# Do Jamaican Domestic Systemically Important Financial Institutions have a Deposit Rate Advantage?

Kacian Lewis, Andrene Senior &
Rasheeda Smith Yee[1]

## *Abstract*

This paper explores the existence of a funding cost advantage for “systemically important” deposit-taking institutions (DTIs) compared to other DTIs, attributable to their too-important-to-fail characteristics. Using readily available indicators for the period 2000 to 2013, we seek to confirm the existence of systemically important financial institutions, in the first stage of our analysis as well as investigate what happens to their risk profile when we extend our study to include affiliate non-DTI financial institutions. In the second stage we look at whether Jamaica’s systemically important DTIs have a significant pricing advantage, after controlling for key risk variables. We find evidence that there exist three systemically important DTIs in Jamaica and two systemically important banking groups in our extended framework. We also find that these institutions do appear to have cost advantage.

**JEL classification:** G01; G18; G21; L50

**Keywords:** too-important-to-fail, implicit subsidy, systemic risk

---

[1] Kacian Lewis is a Graduate Student in the Department of Economics, UWI, Mona Campus, Jamaica. This paper was written while Kacian Lewis served as an Intern in the Financial Stability Department at the Bank of Jamaica <kacian.lewis@uwimona.edu.jm>. Andrene Senior is an Economist in the Financial Stability Department, Bank of Jamaica <andrene.senior@boj.org.jm>. Rasheeda Smith Yee is a Board Operations Officer at the International Monetary Fund <rsmithyee@imf.org>. The views expressed are those of the authors and not necessarily those of the Bank of Jamaica or the International Monetary Fund.

## 1. Introduction

In the context where the failure of large banks can have a far more detrimental impact on the domestic system than smaller banks, it is critical that risks emanating from large institutions are assessed and steps taken to mitigate these risks. These risks are exacerbated when large institutions have funding cost advantages based on investors' belief that the government will provide support should the bank become impaired or fail. This 'too-important-to-fail' (TITF) problem makes investors and depositors willing to accept lower yields from larger banks and therefore provides them with added resources to become even more systemically important.

It is important to note that large banks, as measured by assets size, do not necessarily display TITF characteristics. Oftentimes, large banks are allowed to fail when they are not systemically important. Thus, the term TITF is generally reserved for institutions that are so important to the stability of the financial sector that impairment of the bank would spur some policy action to support the bank. In an effort to reduce the TITF phenomenon, many countries, particularly since the 2008 global financial crisis, have either adopted or are adopting higher statutory requirements for systemically important banks, depending on the risk they pose to the system. Policy has also sought in some cases to put restrictions on tax-payer financed bailout of banks.

Determining the existence of cost advantage requires evaluating and classifying institutions based on some measure of size or systemic importance. In practice, this has been done by classifying institutions in terms of asset size and more recently by looking at a number of categories to determine an institutions overall systemic importance to a system. Brämer and Gischer (2012) provide a method for measuring the importance of institutions in the domestic financial system, and as such the risk posed by the failure of these institutions.[2] Their methodology classifies DTIs as "Domestic Systemically Important Banks" (D-SIBs) based on their importance in key areas including but not limited to size.[3] In this context, it provides a way for us to avoid the question of at what asset size does a bank become too large.

[2] This paper was revised by the Australian Prudential Regulatory Authority in December 2013.
[3] The Basel Committee has developed a set of 12 principles for the D-SIB framework. The principles focus on the assessment methodology for D-SIBs and on Higher Loss Absorbency for D-SIBs i.e. on determining institutions that may be required to hold additional capital depending on their significance (see Appendix 1).

The aim of this paper is to ascertain whether D-SIBs receive a cost advantage relative to other banks in Jamaica. We first utilize the methodology introduced in Brämer and Gischer (2012) to classify DTIs as D-SIBs or non-D-SIBs. We then extend the framework to incorporate affiliate securities dealers and insurance companies to assess how accounting for these institutions changes the risk profile of the D-SIBs. The final step is to determine if institutions that are deemed to be systemically important receive the benefit of lower funding costs. It is hoped the paper will provide a base for discussions on appropriate regulations for D-SIBs, which may be perceived as TITF, and the management of advantages gained by the institutions from this Government subsidy.

## 2. Literature review

Measuring the cost advantage enjoyed by larger banks has received significant interest in recent years, particularly in the context where large banks have been rescued at significant cost to taxpayers. A number of studies have focused on the measuring the effect of the 'too big to fail' (TBTF) subsidy, as opposed to the TITF subsidy on deposit funding costs. Others have focused on the impact of this implicit subsidy on corporate bond spreads.

Noss and Sowerbutts (2012) examined the implicit subsidy in United Kingdom banks and the resulting distortions in the financial market. They utilized the funding advantage and the contingent claim models to measure the subsidy and found evidence that creditors reduced their required compensations from banks they considered TBTF. Baker and McArthur (2009) quantified the implicit value of government protection provided by the TBTF policy, using United States data on the relative cost of funds for banks, before and after the crisis. The authors found that the cost of funding for smaller banks and TBTF banks widened post-crisis, suggesting that TBTF banks were able to borrow at lower cost than other banks, and relied less on credit ratings.

Jacewitz and Pogach (2013) assessed whether large banks have a deposit rate advantage over smaller banks, by looking at the difference in the risk premium paid by the two groups of institutions. They found that between 2006 and 2008, large banks had a 36 basis points (bps) deposit risk premium advantage, after controlling for common risk variables. Similarly, Kumar and Lester, in a recent study (2014) found that large banks (with US$100 billion in assets) benefited from funding costs advantages of more than 30 bps on uninsured money market deposit accounts (MMDAs) before 2010 but by the end of 2012 to advantage declined to 20 bps, after controlling for common balance sheet measures of risk.

Other studies focused on the discount that bond holders offered the largest banks as opposed to smaller banks. For example, Santos (2014), used a model of bond spreads to compare credit swaps on bonds in the primary market. It found that the largest banks benefited from a discount of 44 bps compared to the cost other banks pay to issue bonds in the market. This suggests that bonds from TBTF banks were considered to be safer than their smaller counterparts. This advantage allowed the largest banks to accumulate more funding in the bond market at a discount. Although large non-financial institutions and corporations had similar results, the test showed that the discount for the largest banks was significantly higher from that of the largest non-financial institutions and non-financial corporations.

Araten and Turner (2012) sought to determine the extent of funding cost differences between Global Systemically Important Banks (G-SIBs) and non-G-SIBs in the U.S. The study controlled for macroeconomic factors and firm-specific credit risk and found the existence of a moderate cost advantage associated with G-SIBs with regard to domestic deposits and smaller cost advantages with respect to credit spreads on senior, unsecured debt. Araten and Turner also examined the credit default swap spreads for large firms in other industries and found an even more significant size effect in other industries. Similarly, Acharya, Anginer and Warburton, (2013) examined the relationship between risk undertaken by financial institutions and the credit spread on bonds. They found that while a positive relationship existed for small and medium institutions, there was no discernable relationship for the largest institutions, suggesting that bondholders of the largest banks expected an implicit subsidy to protect them from the repercussions of a default. In addition, the authors found that although the largest banks tend to be riskier, they have however, enjoyed lower spreads.

The Basel Committee on Banking Supervision (BCBS) introduced policy measures in 2011 with the broad aim of reducing the probability and the impact of failure of G-SIBs. The measures outlined the magnitude of additional loss absorbency that is required of G-SIBs (BCBS, 2011). Furthermore, the BCBS in order to identify G-SIBs used an indicator based measurement approach, which assessed institutions in terms of relative size, interconnectedness, substitutability, global activity and complexity. During 2012, the BCBS adopted this method with some variation to assess banks that are not highly internationally active but have a significant impact on their domestic financial system and economy. The D-SIB framework focuses on the impact that the failure of such banks will have on the domestic economy.

## 3. The D-SIB Framework for Jamaica

The framework follows the methodology outlined in Brämer and Gischer (BG) 2012, which assesses the significance of banks based on several categories. BG closely follows the Basel Committee's recommendations for assessing D-SIBs. Categories include:

- *Size*: focuses on a bank's interaction with the domestic sector and uses 'total resident assets'.
- *Interconnectedness*: uses 'loans to financial corporations' and 'deposits from financial corporations'.
- *Non-Substitutability:* assesses whether it will be difficult for customers, outside of the financial industry, to find an alternate supplier should a bank cease providing a service, with indicators such as credit to households, 'credit to non-financial corporations', 'credit to general government', 'credit to community service organizations', and 'credit to non-profit institutions'.
- *Complexity:* assesses the impact on systemic stability from the failure of a bank with more complex business structures by looking at 'trading securities', which includes speculative short-term assets and 'investment securities', which includes 'financial assets available for sale' and 'assets held to maturity'.

***Methodology for Determining Systemic Importance***

The Basel Committee offers some flexibility in the implementation of appropriate measures to identify D-SIBs. Given that the Committee's framework is 'principles-based' and does not define a specific threshold value to determine D-SIBs, a working definition was used for this analysis. Furthermore, the size, interconnectedness, non-substitutability and complexity categories previously mentioned each has an equal weight of 25 per cent, and the indicators within each category are also equally weighted. A bank is deemed to have systemic importance if it has a category score value higher than 0.1 or a total score higher than 0.4 thus placing emphasis on scores for individual categories as well as on the total score (for example, see Bramer and Gischer, 2012).

Firstly, the analysis captures the results for Jamaica's 12 DTIs alone, and then covers results for banking groups, which may include securities dealers and insurance companies. That is, for the purpose of the analysis related entities are combined into a single entity. The paper utilizes data at end 2013 to ascertain which DTIs can be classified as D-SIBs based on the four categories of mentioned above.

The score for bank *i* for period *j* is computed as follows:

$$SCORE_{ij} = \frac{A_{ij}}{\sum_i^n A_{ij}} + \left(\frac{(LFC_{ij} + DFC_{ij})}{(\sum_i^n LFC_{ij} + \sum_i^n DFC_{ij})}\right) + \left(\frac{(LH_{ij} + LNFC_{ij} + LGG_{ij} + LCS_{ij})}{(\sum_i^n LH_{ij} + \sum_i^n LNFC_{ij} + \sum_i^n LG_{ij} + \sum_i^n LCS_{ij})}\right) + \left(\frac{(TS_{ij} + IS_{ij})}{(\sum_i^n TS_{ij} + \sum_i^n IS_{ij})}\right)$$

where, *A* represents total resident assets, LFC represents loans to financial corporations, DFC represents deposits from financial corporations, LH represents loans to households, LNFC represents loans to non-financial corporations, LGG represents loans to the general government, LCS represents loans to community service and non-profit organizations, TS represents trading securities and IS represents investment securities.

***DTI Results***

Prior expectations are that the Bank of Nova Scotia Jamaica (BNSJ) and the National Commercial Bank (NCB) will be classified as D-SIBs. The results validate this expectation and also indicate that Jamaica National Building Society (JNBS) is a domestic systemically important institution. The DTI sector can thus be classified into three D-SIBs, with high systemic importance, and eight non-D-SIBs.

The highest systemic risk emanates from NCB, which has a score of 1.34, accounting for 31.6 per cent of the DTI sector. The three major institutions NCB, BNSJ, which includes the commercial bank and the building society, and JNBS have a cumulated score of 2.79 and represent 70.4 per cent of the Jamaican DTI sector. Note that, two systemically most important institutions NCB and BNSJ have an almost identical score in the category of 'interconnectedness'. The higher systemic risk of NCB largely stems from its high participation in trading and investment activities which resulted in a higher score in 'complexity'.

The top two D-SIBs are significant in all four categories, while two of the non-D-SIB institutions, Victoria Mutual Building Society (VMBS) and First Caribbean International Bank (FCIB), demonstrate systemic importance in the categories 'complexity' and 'interconnectedness', respectively.

**Table 1: Systemic Importance of Jamaican Banks (December 2013)**

| *Rank* | *Institution Name* | *Size* | *Interconnectedness* | *Non-Substitutability* | *Complexity* | *TOTAL SCORE* |
|---|---|---|---|---|---|---|
| 1 | NCB | 0.32 | 0.32 | 0.32 | 0.38 | 1.34 |
| 2 | BNSJ | 0.27 | 0.32 | 0.29 | 0.14 | 1.02 |
| 3 | JNBS | 0.12 | 0.04 | 0.11 | 0.16 | 0.44 |
| 4 | VMBS | 0.08 | 0.07 | 0.06 | 0.12 | 0.33 |
| 5 | FCIB | 0.06 | 0.11 | 0.07 | 0.02 | 0.27 |
| 6 | RBC | 0.05 | 0.05 | 0.07 | 0.02 | 0.19 |
| 7 | FGB | 0.04 | 0.01 | 0.03 | 0.05 | 0.13 |
| 8 | CBNA | 0.02 | 0.06 | 0.01 | 0.02 | 0.10 |
| 9 | JMMBMB | 0.02 | 0.00 | 0.01 | 0.06 | 0.10 |
| 10 | SBJ | 0.02 | 0.01 | 0.02 | 0.03 | 0.08 |
| 11 | MFG | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| | **Total Sum** | **1.00** | **1.00** | **1.00** | **1.00** | **4.00** |

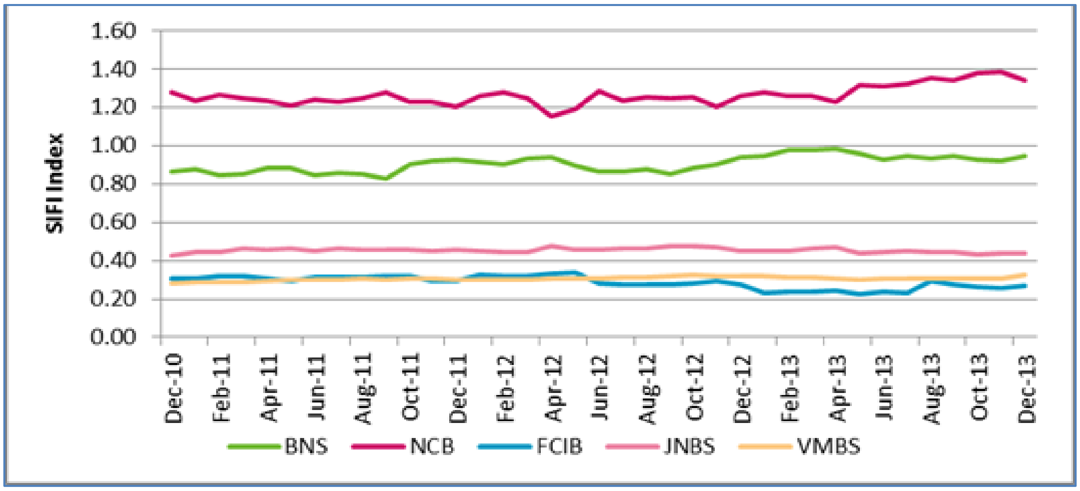
*includes data on DTIs only

indicates importance within a category

indicates overall systemic importance

Figure 1 displays important monthly information on the systemic importance of Jamaica's DTIs over the period December 2010 to December 2013. The graph illustrates that three DTIs, NCB, BNS and JNBS, displayed systemic importance within the DTI sector throughout this review period. Systemic importance has, in addition, increased for all three major DTIs for this review period. The absolute gain over the sample period for NCB, BNS and JNBS were 0.06, 0.08 and 0.01, respectively. None of the non-D-SIBs displayed any overall systemic importance at any point during the review period.

**Figure 1: Domestic Systemic Importance in Jamaican DTIs**




The three major institutions were the only institutions that reflected systemic importance in terms of 'size' and 'non-substitutability' throughout the period. FCIB showed some evidence of systemic importance in the 'interconnectedness' category during the review period. VMBS was significant in the 'complexity' category for the period June 2012 to December 2013.

***Results for DTI Financial Groups*** [4]

When the analysis is extended to include affiliate securities dealers and insurance companies of DTIs, data as at end-2013 on Jamaica's banking groups show that JNBS becomes less important to the system and the NCB and BNS groups are the only two systemically important banking groups. NCB Group has the highest systemic relevance with a score of 1.19, relative to a score of 1.34 within the DTI sector alone. The highest category of disparity between the two major banking groups remains in the category of 'complexity'. The rank of the NCB Group largely reflects the systemic importance of its securities dealer subsidiary, NCB Capital Markets Limited (NCB CAP), relative to the systemic importance of the securities dealer subsidiary of the BNS

[4] A detailed table is provided in Appendix 2.

group, Scotia Investment Limited (SIL). Of note is that the main category of disparity between the two securities dealers is also reflected by the 'complexity' category. Note that the decline in the score of systemic relevance for NCB Group relative to the score for NCB is not only due to the broadening of the framework, but also to the relatively lower importance of NCB group's insurance company (see Table 2).

The smaller of the major banking groups, BNSJ, yields a systemic relevance that is 3.1 times as high as that of the largest non-D-SIB, which is the JN Group. JN Group, with a score of 0.31, is systemically important in the category of 'non-substitutability', showing a category score above the 0.1 category threshold. In addition, the JN Group declined in importance in the banking group analysis relative to the analysis of the DTIs due to the low importance of both its securities dealer and insurance company subsidiaries.

**Table 2: Systemic Importance of Banking Groups (December 2013)**

| *Rank* | *Institution Name* | *Size* | *Interconnectedness* | *Non-Substitutability* | *Complexity* | *TOTAL SCORE* |
|---|---|---|---|---|---|---|
| 1 | NCB Group | 0.27 | 0.33 | 0.31 | 0.28 | 1.19 |
| 2 | BNS Group | 0.22 | 0.30 | 0.29 | 0.17 | 0.97 |
| 3 | JN Group | 0.09 | 0.04 | 0.11 | 0.08 | 0.31 |
| 4 | Sagicor Group | 0.11 | 0.05 | 0.02 | 0.14 | 0.33 |
| 5 | JMMB Group | 0.09 | 0.04 | 0.03 | 0.12 | 0.27 |
| 6 | VMBS Group | 0.05 | 0.05 | 0.06 | 0.04 | 0.20 |
| 7 | FCIB Group | 0.03 | 0.09 | 0.07 | 0.01 | 0.20 |
| 8 | RBC Group | 0.03 | 0.04 | 0.07 | 0.01 | 0.14 |
| 9 | FGB Group | 0.04 | 0.02 | 0.03 | 0.05 | 0.14 |
| 10 | GLI Group | 0.03 | 0.01 | - | 0.05 | 0.09 |
| 11 | Other | 0.04 | 0.05 | 0.01 | 0.04 | 0.15 |
| | **Total Sum** | **1.00** | **1.00** | **1.00** | **1.00** | **4.00** |

(pink) indicates systemic importance within a category
(green) indicates overall systemic importance

Sagicor Group, ranked fourth in terms of importance, compared to a rank of tenth in the analysis of the DTI sector alone. The Group displayed systemic importance in the 'complexity' and 'size' categories. The affiliate securities dealer and the insurance company subsidiaries had very similar scores in the 'complexity' category, with the insurance company being larger in 'size' than the securities dealer. Within the Sagicor Group, the commercial bank has the lowest importance.

The JMMB Group also showed a significant increase in rank and systemic importance when its securities dealer subsidiaries were combined along with the merchant bank. Note that, the securities dealer, JMMB, has a score of systemic importance that is 4.4 times that of the merchant bank, JMMBMB. The JMMB Group, though not demonstrating overall systemic importance based on the 0.4 threshold was systemically relevant in the ‘complexity’ category.

## 4. Deposit Rate Advantage Among Jamaican D-SIBs

In this section we investigate whether the D-SIBs identified in Section 3 have a cost advantage relative to non-D-SIBs. To do this, the study assesses the deposit premium paid by banks, as measured by the difference between the weighted average time deposit rate and the savings rate for each DTI. The use of this risk premium, rather than a single deposit rate, controls for non-risk factors.[5] In order to control for other risks specific to the bank’s balance sheet, outside of being considered TITF, indicators related to liquidity, capital and assets quality are selected and included in the study.

An examination of the mean time deposit rate for D-SIBs relative to that of non-D-SIBs over the period 2006-2013, shows a general downward trend in rates from the beginning of 2006 to 2008 (see Figure 2). This is notwithstanding a spike in non-D-SIB rates in 2009, which coincided with the global crisis. A similar spike was not evident for D-SIBs. Notably, the average rate for non-D-SIBs has been above that of D-SIBs for the period. This gives support to a possibility that Jamaican DTIs do in fact exhibit TITF characteristics.

[5] These could include the benefits of having a broader range of services of having a larger network.

**Figure 2: Average time deposit rates (2006-2013)**

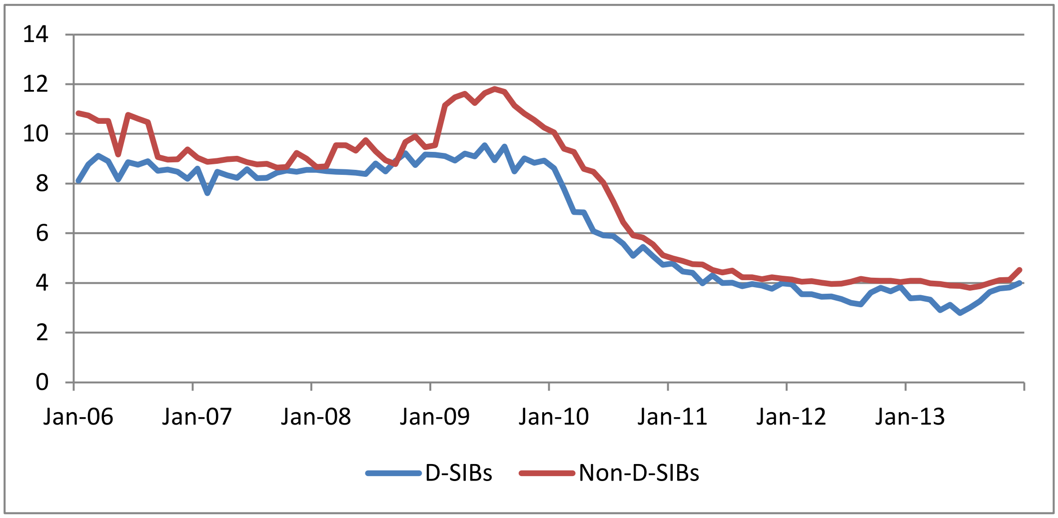
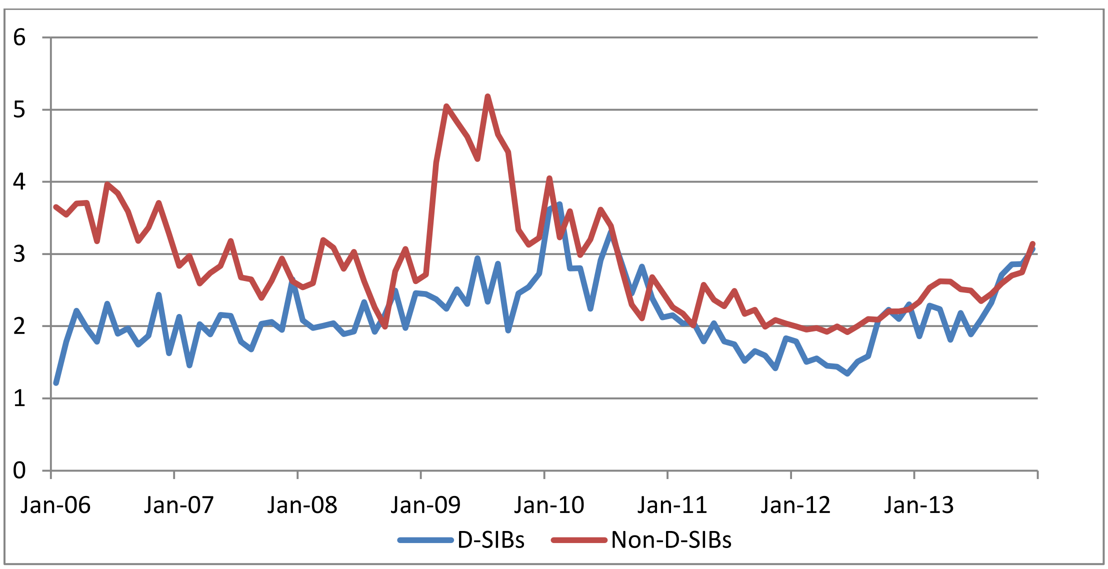



Figure 3 presents the risk premium for the both groups of institutions over the period 2006 to 2013. The figures show that the D-SIBs paid a smaller risk premium for all of the period.

**Figure 3: Mean risk premium (2006-2013)**



### *Data for Assessing Deposit Rate Advantage*

The data for econometric assessment of whether deposit rate advantage exists for D-SIBs spans the period January 2001 to December 2013, covering 10 DTIs.[6] Table 3 provides the description of the variables used in the study. All data had a monthly frequency except for data on the profits of DTIs. Quarterly data on the profits of DTIs was converted to a monthly series by interpolation using the EViews software. The control variables, taken from the literature (see Pogach & Jacewitz, 2013 and Kumar & Lester, 2014), capture the institutions' capital adequacy, asset quality, management, earnings, liquidity, earnings and sensitivity to market risk.[7] The assessment was in some cases limited by the data availability on key control variables.

**Table 3: Summary of the Variables**

| Variables | Description |
|---|---|
| $Rp_{i,t}$ | Difference between the weighted average savings and time deposit rates for institution *i* at time *t*. |
| $Inc_{i,t}$ | Pre-profit income to total assets of institution *i* at time *t*. |
| $Liq_{i,t}$ | Liquid funds, including treasury bills, BOJ securities, other government securities, other public sector securities less items in course of collection and pledged assets for institution *i* at time *t*. |
| $Vol_{i,t}$ | Annual variance in asset growth for institution *i* at time *t*. |
| $Dg_{i,t}$ | Annualised monthly growth in deposits for institution *i* at time *t*. |
| $DSIB_{i,t}$ | A dummy that assigns a value of "1" for institutions designated D-SIBs and "0" for other financial institutions. |
| $Time_t$ | A vector of 13 dummy variable, one for each year covered by the study. |

### *Pre-diagnostics test*

The unit root test results for the variables included in the study are presented in Appendix 3. The Im, Pesaran and Shin (2003) and the Levin, Lin and Chu (2002) tests were conducted to determine order of integration of the variables. In cases where the results were mixed, the majority result, including the ADF-Fisher Chi-square and PP-Fisher Chi-square tests was accepted. As such, all variables were deemed to be stationary in levels (see Appendix 3). A

[6] The financial institutions are the Bank of Nova Scotia Group (BNS), National Commercial Bank (NCB), Royal Bank of Trinidad and Tobago (RBTT), First Global Bank (FGB), First Caribbean International Bank Group (FCIB), Citibank North America (CBNA), Pan Caribbean Bank (PCB), Jamaica National Building Society (JNBS), Victoria Mutual Building Society (VMBS) and Jamaica Money Market Brokers Merchant Bank (JMMB)

[7] They capture the effectiveness of management in controlling and monitoring credit risk, and the profitability of the banks, which could influence an investor's decision to choose a particular bank over another. They also are an indication of how readily a bank can react to systemic risks such as a recession, a natural disaster or political instability.

covariance analysis showed that the explanatory variables chosen were weakly correlated with the dependent variable.

***Methodology***

The model employed closely follows a study by Kumar and Lester, (2014). The equation has the following specifications:

$$rp_{i,t} = \alpha + \beta_k BankControls_{kit} + \gamma(DSIB_i \times time_t) + \varepsilon_{i,t}$$

where, *t* represents time, *i* denotes the individual banks, *rp* represents the difference in rates paid deposits on the long end relative to rates paid on the short end, and $BankControls$ represents variables used to measure the bank risk, derived from the publicly available financial statements.

The variable $time$ is a vector of dummy variables representing each year of the data set (from 2001 to 2013). The dummy variable, *DSIB*, was created to capture the advantages D-SIBs may have due to lower cost of funding over the period. Under the D-SIBs framework, banks with a score of 0.40 and over are considered to be systemically important and grouped accordingly. Banks with a lower score are considered to be small and grouped as other banks. The interaction of time effects with $DSIB$ captures the trends that impacted the deposit pricing for D-SIBs during the period. The institutions covered in this section include all DTIs that existed during the period with the exception of MF&G Trust & Finance Limited, which was excluded due to insufficient data.

Several models were estimated to assess the impact of TITF on the cost of funding. The first set of models (1-3) look at the impact of TITF when banking groups with a score of 0.4 and over are defined as D-SIBs, in which case only NCB and BNS are assessed to be systemically important. The second set of models (4-6) looks at the results when banking groups with a score of 0.25 and over (NCB, BNS, JNBS, PCB/SCJ and JMMB) are defined as systemically important.

The models were estimate using the Generalized Method of Moments (GMM) technique. This method is useful in providing unbiased and efficient estimates in dynamic models which have lagged endogenous variables as regressors. Arellano and Bond (1991) suggest that consistent and efficient estimates can be obtained by using lagged values of the dependent variable and lagged values of the exogenous variables as instruments. Baltagi (2001), highlight that the GMM methodology accounts for the possibility of correlations between the independent variables, making it an advantageous technique. The models were subjected to robustness checks for dynamic panel models and the Sargan tests showed no evidence of over-identifying restrictions indicating that the instruments used in the model are valid.

### *Results[8] for Large Banking Groups (NCB and BNS only)*

According to the literature, *deposit growth* and *volatility* should have positive relationships with the risk premium paid by a bank while higher *income* and *liquidity* should reduce the premium paid by banks. In regards to this study, results from Model 1 indicate that all the control variables utilized were significant at the 1.0 per cent level, with the exception of *income* (see Table 4). The signs for the coefficients coincided with the literature for *deposit growth*, *income* and *liquidity*. [9]

In Model 2 we included a dummy variable to capture the effect from the recent global crisis, which is interacted with the dummy variable representing D-SIBs, to investigate if this event could have had an impact in the premiums paid by D-SIBs, relative to non-D-SIBs. The coefficient of this interactive dummy is expected to be negative, suggesting lower costs for D-SIBs. The coefficients on the control variables remained the same in terms of sign, however the variable *income* which was previously insignificant, became significant at the 5.0 per cent level. The results suggest that NCB and BNS have a funding cost advantage of 29 bps post crisis.

[8] Detailed results are provided on Appendix 4

[9] Equity to total assets, non-performing loans to total loans and loan-loss reserves to total assets were at first included in the model, but based on the results of the redundant variable test were subsequently excluded.

**Table 4: Results for NCB and BNS as D-SIBs (D-SIB≥0.4)**

| Explanatory Variable | (1) | (2) | (3) |
|---|---|---|---|
| Intercept | 0.4062*** | 0.5331*** | 0.4777*** |
| Risk Premium(-1) | 0.8829*** | 0.8761*** | 0.8579*** |
| Deposit Growth | 0.0499*** | 0.0432*** | 0.0518*** |
| Volatility | -0.0168*** | -0.0112*** | -0.0190*** |
| Income | -0.0003 | 0.0006** | 0.0024** |
| Liquidity | -0.1273*** | -0.1197*** | -0.1095*** |
| Liquidity(-1) | 0.1319*** | 0.1189*** | 0.1190*** |
| D-SIB*Post Crisis Dummy | - | -0.2947*** | - |
| D-SIB*yr02 | - | - | -0.0265 |
| D-SIB *yr03 | - | - | -0.0535 |
| D-SIB *yr04 | - | - | -0.6060 |
| D-SIB *yr05 | - | - | -0.2219 |
| D-SIB *yr06 | - | - | -0.4615*** |
| D-SIB *yr07 | - | - | 0.4808** |
| D-SIB *yr08 | - | - | -0.2708 |
| D-SIB *yr09 | - | - | -0.4031 |
| D-SIB *yr10 | - | - | -0.2930 |
| D-SIB *yr11 | - | - | -0.8170*** |
| D-SIB *yr12 | - | - | -0.7462*** |
| D-SIB *yr13 | - | - | 0.2991 |
| Observations | 1157 | 1157 | 1157 |
| Adjusted $R^2$ | 0.7005 | 0.7241 | 0.6969 |
| Sargan test | 0.0721 | 0.0591 | 0.1302 |

Significant at 1%*** 5%** 10%*

Model 3 included interactive dummy variables for each year of the study in an effort to isolate specific years in which a cost advantage was evident. Again results for the control variables where relatively unchanged. The results indicate that NCB and BNS had funding cost advantages of 46 bps in 2006 but paid a higher premium of 48 bps in 2007 over smaller DTIs. In 2011 and 2012, the coefficients on the interaction terms were the highest, with values of 81 bps and 75 bps respectively, compared to the preceding years. It can be noted that these banks did not receive this funding cost advantage during the global crisis (2008-2009) and during the periods of the Jamaica Debt Exchange (JDX) and the National Debt Exchange (NDX). These results are contrary to those in Kumar and Lester (2014) that large systemically important institutions benefit from an implicit subsidy during the global crisis over non-systemically important financial institutions. It suggests that investors in Jamaica are willing to take a smaller risk premium from the largest institutions when the financial markets are stable.

***Results for Large Banking Groups (NCB, BNS, JNBS, JMMBMB and PCB/SCJ)***

In Models 4 to 6, we alter our specification of D-SIBs to include JNBS, JMMBMB and PCB (SCJ) groups to explore whether these 'medium size' groups also benefited from a cost advantage (see Table 5).[10] For Model 4 (control variables alone) and Model 5 (including the dummy for the crisis) the results varied very little from Models 1 and 2. Notably, for Model 6 the interactive dummy was significant for the five years leading up to the crisis (2004- 2008) and the period 2011 to 2013. When we compare Model 6 (including annual dummy variable) results to Model 3 results, it is clear however that the cost advantage of the larger banking groups (NCB and BNS) was significantly greater than that received by this extended group. This suggests that although medium size institutions could have some advantage relative to smaller institutions, it is not as significant as that of the larger institutions. Importantly, the larger advantage of NCB and BNS is even more significant in 2011 and 2012, the years following the Jamaica Debt Exchange. Notwithstanding these findings, care must be taken in attributing this relative advantage to TITF characteristics (or an implicit Government subsidy), rather than some other advantages of being large.

[10] Given data limitations we were unable to explore whether medium size institutions, on their own, have a cost advantage over smaller institution. Consequently D-SIB here is an extension of the definition to D-SIB to include institutions with scores of 0.25 and over.

**Table 5: Results for NCB, BNS, JNBS, PCB/SCJ and JMMB as D-SIB (D-SIB≥0.25)**

| Explanatory Variable | (4) | (5) | (6) |
|---|---|---|---|
| Intercept | 0.4511*** | 0.6210*** | 0.5904*** |
| Risk Premium(-1) | 0.8976*** | 0.8671*** | 0.8661*** |
| Deposit Growth | 0.0392*** | 0.0436*** | 0.0434*** |
| Volatility | -0.0106*** | -0.0117*** | -0.0149*** |
| Income | -0.0006 | 0.0005 | 0.0022** |
| Liquidity | -0.1063*** | -0.1186*** | -0.0893*** |
| Liquidity(-1) | 0.1040*** | 0.1162*** | 0.0916*** |
| D-SIB*Post Crisis Dummy | - | -0.2929*** | - |
| D-SIB*yr02 | - | - | -0.0681 |
| D-SIB *yr03 | - | - | -0.0329 |
| D-SIB *yr04 | - | - | -0.3979* |
| D-SIB *yr05 | - | - | -0.3290* |
| D-SIB *yr06 | - | - | -0.4329*** |
| D-SIB *yr07 | - | - | -0.4030*** |
| D-SIB *yr08 | - | - | -0.2928* |
| D-SIB *yr09 | - | - | -0.1525 |
| D-SIB *yr10 | - | - | -0.3148 |
| D-SIB *yr11 | - | - | -0.5266*** |
| D-SIB *yr12 | - | - | -0.5485*** |
| D-SIB *yr13 | - | - | 0.2302* |
| Observations | 1157 | 1157 | 1157 |
| Adjusted $R^2$ | 0.7656 | 0.7153 | 0.7519 |
| Sargan test | 0.0721 | 0.0591 | 0.1302 |

Significant at 1%*** 5%** 10%*

## 5. Conclusion and Policy Recommendations

The results confirm the existence of three D-SIBs in Jamaica, NCB, BNS and JNBS and, in the extended framework, the existence of two systemically important D-SIB groups, NCB Group and BNS Group. The results also highlight the relevance of the Sagicor Group in the areas of size and complexity and JMMB Group in the category of complexity. While data availability does not allow us to assess this at the group level, there is also evidence that the two largest DTIs have grown even more systemically important in recent years. The smaller of the D-SIB groups, BNS Group, has a score of over three times the largest non-D-SIB Group, further highlighting the dominance of these larger groups and the need to identify strategies to deal with these systemic institutions.

This paper further provides evidence that D-SIBs pay significantly less on comparable deposits than their counterparts. While we cannot definitively state that D-SIBs have benefited from an implicit Government subsidy, in the context of TITF characteristics, it is clear that a cost advantage exists. In the context where this lower cost of funding provides additional resources for these institutions to become even more significant, this creates an additional layer of risk for the system.

In this regard, we recommend the exploration of policy measures to reduce the probability of failure of these institutions compared to non-systemic institutions and to limit their ability to become even more systemically important. These could include supplementary capital requirement for D-SIBs, structural measure such as caps on counterparty exposure and other requirements related to size or market capitalization. Adoption of such measure requires consideration and weighing of macro-financial risks including the probability of default of the TITF institutions.

## REFERENCES


Araten, M., & Turner, C. (2013), *Understanding the funding cost differences between global systemically important banks (GSIBs) and non-G-SIBs in the USA*, Journal of Risk Management in Financial Institutions, 6(4), 387-410.

Acharya, V., Anginer, D., &Warburton, J. (2013), *The end of market discipline? Investor expectations of implicit state guarantees*,Working Paper

Australian Prudential Regulation Authority (2013), *Domestically systemically important banks in Australia*, Information Paper, December 2013.

Basel Committee on Banking Supervision (2012), *A framework for dealing with domestic systemically important banks*, Bank for International Settlement, Basel.

Basel Committee on Banking Supervision (2013), *Globally systemically important banks: updates assessment methodology and the higher loss absorbency requirement*, Bank for International Settlement, Basel.

Baltagi, B. H. (2001). *Econometric Analysis of Panel Data.* 2d ed. New York: John Wiley & Sons.

Baker, D., & McArthur, T. (2009*), The value of the "too big to fail" big bank subsidy,* CEPR Reports and Issue Briefs 2009-36, Centre for Economic Policy and Research

Brämer, P., and Gischer, H. (2012), *Domestically systemically important banks: An indicator-Based Measurement Approach for the Australian Banking System*, Faculty of Economics and Management, Working Paper 3/2012.

Castro, C., (2011), *Measuring and testing for systemically important financial institutions,* Universidad del Rosario, no. 101.

Im, K., Pesaran, M., & Shin, Y., (2003), *Testing for Unit Roots in Heterogeneous Panels,* Journal of Econometrics, vol. 115 (1), pages 53-74.

International Association of Insurance Supervisor (2012), *Globally systemically Important Insurers: Proposed Assessment Methodology*, May 2012, International Association of Insurance Supervisor.

International Monetary Fund (2012), *Australia: Addressing Systemic Risk through higher loss absorbency,* IMF country paper no. 12/311, Washington D.C.

Jacewitz, S., & Pogach, J. (2012), *Deposit rate advantages at the largest banks*, FDIC Working Paper.

Kumar, A., & Lester, J. (2014), 'Do Deposit Rates Show Evidence of Too Big to Fail Effects?', SSRN 2412852.

Levin, A., Lin, C.F., Chu, C-S.J. (2002), *Unit root tests in panel data: Asymptotic and finite sample properties.* Journal of Econometrics, vol. 108(1), pages1-24.

Noss, J., & Sowerbutts, R. (2012), *The implicit subsidy of banks*, Financial Stability Paper No. 15-May 2012, Bank of England

Santos, J. A. (2014), 'Evidence from the bond market on banks Too-Big-To-Fail subsidy'. *Economic Policy Review, Forthcoming*.

The Geneva Association Systemic Risk Working Group (2010), *Systemic risk in insurance: An analysis of insurance and financial stability*.

# APPENDIX

## Appendix 1

### Basel Committee: A framework for dealing with domestic systemically important banks

***Principle 1:*** National authorities should establish a methodology for assessing the degree to which banks are systemically important in a domestic context.
***Principle 2:*** The assessment methodology for a D-SIB should reflect the potential impact of, or externality imposed by, a bank's failure.
***Principle 3:*** The reference system for assessing the impact of failure of a D-SIB should be the domestic economy.
***Principle 4:*** Home authorities should assess banks for their degree of systemic importance at the consolidated group level, while host authorities should assess subsidiaries in their jurisdictions, consolidated to include any of their own downstream subsidiaries, for their degree of systemic importance.
***Principle 5:*** The impact of a D-SIB's failure on the domestic economy should, in principle, be assessed having regard to bank-specific factors: (a) Size; (b) Interconnectedness; (c) Substitutability/financial institution infrastructure (including considerations related to the concentrated nature of the banking sector); and (d) Complexity (including the additional complexities from cross-border activity). In addition, national authorities can consider other measures/data that would inform these bank-specific indicators within each of the above factors, such as size of the domestic economy.
***Principle 6:*** National authorities should undertake regular assessments of the systemic importance of the banks in their jurisdictions to ensure that their assessment reflects the current state of the relevant financial systems and that the interval between D-SIB assessments not be significantly longer than the G-SIB assessment frequency.
***Principle 7:*** National authorities should publicly disclose information that provides an outline of the methodology employed to assess the systemic importance of banks in their domestic economy.
***Principle 8:*** National authorities should document the methodologies and considerations used to calibrate the level of HLA that the framework would require for D-SIBs in their jurisdiction. The level of HLA calibrated for D-SIBs should be informed by quantitative methodologies (where available) and country-specific factors without prejudice to the use of supervisory judgment.
***Principle 9:*** The HLA requirement imposed on a bank should be commensurate with the degree of systemic importance, as identified under Principle 5. In the case where there are multiple D-SIB buckets in a jurisdiction, this could imply differentiated levels of HLA between D-SIB buckets.
***Principle 10:*** National authorities should ensure that the application of the G-SIB and D-SIB frameworks is compatible within their jurisdictions. Home authorities should impose HLA requirements that they calibrate at the parent and/or consolidated level, and host authorities should impose HLA requirements that they calibrate at the sub-consolidated/subsidiary level. The home authority should test that the parent bank is adequately capitalised on a standalone basis, including cases in which a D-SIB HLA requirement is applied at the subsidiary level. Home authorities should impose the higher of either the D-SIB or G-SIB HLA requirements in the case where the banking group has been identified as a D-SIB in the home jurisdiction as well as a G-SIB.
***Principle 11:*** In cases where the subsidiary of a bank is considered to be a D-SIB by a host authority, home and host authorities should make arrangements to coordinate and cooperate on the appropriate HLA requirement, within the constraints imposed by relevant laws in the host jurisdiction.
***Principle 12:*** The HLA requirement should be met fully by Common Equity Tier 1 (CET1). In addition, national authorities should put in place any additional requirements and other policy measures they consider to be appropriate to address the risks posed by a D-SIB.

## Appendix 2

### Detailed Ranking for DTIs, Securities Dealers and Insurance Companies

| *Rank* | *Institution Name* | *Size* | *Interconnectedness* | *Non-Substitutability* | *Complexity* | *TOTAL SCORE* |
|---|---|---|---|---|---|---|
| 1 | NCB | 0.17 | 0.24 | 0.31 | 0.12 | 0.85 |
| 2 | BNSJ | 0.14 | 0.23 | 0.25 | 0.04 | 0.65 |
| 3 | NCBCAP | 0.07 | 0.08 | - | 0.11 | 0.26 |
| 4 | JNBS | 0.07 | 0.03 | 0.11 | 0.05 | 0.26 |
| 5 | JMMB | 0.07 | 0.03 | 0.01 | 0.10 | 0.22 |
| 6 | VMBS | 0.04 | 0.05 | 0.06 | 0.04 | 0.19 |
| 7 | FCIB | 0.03 | 0.08 | 0.07 | 0.01 | 0.19 |
| 8 | SIL | 0.04 | 0.05 | 0.00 | 0.06 | 0.16 |
| 9 | SIJ | 0.04 | 0.04 | 0.00 | 0.07 | 0.15 |
| 10 | RBC | 0.03 | 0.03 | 0.07 | 0.01 | 0.14 |
| 11 | SLJ | 0.06 | 0.00 | - | 0.07 | 0.13 |
| 12 | SJL | 0.03 | 0.01 | - | 0.06 | 0.10 |
| 13 | GLI | 0.03 | 0.01 | - | 0.05 | 0.08 |
| 14 | FGB | 0.02 | 0.01 | 0.03 | 0.02 | 0.08 |
| 15 | NCBIC | 0.02 | 0.00 | - | 0.05 | 0.07 |
| 16 | CBNA | 0.01 | 0.04 | 0.01 | 0.01 | 0.07 |
| 17 | SJBS | 0.01 | 0.01 | 0.04 | 0.00 | 0.06 |
| 18 | JMMBMB | 0.01 | 0.00 | 0.01 | 0.02 | 0.05 |
| 19 | FGFS | 0.01 | 0.00 | - | 0.03 | 0.04 |
| 20 | SBJ | 0.01 | 0.01 | 0.02 | 0.01 | 0.05 |
| 21 | JNFUND | 0.01 | 0.01 | 0.00 | 0.02 | 0.04 |
| 22 | Barita | 0.01 | 0.00 | - | 0.02 | 0.03 |
| 23 | MIL | 0.01 | 0.00 | 0.00 | 0.01 | 0.02 |
| 24 | AGI | 0.01 | 0.00 | - | 0.01 | 0.02 |
| 25 | NEM | 0.00 | 0.00 | - | 0.01 | 0.01 |
| 26 | JIIC | 0.00 | 0.00 | - | 0.01 | 0.01 |
| 27 | BCIC | 0.00 | 0.00 | - | 0.01 | 0.01 |
| 28 | GLOBE | 0.00 | 0.00 | - | 0.01 | 0.01 |
| 29 | GA | 0.00 | 0.00 | - | 0.00 | 0.01 |
| 30 | ICWI | 0.00 | 0.00 | - | 0.00 | 0.01 |
| 31 | CCSL | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 |
| 32 | Proven | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| 33 | FCISL | 0.00 | 0.01 | - | 0.00 | 0.01 |
| 34 | RBTT SD | 0.00 | 0.00 | - | - | 0.01 |
| 35 | CJIC | 0.00 | 0.00 | - | 0.00 | 0.00 |
| 36 | MFG | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 37 | KEY | 0.00 | 0.00 | - | 0.00 | 0.00 |
| 38 | JNLIFE | 0.00 | - | - | 0.00 | 0.00 |
| | **Total Sum** | **1.00** | **1.00** | **1.00** | **1.00** | **4.00** |

**Appendix 3**

### A.3.1: Unit Root Tests

| Variables | Im-Peraran-Shin | | Levin-Lin-Chu | | Order of Integration |
|---|---|---|---|---|---|
| | ***t-stat*** | ***p-value*** | ***t-stat*** | ***p-value*** | |
| Deposit Growth | -43.8882 | 0.0000 | -62.4626 | 0.0000 | I(0) |
| Income | -5.40123 | 0.0000 | -1.57414 | 0.0577 | I(0) |
| Liquidity | -6.05198 | 0.0000 | -2.73414 | 0.0000 | I(0) |
| Volatility | -3.91585 | 0.0000 | -1.49987 | 0.0668 | I(0) |
| Risk Premium | -5.80213 | 0.0000 | -3.40735 | 0.0000 | I(0) |

*Null Hypothesis: Unit root (Individual unit root process) (common unit root process)*

# Appendix 4

## A.4.1: Results: with NCB and BNS as D-SIBs

**Model 1**: Panel GMM EGLS (Cross-section SUR)
Sample (adjusted): 2001M04 2013M12
Periods included: 153
Cross-sections included: 10
Total panel (unbalanced) observations: 1157
2SLS instrument weighting matrix
Linear estimation after one-step weighting matrix
White cross-section standard errors & covariance (d.f. corrected)

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.406157 | 0.161669 | 2.512275 | 0.0121 |
| DG | 0.049882 | 0.015646 | 3.188041 | 0.0015 |
| VOL | -0.016765 | 0.003836 | -4.369974 | 0.0000 |
| INC | -0.000256 | 0.000843 | -0.304237 | 0.7610 |
| LIQ | -0.127348 | 0.032249 | -3.948871 | 0.0001 |
| LIQ(-1) | 0.131871 | 0.031291 | 4.214337 | 0.0000 |
| RP(-1) | 0.882895 | 0.021531 | 41.00522 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.702057 | Mean dependent var | 2.838003 |
| Adjusted R-squared | 0.700502 | S.D. dependent var | 2.016035 |
| S.E. of regression | 0.995197 | Sum squared resid | 1138.979 |
| Durbin-Watson stat | 2.160670 | J-statistic | 283.4228 |
| Instrument rank | 13 | | |

**Model 2**: Panel GMM EGLS (Cross-section SUR)
Sample (adjusted): 2001M04 2013M12
Periods included: 153
Cross-sections included: 10
Total panel (unbalanced) observations: 1157
2SLS instrument weighting matrix
Linear estimation after one-step weighting matrix
White cross-section standard errors & covariance (d.f. corrected)

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.533135 | 0.166883 | 3.194653 | 0.0014 |
| VOL | -0.011203 | 0.003791 | -2.955388 | 0.0032 |
| LIQ | -0.119715 | 0.031697 | -3.776840 | 0.0002 |
| LIQ(-1) | 0.118880 | 0.031103 | 3.822094 | 0.0001 |
| INC | 0.000617 | 0.000969 | 0.636600 | 0.5245 |
| DG | 0.043165 | 0.014211 | 3.037446 | 0.0024 |
| LARGE*POST_C | -0.294663 | 0.114372 | -2.576356 | 0.0101 |
| RP(-1) | 0.876143 | 0.021981 | 39.85948 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.725785 | Mean dependent var | 2.940672 |
| Adjusted R-squared | 0.724114 | S.D. dependent var | 2.041075 |
| S.E. of regression | 0.978062 | Sum squared resid | 1099.139 |
| Durbin-Watson stat | 2.215586 | J-statistic | 303.9786 |
| Instrument rank | 15 | | |

**Model 3**: Panel GMM EGLS (Cross-section SUR)
Sample (adjusted): 2001M04 2013M12
Periods included: 153
Cross-sections included: 10
Total panel (unbalanced) observations: 1157
2SLS instrument weighting matrix
Linear estimation after one-step weighting matrix
White cross-section standard errors & covariance (d.f. corrected)

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.477721 | 0.184491 | 2.589405 | 0.0097 |
| DG | 0.051780 | 0.017212 | 3.008304 | 0.0027 |
| VOL | -0.018953 | 0.003997 | -4.741555 | 0.0000 |
| INC | 0.002390 | 0.001190 | 2.007647 | 0.0449 |
| LIQ | -0.109480 | 0.032432 | -3.375655 | 0.0008 |
| LIQ(-1) | 0.119008 | 0.031605 | 3.765438 | 0.0002 |
| LARGE*YR02 | -0.026494 | 0.293582 | -0.090243 | 0.9281 |
| LARGE*YR03 | -0.053529 | 0.270000 | -0.198257 | 0.8429 |
| LARGE*YR04 | -0.605955 | 0.389876 | -1.554224 | 0.1204 |
| LARGE*YR05 | -0.221921 | 0.190675 | -1.163871 | 0.2447 |
| LARGE*YR06 | -0.461478 | 0.196553 | -2.347855 | 0.0191 |
| LARGE*YR07 | -0.480819 | 0.224314 | -2.143505 | 0.0323 |
| LARGE*YR08 | -0.270820 | 0.247700 | -1.093337 | 0.2745 |
| LARGE*YR09 | 0.403130 | 0.302592 | 1.332253 | 0.1830 |
| LARGE*YR10 | -0.293026 | 0.333424 | -0.878840 | 0.3797 |
| LARGE*YR11 | -0.817026 | 0.226701 | -3.603983 | 0.0003 |
| LARGE*YR12 | -0.746214 | 0.232192 | -3.213780 | 0.0013 |
| LARGE*YR13 | -0.299168 | 0.218424 | -1.369667 | 0.1711 |
| RP(-1) | 0.857856 | 0.024460 | 35.07212 | 0.0000 |

Weighted Statistics

| | | | |
|---|---|---|---|
| R-squared | 0.701606 | Mean dependent var | 2.955545 |
| Adjusted R-squared | 0.696886 | S.D. dependent var | 2.119997 |
| S.E. of regression | 0.996647 | Sum squared resid | 1130.381 |
| Durbin-Watson stat | 2.096456 | J-statistic | 266.5112 |
| Instrument rank | 26 | | |

## A.4.2: Results: with NCB, BNS, JNBS, PCB/SCJ and JMMB as D-SIBs

**Model 4**: Panel GMM EGLS (Cross-section weights)
Sample (adjusted): 2001M04 2013M12
Periods included: 153
Cross-sections included: 10
Total panel (unbalanced) observations: 1157
White cross-section standard errors & covariance (d.f. corrected)

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.451187 | 0.160446 | 2.812072 | 0.0050 |
| DG | 0.039231 | 0.013457 | 2.915265 | 0.0036 |
| VOL | -0.010554 | 0.005251 | -2.010019 | 0.0447 |
| INC | -0.000611 | 0.000905 | -0.674873 | 0.4999 |
| LIQ | -0.106298 | 0.031752 | -3.347750 | 0.0008 |
| LIQ(-1) | 0.104039 | 0.031434 | 3.309713 | 0.0010 |
| RP(-1) | 0.897631 | 0.020308 | 44.20061 | 0.0000 |

Weighted Statistics

| | | | |
|---|---|---|---|
| R-squared | 0.766824 | Mean dependent var | 5.780261 |
| Adjusted R-squared | 0.765608 | S.D. dependent var | 4.178079 |
| S.E. of regression | 1.830011 | Sum squared resid | 3851.280 |
| Durbin-Watson stat | 2.270629 | J-statistic | 339.3230 |
| Instrument rank | 13 | | |

**Model 5**: Panel GMM EGLS (Cross-section SUR)
Sample (adjusted): 2001M04 2013M12
Periods included: 153
Cross-sections included: 10
Total panel (unbalanced) observations: 1157
White cross-section standard errors & covariance (d.f. corrected)

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.621008 | 0.182749 | 3.398148 | 0.0007 |
| VOL | -0.011688 | 0.003906 | -2.991940 | 0.0028 |
| LIQ | -0.118564 | 0.031494 | -3.764654 | 0.0002 |
| LIQ(-1) | 0.116178 | 0.030831 | 3.768263 | 0.0002 |
| INC | 0.000537 | 0.000910 | 0.589953 | 0.5553 |
| DG | 0.043622 | 0.014380 | 3.033596 | 0.0025 |
| LARGE*POST_C | -0.292894 | 0.096685 | -3.029344 | 0.0025 |
| RP(-1) | 0.867113 | 0.022716 | 38.17169 | 0.0000 |

Weighted Statistics

| | | | |
|---|---|---|---|
| R-squared | 0.717010 | Mean dependent var | 2.902743 |
| Adjusted R-squared | 0.715286 | S.D. dependent var | 2.057187 |
| S.E. of regression | 0.991823 | Sum squared resid | 1130.286 |
| Durbin-Watson stat | 2.207327 | J-statistic | 298.3632 |
| Instrument rank | 15 | | |

**Model 6**: Panel GMM EGLS (Cross-section weights)
Sample (adjusted): 2001M04 2013M12
Periods included: 153
Cross-sections included: 10
Total panel (unbalanced) observations: 1157
2SLS instrument weighting matrix
Linear estimation after one-step weighting matrix
White cross-section standard errors & covariance (d.f. corrected)

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.590418 | 0.197812 | 2.984737 | 0.0029 |
| DG | 0.043411 | 0.014334 | 3.028464 | 0.0025 |
| VOL | -0.014923 | 0.004361 | -3.422382 | 0.0006 |
| INC | 0.002159 | 0.001140 | 1.893824 | 0.0585 |
| LIQ | -0.089321 | 0.031196 | -2.863241 | 0.0043 |
| LIQ(-1) | 0.091615 | 0.030463 | 3.007464 | 0.0027 |
| LARGE*YR02 | -0.068126 | 0.171937 | -0.396229 | 0.6920 |
| LARGE*YR03 | -0.032937 | 0.183310 | -0.179681 | 0.8574 |
| LARGE*YR04 | -0.397895 | 0.218984 | -1.817006 | 0.0695 |
| LARGE*YR05 | -0.328967 | 0.195131 | -1.685878 | 0.0921 |
| LARGE*YR06 | -0.432851 | 0.153898 | -2.812578 | 0.0050 |
| LARGE*YR07 | -0.402994 | 0.170538 | -2.363071 | 0.0183 |
| LARGE*YR08 | -0.292819 | 0.162906 | -1.797466 | 0.0725 |
| LARGE*YR09 | -0.152539 | 0.205628 | -0.741818 | 0.4584 |
| LARGE*YR10 | -0.314791 | 0.219247 | -1.435784 | 0.1513 |
| LARGE*YR11 | -0.526602 | 0.143719 | -3.664113 | 0.0003 |
| LARGE*YR12 | -0.548526 | 0.157765 | -3.476854 | 0.0005 |
| LARGE*YR13 | -0.230219 | 0.138608 | -1.660935 | 0.0970 |
| RP(-1) | 0.866087 | 0.024531 | 35.30529 | 0.0000 |

Weighted Statistics

| | | | |
|---|---|---|---|
| R-squared | 0.755732 | Mean dependent var | 5.589670 |
| Adjusted R-squared | 0.751869 | S.D. dependent var | 4.097910 |
| S.E. of regression | 1.835561 | Sum squared resid | 3834.247 |
| Durbin-Watson stat | 2.184695 | J-statistic | 306.8805 |
| Instrument rank | 26 | | |