Banking Regulation: does compliance pay?
Evidence from Trinidad & Tobago[1]

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Abstract

This paper seeks to establish empirically whether compliance by an individual commercial bank in Trinidad & Tobago with the Basel Core Principles (BCP) 6-15 for Effective Banking Supervision brings about any measurable improvement in its performance. It distinguishes itself from other studies that examine the relationship between the level of compliance and the performance of the banking or financial system as a whole. The data used is also distinctive: in addition to Commercial Bank Balance sheet and macroeconomic data, the study employs a data set comprising BCP 6-15 compliance ratings of each of the four major banks in Trinidad and Tobago rather than country ratings.

A panel fixed effects econometric estimator model is applied to four specifications, each one involving a different indicator of banking performance. BCP compliance significantly affects only two of these indicators. Of the macroeconomic variables, GDP growth and inflation are insignificant in all four specifications while the exchange rate and the prime lending rate have limited impact on performance. Of the bank-specific variables, the operating cost ratio is insignificant in all specifications while provision for loan loss affects two performance indicators.

KEYWORDS: **Basel Prudential Regulations and Requirements; regulatory compliance; bank performance.**

1. Introduction

A commercial bank is probably the most important financial intermediary in an economy because of the role it plays as a provider of liquidity, in monitoring services and as producers of information (Diamond and Dybvig 1983). Banks in their daily operations are exposed to a wide array of risks which, if not managed and controlled, may result in disastrous consequences for the economy as a whole. Banking crises have become more frequent and severe in recent times: Lindgren et al. (1996) found that 133 out of IMF 181 member countries suffered some form of banking crises between 1980 and 1995. Capiro and Klingebiel (2003) record 117 systemic bank crises in 93 countries and 51 non-systemic crises in 43 countries since the 1970s, and many of these are developing or transitional economies. From the evidence, it is clear why such great emphasis is placed on regulating the banking industry, which remains one of the most regulated industries in the world.

The main goal of regulation, in particular regulation imposed by the Basel Accord, is to provide a sound and efficient banking system. The motivation for this study stems from the recent increased emphasis placed on regulating the banking sector and the thrust by the Bank of International Settlements for all banks to be fully compliant with the Basel Accord within a stipulated time, which was initially the end of 2007. This Accord contains twenty-five principles,

known as the Basel Core Principles for Effective Banking Supervision (BCP), which are supposed to guide a bank through its operations in order to prevent disruptions to banks and, by extension, the financial sector and the economy as a whole. But does compliance by an individual commercial bank result in measurable improvements in its performance? Since the process of compliance is a costly, time consuming one, performance improvement would be a major incentive for a bank to comply.

This study attempts to establish empirically whether compliance by an individual commercial bank in Trinidad & Tobago with BCP 6-15 brings about any measurable improvement in performance by that bank. It distinguishes itself from other studies that examine the nature of the relationship between the level of compliance with the BCP and the performance of the banking or financial system as a whole, which include Sundararajan et al (2001), who look at the relationship between BCP compliance and the soundness of the financial system; Montgomery (2005), who investigates the relationship between Basel capital adequacy requirements and portfolio choice of Japanese banks; Podpiera (2004), who studies the relationship between banking sector performance and the quality of regulation and supervision as measured by compliance with the BCP; and Demirgüç-Kunt et al (2006), who investigate whether compliance with the BCP improves bank soundness.

The data used in this study is also distinctive: in addition to Commercial Bank Balance sheet and macroeconomic data, it employs a data set comprising BCP 6-15 compliance ratings of each of the four major banks in Trinidad and Tobago rather than country ratings. A panel fixed effects econometric estimator model is applied to four specifications, each one involving a different indicator of banking performance: net interest margin, return on assets, return on equity and non-performing loan ratio.

The rest of this paper is organized as follows: in the following section, the data and methodology employed in the analysis of the Trinidad & Tobago case are discussed and reviewed, after which follow the results of the estimation exercise. The paper then concludes.

2. Data and Methodology

In order to test whether compliance affects bank performance in Trinidad & Tobago, the following model is proposed:

$Y_{it} = \alpha + \beta_1 bcp_{it} + \beta_2 op_{it} + \beta_3 pll_{it} + \beta_4 gdp\_growth_t + \beta_5 irate_t + \beta_6 erate\_buy_t + \beta_7 lending\_rate_t + \varepsilon_{it}$
(1)

where i denotes the bank's subscript and t is subscript indicating the year. Y is a measure of bank performance, which will be explained by bank-specific explanatory variables consisting of a bank's BCP compliance variable, *bcp*, its operating expense ratio *op*, and its

provision for loan loss to average asset ratio, *pll*. Explanatory aggregate macroeconomic variables are the GDP growth rate, *gdp_growth*, the inflation rate, *irate*, the exchange rate, *erate_buy* and the prime lending rate, *lending_rate.*

One problem with (1) is that the number of explanatory variables is limited; hence, there may be other determinants of bank performance that cannot be controlled for, the effect of which would be captured in the error term. If these were correlated with one (or several) of the other explanatory variables, then the estimated coefficients would be biased. One possibility is to assume that all such unobservable factors are time invariant:

$$\varepsilon_{it} = \mu_i + v_{it} \qquad\qquad\qquad\qquad (2)$$

where μ represents the time invariant unobservables and ν is a standard i.i.d. error term. Under this assumption, a panel fixed effects estimator may be employed to purge these time invariant unobservables, where all variables are transformed into deviations from their mean. By using a fixed effects estimator one is essentially subtracting the (cross-bank) mean from all variables. This removes cross-bank (time invariant) variation, leaving only the variation of variables over time within banks. The variation to be explained will primarily come over time from within rather than across banks.

Four alternative measures of Y are used: net interest margin, return on assets, return on equity and non-performing loan ratio. Balance sheet data from the annual reports of all the banks is used to calculate these values which are used as indicators of bank performance in preference to traditional indicators such as total assets, performing loans and non-performing loans. Koch and Mac Donald (2003) argue that the latter suffer from three basic flaws: (1) they ignore the wide diversity of strategies pursued by different institutions; (2) a bank's total assets no longer serve as a meaningful yardstick when banks engage in off-balance sheet activities and (3) analysis using such variables provides no direct information concerning how or which of the banks contribute to the creation of shareholder value. Ikhide (2000) also argues against the use of 'aggregative indices' such as total assets, loans or deposits as an index of bank performance since none of these can sufficiently capture bank performance. Faced with these problems, more and more studies have resorted to the use of accounting data on bank margins, costs and profits as measures of bank performance, as is done in this paper.

The correlation matrix in Table 1 below provides evidence that the four different measures of bank performance are capturing different aspects of performance since there is very little correlation between them.

Table 1: Correlation Matrix

	Return on equity	Return on assets	Non performing loan ratio	Net Interest margin
Return on equity	1.0000			
Return on assets	0.1827	1.0000		
Non performing loan ratio	-0.4779	-0.0402	1.0000	
Net Interest margin	0.0303	-0.0228	-0.4973	1.0000

In order to measure *bcp*, data on BCP compliance was obtained from the Central Bank of Trinidad and Tobago (CBTT) for four major banks using a questionnaire[2]. The CBTT was asked to rate the individual banks on the level of compliance with the BCP 6-15 over the period 1997-2006 on a scale of 0 to 10. A score of 0 indicates that the bank is non-compliant, between 1-4 that it is materially non-compliant, between 5-9 that it is largely compliant, and 10 that it is fully compliant. The CBTT was also asked to provide the relative weight it attached to each of the BCP 6-15. An overall summary measure of compliance, *bcp*, is calculated as a weighted average of ratings for each principle:

$$bcp_{it} = \sum_{j=1}^{m} w_j r_{ijt}$$

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[2] The questionnaire is available on request from the authors.

where w_j is the principle specific weight as provided by the Central Bank, and r are the ratings of the principles, which are bank-specific and varying over time. Note that this measure is necessarily bounded between 0 and 10.

The trends in *bcp* over time for each of the four banks are depicted in Figure 1. They show that in three out of the four banks compliance with the BCP increased over time. These trends are not surprising since all banks worldwide are expected to comply fully with the BCP, even those in developing countries who, though lagging behind, are expected to make continuous efforts to be fully compliant with all the principles.

Figure 1: Trends in bcp by Bank
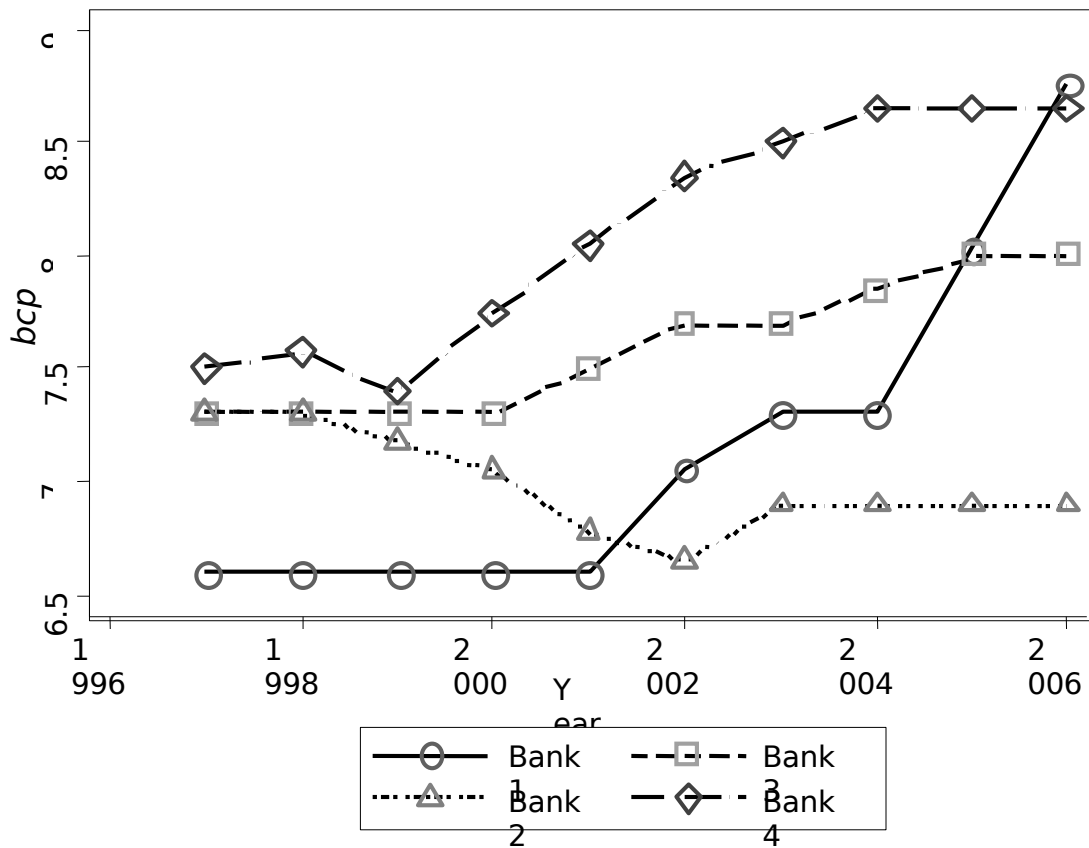
The macroeconomic data was obtained from the CBTT's online database. The variables chosen are reflective of how the economy is performing and will therefore directly affect a bank's performance.

Summary statistics of all variables used in the analysis are shown in Table 2. In the case of the explanatory variable of main interest, *bcp*, note that on average a bank's summary rating is a little above 7.4. However, the sizeable standard deviations show that there are considerable differences across the different banks and over time.

Table 2: Summary Statistics

Variable	Mean	Standard Deviation
BCP index	7.465	0.6437272
Operating expense ratio	0.3526672	0.23892
Net Interest Margin	2.2204	0.76516
Return on Asset	0.0200588	0.0245034
Return on equity	0.1413488	0.522823
Provision for loan loss to Average Asset	0.118123	0.013347
Non performing loan ratio	0.0479562	0.0396074
Non performing loan coverage ratio	0.812559	0.8291881
GDP growth	8.635	2.794237
Exchange rate	6.22745	0.319152
Inflation rate	4.995	1.986702
Prime lending rate	13.463	3.215193

3. **Results**

The results of using a panel fixed effects estimator for equation (1) are given in Table 3, where the alternative measures of Y are clearly shown: *nim* (net interest margin), *roa* (return on assets), *roe* (return on equity) and *nplr* (non-performing loan loss ratio).

Table 3: Panel Fixed Effects Estimation of the Impact of BCP on Bank Performance

	(1)	(2)	(3)	(4)
Dep. Var.:	**nim**	**roa**	**roe**	**nplr**
bcp	0.070	0.012**	-0.023	-0.026*
	(0.195)	(0.005)	(0.019)	(0.015)
op	-3.884	-0.094	-0.228	0.091
	(2.378)	(0.065)	(0.229)	(0.180)
pll	7.568	1.755***	-0.406	0.931*
	(6.036)	(0.164)	(0.580)	(0.458)
gdp_growth	0.002	-0.000	-0.003	0.001
	(0.032)	(0.001)	(0.003)	(0.002)
erate_buy	6.035**	-0.045	0.197	0.245
	(2.649)	(0.072)	(0.255)	(0.201)
irate	0.030	0.001	0.001	-0.003
	(0.039)	(0.001)	(0.004)	(0.003)
lending_rate	-0.167***	-0.000	-0.002	0.002
	(0.030)	(0.001)	(0.003)	(0.002)
Observations	38	38	38	38
F-u	1.66*	10.68***	10.91***	1.26*
R-squared	0.78	0.86	0.11	0.50

Notes: (1) "F-u" – F-test of fixed effects; (2) standard errors in parentheses; (3) ***, **, and * indicate one, five, and ten per cent significance levels.

The F-test of the null hypothesis of no individual fixed effects results in rejection of the null in all four cases, hence providing support for the fixed effects estimator (in preference to Ordinary Least Squares). The main focus of these results is whether compliance with the BCP affects bank performance. Here, compliance significantly affects the return on assets and the non-performing loan

ratio: an improvement in compliance increases the value of the return on assets and decreases the value of the non-performing loan ratio. These results are in line with ex ante expectations since the more a bank complies with BCP, the more we expect that its performance would improve. Since BCP 6-15 give comprehensive guidelines concerning loan granting and provision for loss policies, it is expected that compliance would reduce the value of non-performing loans. However, *bcp* is not significant in the other two cases: BCP compliance has no effect on the net interest margin or on the return on equity.

Of the macroeconomic variables, GDP growth and inflation are insignificant in all specifications, a result that is inconsistent with theory because we expect that, if there is an improvement in GDP, bank performance will improve. The exchange rate and the prime lending rate only have a significant impact on the net interest margin. As the exchange rate (measured in Trinidad and Tobago dollars per US dollar) increases, net interest margin also increases. This is surprising as on expects that as the value of the dollar decreases the bank would be worse off. As the prime lending rate increases, net interest margin decreases. This result is consistent with expectations because, as the interest rate increases, people borrow less, which decreases the value of interest income earned. Of the bank-specific variables, the operating cost ratio is insignificant in all specifications,

suggesting that the operating cost ratio cannot explain any changes/differences in bank performance. The provision for loan loss positively affects non-performing loan ratio, indicating that as banks make more provisions for bad loans the value of non performing loans increases. However, provision for loan loss positively affects return on assets meaning that as provision for loan loss increases, return on assets also increases. This is contrary to expectations as one expects that as the bank makes more provisions for bad loans the value of assets would decrease.

4.   **Conclusion**

This paper investigated how compliance with BCP 6-15 affects the performance of an individual bank in Trinidad & Tobago. To this end, a unique data set of BCP compliance ratings, macroeconomic and balance sheet variables was compiled for four major banks in Trinidad and Tobago and analyzed using a panel fixed effects econometric estimators.

The results show that BCP compliance significantly affects return on assets and non-performing loan ratio: an increase in compliance increases the value of return on assets and decreases the value of non-performing loan ratio, which is expected. GDP growth and inflation have no impact on bank performance, which is an enexpected result especially in the case of the GDP effect. The exchange rate and the prime lending rate only have a significant impact on net interest margin only: as the exchange rate increases net interest margin also increases and as the prime lending rate increases net interest margin decreases. In terms of the bank-specific variables the operating cost ratio is insignificant in all specifications: the operating cost ratio does not explain bank performance. Provision for loan loss to average asset ratio positively affects return on assets and the non-performing loss ratio.

It is still unclear whether BCP compliance brings about performance improvement, as there are arguments both for and against. What must be noted is that the Bank of International Settlements expects all banks to become compliant. If banks, particularly in the developing world, want to remain or become competitive and attract foreign investment, they must invest time and resources to implement these principles as this would give investors a certain amount of security as these principles are designed to prevent banking failures.

As a final note, it is important to emphasize that there is considerable room for further research in terms of exploring the relationship between bank performance and regulation. The major hindrance in this regard is clearly data availability.

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