER: Supervisory Power, PRMON: Private monitoring index, CP: Bank Capital, SIZE: Bank Size, LEND: Bank lending, EFFIC: Efficiency, LIQ: Liquidity.

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Table (3) also displays the results of regression analyses of two models testing (H2) and assuming that stringent capital regulatory requirement is negatively associated with risk-taking. Where capital regulatory requirement is measured by CAPRQ and risk-taking is measured by NPL and LLR taking into account all the control variables in this study. The F-statistics of NPL and LLR (models 4 and 5) is equal to 12.957 and 27.429 respectively and are highly significant with p-value of 0.000. The goodness-of-fit of an OLS regression measured by the R2 is 0.143 for NPL and 0.261 for LLR shows that the CAPRQ variable accounts for 14.3% (26.1%) of the variation in the non-performing loans ratio (loan loss reserves ratio). The average variance inflation factor in the model variables are ranging from 2.720 (NPL) and 2.752 (LLR) indicating that there is no multicollinearity problem.

The above results reveal that Capital regulatory requirement has a negative impact on risk-taking measured by NPL and LLR the results are statistically significant at 1% for model 4 but not statistically significant in model 5. The correlation coefficient between Capital Regulatory index and NPL, and LLR individually amounts to -0.145 and -0.020 respectively. Loan loss reserves is a proxy for loan quality, banks holding bad quality loans are expected to engage in more risky decisions as it suggests that bank is predicting future bad times. These results are consistent with Floquet and Biekpe (2008); Agoraki *et al.* (2011); Thangavelu and Findlay (2011); Alam (2012); Lee and Hsieh (2013); Manlagnit (2015); Maraghni and Rajhi (2015); Moussa (2015); Mohammed and Wetere (2016); Yousuf and Felföldi (2018).

Studies interpreted these results to mean that higher capital requirement increases competition caused by high entry barriers; this lowers risk-taking behaviour as banks accumulate power. Furthermore, while stringent capital requirements are linked to fewer non-performing loans, it is also decreases probability of financial distress. The second hypothesis predicting that stringent capital regulatory requirement is negatively associated with risk-taking is therefore accepted.

Table (4) illustrates the results of the regression analysis of three models testing Hypothesis 3 (H3) and the impact of supervisory power on profitability; where supervisory power is measured by SPOWER. The F-statistics of NIP, ROA and ROE (models 6 – 8) is equals to 17.453, 70.456 and 53.696 respectively, and are highly significant with p-value of 0.000. The R^2 in ROA shows that the independent variable accounts for 41.9% of the variation in the dependent variable. The average variance inflation factor in the model variables is ranging from 2.078-3.435 indicating that there is no multicollinearity problem.

The findings of the first three models reveal that Supervisory Power index has a negative impact on profitability showing only significant effect at 1% in models 7 and 8. The correlation coefficient between Supervisory Power index and NIP, ROA and ROE individually amounts to -0.064, -0.091 and -0.198. Powerful supervisors as supported by several empirical studies may impede banks' performance as they might use their power for their own personal benefit as depicted in the agency theory. Moreover, higher supervisory requirements increase the cost of raising bank capital, therefore, supervisors may be considered as a source of corrupting banks and not enhancing performance. These conclusions and results are supported by Barth *et al.* (2006); Caprio *et al.* (2007); Alam (2012); Gaganis and Pasiouras (2013); Manlagnit (2015). In contrast, Thangavelu and Findlay (2010) explored the impact of bank regulation and supervision on the efficiency of banks during 1994-2008. They found that official supervision tends to improve the efficiency of the financial institutions in Southeast Asia. The third hypothesis (H3) that states that supervisory power is negatively associated with profitability is therefore accepted.

Table-3. Estimating the relationship between capital regulatory index and profitability and Risk-taking measures.

	Profitability						Risk-taking			
	Model 1 (NIP)		Model 2 (ROA)		Model 3 (ROE)		Model 4 (NPL)		Model 5 (LLR)	
	Standardized Coefficients Beta	T-statistic	Standardized Coefficients Beta	Standardized Coefficients Beta	T-statistic	T-statistic	Standardized Coefficients Beta	T-statistic	Standardized Coefficients Beta	T-statistic
(Constant)		8.955***			3.678***	10.20***		3.678***		3.199***
CAPRQ	-0.149	-3.375***	-0.185	-0.145	-3.238***	-6.264***	-0.145	-3.238***	-0.020	-0.472
CP	-0.047	-1.036	-0.004	0.060	1.586*	2.958***	0.060	1.586*	0.055	1.568*
LIQ	0.132	3.493***	0.070	-0.062	-1.225	0.557	-0.062	-1.225	0.133	2.750***
SIZE	-0.067	-1.555*	-0.133	-0.009	-0.233	0.243	-0.009	-0.233	-0.042	-1.159
LEND	-0.181	-4.658***	0.011	-0.002	-0.048	3.493***	-0.002	-0.048	-0.088	-2.014**
EFFIC	0.207	2.271**	0.064	0.093	1.106	1.418*	0.093	1.106	-0.035	-0.450
DIV	-0.209	-2.300**	-0.075	-0.092	-1.095	-1.159	-0.092	-1.095	0.004	0.049
OPLEV	0.097	2.704***	-0.106	-0.069	-1.776**	-4.547***	-0.069	-1.776**	-0.027	-0.746
CIR	-0.498	-13.355***	-0.730	0.204	5.303***	-23.058***	0.204	5.303***	0.191	5.415***
GDP	0.055	1.469*	0.035	-0.057	-1.483*	1.055	-0.057	-1.483*	-0.169	-4.811***
INFL	-0.087	-2.000**	-0.047	-0.139	-3.276***	2.021**	-0.139	-3.276***	-0.148	-3.732***
CRISIS	-0.046	-1.388*	-0.040			-0.937				
F-statistic	23.255		75.332	12.957			12.957		27.429	
P-value for F-st	0.000		0.000	0.000			0.000		0.000	
R-squared	0.282		0.436	0.143			0.143		0.261	
Adjusted R2	0.269		0.430	0.132			0.132		0.251	
Mean VIF	2.672		1.976	2.720			2.720		2.752	

Note: *** Statistically significant at 1%, ** statistically significant at 5%, * statistically significant at 10%

Table (4) also displays the results of the regression analysis of models 9 and 10 which tests Hypothesis 4 (H4) that an increase in supervisory power is negatively associated with risk-taking. The F-statistics of NPL and LLR are equal to 21.062 and 33.052 respectively and are highly significant with p-value of 0.000. The goodness-of-fit of an OLS regression measured by the R2 is 0.176 for NPL and 0.298 for LLR shows that the SPOWER variable accounts for 17.6% (29.8%) of the variation in the non-performing loans ratio (loan loss reserves). The average variance inflation factor in the model variables are ranging from 2.189 (NPL) and 2.883 (LLR) indicating that there is no multicollinearity problem.

Empirical results of models 9 and 10 reveal that supervisory power has a significant positive impact on risk-taking; the results are statistically significant at 1% for both models. The correlation coefficient between Supervisory Power index and NPL and LLR individually amounts to 0.141 and 0.326. Several studies concede that supervision does impact risk-taking, however there are mixed results, confirming that the level and stringency of supervision is what creates the variance in the results. The two conflicting results are predominantly dependent on the country's government; if the government's interest is on public welfare then they would empower supervisory power by providing a positive regulatory environment to ensure bank efficiency. However, if the government has "private interest view", then supervisory role would be implemented to benefit the government alone and not the community. The positive results are further supported by Barth *et al.* (2006); Pasiouras *et al.* (2009); Alam (2012). The fourth hypothesis that states that high supervisory power decreases risk-taking behaviour is therefore rejected.

Table (5) displays the results of the regression analysis of three models testing (H5) which demonstrates the impact of private monitoring and market discipline on profitability. The F-statistics of NIP, ROA and ROE (models 11 – 13) is equals to 23.286, 52.373 and 53.696 respectively, and are highly significant with p-value of 0.000. The R^2 indicates that for ROA, as an example, shows that Private Monitoring accounts for 37.6% of the variation in the ROA. The average variance inflation factor in the models ranges from 1.788-2.702; indicating that there is no multicollinearity problem.

The findings of models 11, 12 and 13, reveal that the third pillar, private monitoring and market discipline, has a significant negative impact at 1% significance on profitability. The correlation coefficient between Private monitoring index and NIP, ROA and ROE individually amounts to -0.128, -0.185, and -0.151 respectively. These results are relevant to the conclusions of the second pillar that the banks in the three countries need to strengthen their corporate governance and private monitoring to reduce corruption and enhance the performance of banks as main financial intermediaries. Thangavelu and Findlay (2010) explained that due to the slow state of growth in Asian developing countries, private monitoring might not be effective on performance conversely a more developed financial market would rely on the private sector to monitor the financial market and provide information to potential depositors. Moreover, the findings on pillar 3 realize that excessive private monitoring can affect the efficient operation of banks and hinder their profitability. These results are consistent with Fernández and Gonzalez (2005); Heid (2007); Balin (2008); Pasiouras *et al.* (2009); Thangavelu and Findlay (2010); Alam (2012); Chortareas *et al.* (2012); Manlagnit (2015). The fifth hypothesis which states that increasing private monitoring and market discipline has a positive impact on profitability has been rejected.

Table-4. Estimating the relationship between Official Supervisory power index and profitability measures.

	Profitability						Risk-taking			
	Model 6 (NIP)		Model 7 (ROA)		Model 8 (ROE)		Model 9 (NPL)		Model 10 (LLR)	
	Standardized Coefficients Beta	T-statistic	Standardized Coefficients Beta	T-statistic	Standardized Coefficients Beta	T-statistic	Standardized Coefficients Beta	T-statistic	Standardized Coefficients Beta	T-statistic
(Constant)		5.012***		12.401***		9.342***		-0.248		-0.066
SPOWER	-0.064	-1.131	-0.091	-2.571***	-0.198	-5.290***	0.141	3.136***	0.326	6.779***
CP	0.001	0.016	-0.006	-0.222	0.08	2.930***	0.154	4.848***	0.056	1.640*
LIQ	0.110	1.823**	0.077	3.227***	0.022	0.879	0.072	2.516***	0.092	2.030**
SIZE	-0.043	-0.973	-0.169	-6.631***	-0.021	-0.769	-0.040	-1.241	-0.100	-2.845***
LEND	-0.215	-3.937***	-0.029	-1.183	0.064	2.472***	-0.130	-4.145***	-0.186	-4.272***
EFFIC	0.147	1.264	0.083	1.733**	0.084	1.663**	0.070	1.143	-0.034	-0.450
DIV	-0.099	-0.863	-0.087	-1.822**	-0.067	-1.330*	-0.050	-0.814	0.015	0.202
OPLEV	0.084	2.138**	-0.137	-5.439***	-0.144	-5.457***	0.008	0.262	-0.033	-0.958
CIR	-0.46	-10.889***	-0.725	-27.428***	-0.622	-22.333***	0.188	5.709***	0.157	4.568***
GDP	0.056	1.257	0.022	0.728	-0.015	-0.485	0.027	0.758	-0.071	-1.904**
INFL	-0.151	-2.803***	-0.176	-5.159***	-0.125	-3.493***	-0.090	-2.164**	0.011	0.243
CRISIS	-0.058	-1.579*	-0.064	-2.624***	-0.048	-1.852**				
F-statistic	17.453		70.456		53.696		21.062		33.052	
P-value for F-st	0.000		0.000		0.000		0.000		0.000	
R-squared	0.255		0.419		0.355		0.176		0.298	
Adjusted R2	0.240		0.413		0.348		0.168		0.289	
Mean VIF	3.435		2.078		2.078		2.189		2.883	

Note: *** Statistically significant at 1%, ** statistically significant at 5%, * statistically significant at 10%

Table (5) displays the results of the regression analysis of the next two models testing (H6) which assumes that increasing private monitoring and market discipline decreases risk-taking. The F-statistics of LLR and NPL (models 14 and 15) are equal to 27.088 and 12.427 respectively and are highly significant with p-value of 0.000. The goodness-of-fit of an OLS regression measured by the R^2 (and adjusted R^2) is 0.276 (0.266) for LLR and 0.149 (0.137) for NPL, showing that PRMON variable accounts for 27.6% (26.6%) of the variation in the loan loss reserves ratio. The average variance inflation factor in the model variables are 2.764 (LLR) and 2.737 (NPL) indicating that there is no multicollinearity problem.

The results of those two models reveal that private monitoring and market discipline has a significant negative impact on risk-taking measured by NPL and LLR the results are statistically significant at 1% for both models. The correlation coefficient between Capital Regulatory index and LLR, and NPL individually amounts to -0.156 and -0.211. Few studies examine the role of market discipline framework on bank's profitability and risk-taking. Furthermore, it was emphasized that a reduction in transparency in banks' framework can hinder monitoring of banks and the prevention of excessive risk-taking; this may lead to fundamental issues in the banks' corporate governance soundness. Consistent with Gonzalez (2009) a negative coefficient for strictness of private monitoring of financial markets indicates a negative outcome for the financial markets in Southeast Asia. Consequently, previous studies argue that improving market discipline through employing transparency and financial disclosures is operative in reducing risk. Other research supporting the results are Altunbas *et al.* (2007); Gonzalez (2009); Thangavelu and Findlay (2010); Agoraki *et al.* (2011); Thangavelu and Findlay (2011); Chortareas *et al.* (2012); Manlagnit (2015). The last hypothesis (H6), which states that increasing private monitoring and market discipline decreases risk-taking has been accepted.

4.3. ANOVA: Country Comparison

To examine the relationship between the dependent variables among the three countries in the study's sample, a One-way analysis of variance (ANOVA) was performed.

These techniques help in testing for significant differences between groups and comparing the means of the groups on the dependent variable. ANOVA can be used for comparison of more than two groups *(Green and Salkind, 2012).* The one-way analysis of variance compares the variability in scores between the different groups caused by the independent variable, with the variance within each of the groups cause by chance. Post-hoc tests are conducted in order to illustrate which groups differ. A one-way between-groups analysis of variance was conducted to explore the impact of different countries on profitability and risk-taking. Sample was divided into three groups according to their country (Group 1: Philippine, Group 2: Thailand, Group 3: India).

The ANOVA table (6) gives between-groups and within-groups mean squares, F ratio and significance value. The Significance value of the variables measuring both profitability and risk-taking, is less than or equal to 0.1 meaning that there is significant difference somewhere among the mean scores of the dependent variables in the three groups. This does not illustrate which group is different from which group. In table (7), the Multiple Comparisons show the statistical significance of the differences between each pair of groups, which gives the results of the post-hoc tests, since there is significant difference in the overall ANOVA. In the Mean Difference, the values that have an (*) next to it means that the two groups being compared are significantly different from one another at the $p< 0.10$ level. The exact significance value is provided in Sig. Post-hoc comparisons using the Tukey HSD test indicates that the mean score of ROE for Philippines (M=6.540, SD=30.001) was significantly different from India (M=17.040, SD=47.880). Thailand (M=10.300, SD=33.812) did not differ significantly from Philippines. Profitability tests between each country indicates that there is a statistically significant difference in ROE between Philippines and India ($p = 0.000$), as well as between India and Thailand (p=0.010). However, there were no differences between Philippines and Thailand (p=0.398). Similar results can be seen among the other variables measuring profitability.

Table 5: Estimating the relationship between Private Monitoring index and profitability measures

	Profitability						Risk-taking			
	Model 11 (NIP)		Model 12 (ROA)		Model 13 (ROE)		Model 14 (NPL)		Model 15 (LLR)	
	Standardized Coefficients Beta	T-statistic	Standardized Coefficients Beta	T-statistic	Standardized Coefficients Beta	T-statistic	Standardized Coefficients Beta	T-statistic	Standardized Coefficients Beta	T-statistic
(Constant)		8.071***		13.833***		10.877***		4.521***		3.786***
SPOWER	-0.128	-2.574***	-0.185	-5.060***	-0.151	-4.175***	-0.156	-3.215***	-0.211	-4.039***
CP	0.028	0.746	-0.045	-1.502*	-0.091	-3.076***	0.067	1.930**	0.064	1.690**
LIQ	0.138	3.798***	0.090	3.455***	0.007	0.281	0.078	1.573*	-0.092	-1.783**
SIZE	-0.045	-1.121	-0.132	-4.314***	-0.061	-2.003**	-0.017	-0.465	-0.008	-0.193
LEND	-0.142	-3.656***	-0.015	-0.515	0.025	0.877	-0.068	-1.604*	-0.007	-0.154
EFFIC	0.209	2.262**	0.129	2.191**	0.157	2.699***	-0.024	-0.313	0.095	1.124
DIV	-0.222	-2.411***	-0.135	-2.312**	-0.126	-2.164**	-0.011	-0.146	-0.095	-1.123
OPLEV	-0.109	-2.858***	-0.099	-3.483***	-0.129	-4.565***	-0.009	-0.262	-0.063	-1.616*
CIR	-0.534	-13.95***	-0.664	-23.292***	-0.669	-23.670***	0.194	5.579***	0.201	5.261***
GDP	0.061	1.622*	0.058	1.855**	0.029	0.956	-0.207	-5.589***	-0.053	-1.299*
INFL	-0.040	-0.844	-0.022	-0.592	0.077	2.076**	-0.053	-1.181	-0.079	-1.630*
CRISIS	-0.044	-1.317*	-0.045	-1.637**	-0.023	-0.845				
F-statistic	23.286		52.373		53.696		27.088		12.427	
P-value for F-st	0.000		0.000		0.000		0.000		0.000	
R-squared	0.285		0.376		0.386		0.276		0.149	
Adjusted R2	0.272		0.369		0..379		0.266		0.137	
Mean VIF	2.702		2.267		2.078		2.764		2.737	

Note: *** Statistically significant at 1%, ** statistically significant at 5%, * statistically significant at 10%

Table-6. Country comparison:ANOVA Table

ANOVA				
		Mean Square	**F**	**Sig.**
NIP	Between Groups	46.913	8.350	0.000
	Within Groups	5.618		
ROA	Between Groups	476.622	7.457	0.001
	Within Groups	63.919		
ROE	Between Groups	18163.150	10.432	0.000
	Within Groups	1741.118		
LLR	Between Groups	5167.205	27.375	0.000
	Within Groups	188.757		
NPL	Between Groups	4438.395	34.936	0.000
	Within Groups	127.044		

*The mean difference is significant at the 0.10 level.

Table-7. Country comparison:ANOVA Multiple Comparisons

Tukey HSD					
Dependent Variable	**(A) Country**	**(B) Country**	**Mean Difference (A-B)**	**SD. Error**	**Sig.**
NIP	Philippines	Thailand	.926*	.259	.001
		India	.657*	.195	.002
	Thailand	Philippines	-.926*	.259	.001
		India	-.270	.246	.518
	India	Philippines	-.657*	.195	.002
		Thailand	.270	.246	.518
ROA	Philippines	Thailand	-2.133*	.555	.000
		India	-1.040*	.479	.077
	Thailand	Philippines	2.133*	.555	.000
		India	1.093*	.444	.037
	India	Philippines	1.040*	.479	.077
		Thailand	-1.093*	.444	.037
ROE	Philippines	Thailand	-3.751	2.897	.398
		India	-10.492*	2.500	.000
	Thailand	Philippines	3.751	2.897	.398
		India	-6.740*	2.320	.010
	India	Philippines	10.492*	2.500	.000
		Thailand	6.740*	2.320	.010
LLR	Philippines	Thailand	-1.978	.970	.103
		India	3.950*	.834	.000
	Thailand	Philippines	1.978	.970	.103
		India	5.929*	.853	.000
	India	Philippines	-3.950*	.834	.000
		Thailand	-5.929*	.853	.000
NPL	Philippines	Thailand	-.111	.910	.992
		India	5.055*	.764	.000
	Thailand	Philippines	.111	.910	.992
		India	5.166*	.760	.000
	India	Philippines	-5.055*	.764	.000
		Thailand	-5.166*	.760	.000

*The mean difference is significant at the 0.10 level.

5. CONCLUSION AND IMPLICATIONS

Examining the impact of bank regulation, supervision and disclosure in developing countries is a crucial issue nowadays. Even though regulations have been adopted and continuously developed, the global banking crisis of 2007-2009 and many more systemic banking crises have led to the downfall of countless economies around the world since 1970, showing defects in the regulatory and supervisory policies (Barth *et al.*, 2013). Despite all the advancements made on these Accords with its new milestones, the optimum design for bank capital regulation is still being debated and argued.

This study contributes to the existing literature by empirically examining the impact of Basel Accord II pillars on bank profitability and risk-taking in lower middle income Asian countries. While employing multivariate regression models, using alternative variables to measure profitability and risk-taking, and testing the robustness of the main results, the study provides the following important conclusions. First, the results depict that proxies used for each pillar; capital requirements, supervisory power and private monitoring show negative relation associated with profitability.

The results are statistically significant at 1% in those three variables in each model. The implications for these results are discussed as follows; the ineffective use of available assets to generate profit may occur due to the increase in capital requirements which could cause high entry barriers which may lead to high costs. Moreover, high requirements impede firms' bank stability and hinder access to external financing. Powerful supervisors, as supported by several studies, may impede banks' performance as they might use their power for their own personal benefit as depicted in the agency theory. Additionally, higher supervisory requirements could increase the cost of raising bank capital, therefore, supervisors may be considered as source of bank corruption and not enhancing performance. Therefore, banks in the three countries need to strengthen their corporate governance and private monitoring to reduce corruption and enhance banks performance; as main financial intermediaries. Since emerging countries tend to share common characteristics and economic conditions, the results of this study should be of interest to other emerging countries; capitalizing on the results reported regarding the effect of the Basel II on bank profitability and risk.

Second, this study provides evidence for a negative relationship between each pillar and risk-taking measures. The results are statistically significant at 1% for model 4, 14, 15 but not statistically significant in model 5. This result may be interpreted to mean that higher capital requirement increases competition caused by high entry barriers; this lowers risk-taking behaviour as banks accumulate power. On the other hand, the proxy of supervisory power reveals that supervision has a significant positive impact on risk-taking measured by NPL and LLR, the results are statistically significant at 1% for both models. Concluding, that the level and stringency of supervision is what creates the variance in the results. The results remain persistent when using alternative risk-taking measures.

Third, with regards to control variables, the results show that banks size have a significant negative relationship with profitability measures of this study, suggesting that large banks are less profitable. This result is consistent with Bertay *et al.* (2013) who show that large banks achieve lower profitability and operate with high risk. However, bank size is found to be statistically insignificant determinant of bank risk taking. An explanation could be that the optimal bank size is less than the size of the large banks existing today. The efficiency control variable is shown to be significantly and positively related to all profitability measures, suggesting that efficiency in banks is inextricably linked to profitability. Moreover, cost to income ratio coefficients show a significantly negative relation with the profitability ratios, which means that profitability decreases due to increase in costs and decrease in income. The coefficients of growth rate (GDP) on different profitability variables are all positive showing that economic development will boost bank profit. The GDP growth coefficients have negative relationship with risk-taking; the reasoning is that banks are expected to face high credit losses due to having an underdeveloped macroeconomic environment.

For inflation, results show that it has a significantly negative relation with profit. This could be because inflation could lead to increase in bank costs and instability in deposits. The dummy variable CRISIS (2007- 2008) had a negatively significant effect on bank profitability variables showing that the global financial crisis has proven to impede bank's performance. Capital ratio is positively related to risk-taking, meaning that an increase in the amount of capital increases risk level, which indicates that regulators allow banks to take more risk when capital increases. Regarding the liquidity ratio, the results depict a significantly positive relationship with risk-taking. Highly liquid banks do not face risk of bank run, thus, they do not need to hold high levels of capital; this might be an incentive for banks to take on more risk. Bank lending is negatively related to risk-taking and profitability,

suggesting that an increase in leverage leads to an increase in agency costs (caused by conflict of interests between managers and stakeholders).

One of the limitations in this paper is that banks in different countries compile financial data using different approaches, which may be cause for issues in comparability. Moreover, this study is focused on only 3 developing Asian countries due to lack of financial data availability of other emerging Asian countries that comply with the Basel Accord. Research results on the impact of bank regulation on bank risk-taking attained from developed countries cannot be generalized on other emerging countries; as the regulatory framework objectives and efforts are also applied differently. Therefore, future research could include a comparison study between developed and emerging countries in Asia, where research is limited with that regard. Furthermore, this study only takes into account the countries that completed the bank regulation and supervision surveys and claimed that they adhere to Basel II accord. To test for true effectiveness of the regulatory policies, a comparison study could be conducted to compare the profitability and risk-taking behaviours among emerging countries that adopt Basel II and emerging countries not adopting the regulatory policies.

In sum, this research suggests that bank regulators should ensure that the banks strengthen their corporate governance and private monitoring to reduce corruption and enhance the performance of banks. Moreover, regulators should be monitored as they might use their power for their own personal benefit as depicted in the agency theory. In conclusion, applying the minimum capital requirements causes an increase in costs of raising bank capital and decreases profits; therefore, banks should be regulated to become more cost efficient and profitable.

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Appendix-1. Overview on sample Economic Characteristics

Country	Series Name	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
India	GDP growth (annual %)	9.264	8.608	3.891	8.480	10.260	6.638	5.484	6.540	7.179	7.934
India	Inflation, consumer prices (annual %)	6.146	6.370	8.352	10.877	11.992	8.858	9.312	10.908	6.650	4.907
India	Bank capital to assets ratio (%)	6.600	6.400	7.300	7.000	7.100	6.702	6.970	6.923	7.088	7.213
India	Population growth (annual %)	1.540	1.503	1.463	1.419	1.374	1.328	1.286	1.251	1.227	1.209
India	Population density (people per sq. km of land area)	391	397	403	408	414	420	425	430	436	441
India	Control of Corruption	-0.28	-0.40	-0.34	-0.45	-0.47	-0.54	-0.51	-0.52	-0.43	-0.35
Philippines	GDP growth (annual %)	5.243	6.617	4.153	1.148	7.632	3.660	6.684	7.064	6.218	5.905
Philippines	Inflation, consumer prices (annual %)	5.485	2.900	8.260	4.219	3.790	4.647	3.172	2.998	4.104	1.434
Philippines	Bank capital to assets ratio (%)	11.70	11.70	8.90	9.532	10.234	11.091	11.703	9.704	9.948	9.987
Philippines	Population growth (annual %)	1.671	1.555	1.486	1.478	1.513	1.560	1.592	1.606	1.593	1.562
Philippines	Population density (people per sq. km of land area)	294	298	303	307	312	317	322	327	332	338
Philippines	Control of Corruption	-0.83	-0.72	-0.76	-0.77	-0.76	-0.67	-0.56	-0.38	-0.44	-0.45
Thailand	GDP growth (annual %)	4.968	5.435	1.726	-0.738	7.507	0.834	7.231	2.702	0.818	2.828
Thailand	Inflation, consumer prices (annual %)	4.637	2.242	5.468	-0.846	3.248	3.810	3.020	2.184	1.890	-0.895
Thailand	Bank capital to assets ratio (%)	9.20	9.800	10.10	8.412	8.527	7.837	7.807	8.523	9.212	10.0
Thailand	Population growth (annual %)	0.470	0.270	0.150	0.143	0.216	0.316	0.390	0.427	0.406	0.344
Thailand	Population density (people per sq. km of land area)	130	130	130	130	131	131	131	132	133	133
Thailand	Control of Corruption	-0.38	-0.37	-0.41	-0.31	-0.33	-0.32	-0.37	-0.34	-0.45	-0.49

Source: World Bank Database

Appendix-2. Variables Definition

Classification	Variable	Symbol	Measurement
Dependent Variables			
Profitability	Return on Average Assets	ROA	Net Income/ Total Assets
	Return on Average Equity	ROE	Net Income/ Total Equity
	*Net income profitability ratio	NIP	Net Income/ Risk Weighted Assets
Risk- Taking	Loan loss reserve to total Loans ratio	LLR	Loan loss reserve / Total Loans
	Non-Performing loans to Total Loans ratio	NPL	(Impaired loans (NPLs)/ Gross loans)
Independent Variables Regulatory Variable 1	**Capital Regulatory Requirement Calculation: (1) +2(a) +2(b) + (3) * 3 +1(if 4<.75). *(Higher values indicate greater stringency)*	CAPRQ	This variable is determined by adding 1 if the answer is yes and 0 otherwise for questions 1-3 and 5, while the opposite occurs in the case of questions 6 and 7 (i.e. yes=0, no =1). The aim of the first four questions is to calculate the overall capital stringency; whether the capital requirement reflects certain risk elements and deducts certain market value losses from capital before minimum capital adequacy is determined. Which is calculated as: While questions 5-7 are asked to infer the initial capital stringency; whether certain funds may be used to initially capitalize a bank and whether they are officially. (1) Is the capital-asset ratio risk weighted in line with the Basle II guidelines used as of end of 2010? (2) Which risks are covered by the current regulatory minimum capital requirements in your jurisdiction: a. Credit risk? b. Market risk? (3) Are Unrealized losses in fair valued exposures deducted from regulatory capital? (4) What fraction of revaluation gains is allowed as part of capital? (5) Are the sources of funds to be used as capital verified by the regulatory/supervisory authorities? (6) Can the initial disbursement or subsequent injections of capital be done with assets other than cash or government securities? (7) Can the initial disbursement or subsequent injections of capital be done with assets other than cash or government securities?
			(4) Can the supervisory authority force a bank to change its internal organizational structure? (5) Do banks disclose to the supervisors the Off-balance sheet items? (6) Please indicate whether the following enforcement powers are available to the supervisory agency a. Require banks to constitute provisions to cover actual or potential losses b. Require banks to reduce or suspend dividends to shareholders c. Require banks to reduce or suspend bonuses and other remuneration to bank directors and managers (7) Which authority has the powers to perform the following problem bank resolution activities? Enter the initials of the corresponding authority from the following list of options: BS = Bank Supervisor, C = Court, DIA = Deposit Insurance Agency, BR/AMC = Bank Restructuring or Asset Management Agency, OTH = Other - please specify). a. Declare insolvency b. Supersede shareholders' rights c. Remove and replace bank senior management and directors

Regulatory Variable 3	**Private Monitoring and Market Discipline Eq1+(1 if Eq2=100%; 0 otherwise)+(1 if Eq3=100%; 0 otherwise)+Eq4+Eq5+[1 if (10)=(11)=1; 0 otherwise]+(12)+(13)	PRMON	This variable is determined by adding 1 if Yes and 0 if No = 0 for questions: (1), (1.a), (4- 6), (8- 13), while the opposite occurs in the case of question 7 (Yes = 0; No = 1). (1) Is an audit by a professional external auditor required for all commercial banks in your jurisdiction? (1.a) If yes, does the external auditor have to obtain a professional certification or pass a specific exam to qualify as such? **Eq1=1*1.a** (2) How many of the top ten banks (in terms of total domestic assets) are rated by international credit rating agencies (e.g., Moody's, Standard and Poor)? (2.a) How many commercial banks were there at the end of 2010? **Eq2= (2)/10*100 if (2.a)>9, (2)/ (2.a) if (2.a) <10** (3) How many of the top ten banks (in terms of total domestic assets) are rated by domestic credit rating agencies? (3.a) How many commercial banks were there at the end of 2010? **Eq3= (3)/10*100 if (3.a)>9, (3)/ (3.a) if (3.a) <10** (4) Is there an explicit deposit insurance protection system for commercial banks? (5) Were insured depositors wholly compensated (to the extent of legal protection) the last time a bank failed? **Eq4:** **1 if (4) = 0 or (5) = 0;** **0 if (4)= 1 and (5) = 1.** (6) Does accrued, though unpaid, interest/principal enter the income statement while the loan is still performing? (7) Does accrued, though unpaid, interest/principal enter the income statement while the loan is non-performing? (8) Are banks required to prepare consolidated accounts for accounting purposes? (9) Are bank directors legally liable if information disclosed is erroneous or misleading? **Eq5= (6) + (7) + (8) + (9)** (10) Is Subordinated debt allowed as part of Tier 1 capital and in what percentages? (11) Is Subordinated debt allowed as part of Tier 2 capital and in what percentages? (12) Do banks disclose to the public Off-balance sheet items? (13) Are bank regulators/supervisors required to make public formal enforcement actions, which include cease and desist orders and written agreements between a bank regulatory/supervisory body and a banking organization?
Control Variables			
Bank specific variables	Bank Capital	CP	Tier 1 Ratio
	Bank Size	SIZE	Natural log of Total Assets
	Bank Type	TYPE	A dummy variable to reflect the type of bank
	Bank lending	LEND	Net Loans/Total Assets
	Efficiency	EFFIC	Non-interest expenses/ Operating Income
	Diversification	DIV	Non-interest income/ Operating Income
	Operating leverage	OPLEV	Fixed Assets/ Total assets
	Liquidity	LIQ	Liquid Assets/ Dep & Short-term funding
	Cost to Income Ratio	CIR	Operating Costs/ Operating Income
	Year Dummy	YEAR	A dummy variable to reflect Time effect
Macroeconomic Variables	GDP growth (annual %)	GDP	GDP growth rate
	Inflation (annual %)	INFL	Inflation, consumer prices (annual %)

Source: Bankscop * Calculated by author, ** Bank regulation and Supervision Database, World Bank (Barth *et al.*, 2012)