Document de travail du LEM / Discussion paper LEM 2019-24

Sovereign risk spill-overs in the banking sectors of Central America and the Caribbean

Prosper F. BANGWAYO-SKEETE

Department of Economics and Finance, University of North Carolina Wilmington / bangwayoskeetepf@uncw.edu

Michael BREI

LEM UMR 9221 /michael.brei@univ-lille.fr

Dorian M. NOEL

Department of Management Studies, The University of the West Indies, St. Augustine Campus, Trinidad and Tobago / dorian.noel@sta.uwi.edu

Justin ROBINSON

Department of Management Studies, The University of the West Indies, Cave Hill Campus, Barbados / justin.robinson@cavehill.uwi.edu

http://lem.cnrs.fr/

Sovereign risk spill-overs in the banking sectors of Central America and the Caribbean

Prosper F. Bangwayo-Skeete*, Michael Brei♦, Dorian M. Noel♣, and Justin Robinson♠

Abstract

This paper examines the relationship between sovereign credit ratings and bank stability in Central America and the Caribbean (CAC). We use data on 177 banks from 24 CAC countries for the period 1999–2014. Our findings indicate that sovereign rating downgrades have been followed by deterioration in bank stability. The risk spill-overs are particularly relevant in countries with low levels of foreign currency reserves, limited financial transparency and weak central bank independence. Consistent with the literature, we find that bank-specific and market factors also impact bank stability. More profitable banks and those with informational advantage in the lending market are more stable, while those with high transaction-based fee business are not.

JEL classification: G21; G01; E44.

Keywords: Caribbean; Central America; Bank Stability; Sovereign Risk Spill-over.

* *Department of Economics and Finance, University of North Carolina Wilmington, USA. Email:* bangwayoskeetepf@uncw.edu

♦ *LEM-CNRS, Department of Economics, University of Lille, France. Email:* michael.brei@univ-lille.fr

♣ *Department of Management Studies, The University of the West Indies, St. Augustine Campus, Trinidad and Tobago. Email:* dorian.noel@sta.uwi.edu

♠ *Department of Management Studies, The University of the West Indies, Cave Hill Campus, Barbados. Email:* justin.robinson@cavehill.uwi.edu

The authors wish to thank Anthony Birchwood, Winston Moore, Anthony Wood and the participants at the 50th Annual Monetary Studies Conference in Barbados, November 2018, for their valuable comments. All remaining errors are our own.

1. Introduction

Banking regulations (such as, risk-based capital framework and reserve requirements) have had the unintended consequence of incentivizing banks to hold more sovereign debt on their balance sheets than suggested by their strategic motives. Bank stability, therefore, should depend on the creditworthiness of governments. Despite this apparent link, the impact of sovereign credit ratings on bank stability is still an open debate in the literature.

In this paper, we study the relationship between sovereign rating risk and bank stability, measured by banks' asset quality. Bernanke and Gertler (1989) and Bernanke, Gertler, Gilchrist (1999) provide theoretical arguments for studying asset quality in the banking system and its link to macroeconomic stability. The authors argue that the pro-cyclicality of credit markets and existence of information asymmetries in lending markets work to amplify and propagate credit market shocks to the real economy. From a practical viewpoint, the argument is even more compelling if one was to consider that banking regulations, such as risk-based capital framework and reserves requirements, have had the unintended effect of transforming banks into amplifiers of sovereign shocks rather heat sinks that is, mechanisms to absorb and dissipate shocks.[1]

The 2008 global financial crisis and the subsequent sovereign debt problems in Europe provide ample evidence of the importance of this line of research. The key message of both crises is that financial stability analysis and sovereign risk assessment need to incorporate macro-financial linkages that is, spill-overs, spillbacks and other contagion channels. In other words, sovereign defaults can cause financial sector fragility just as financial sector fragility can induce sovereign defaults. As a consequence, in recent years, academics and supervisory authorities have shown great interest in macro-financial spill-over models (Das et al., 2012; De Bruyckere et al., 2013; Hesse et al., 2014).

De Bruyckere et al. (2013) study the bank-sovereign nexus in Europe. The authors find that risks spill-over from sovereigns (banks) to banks (sovereigns) and the spill-over intensity is stronger with home bias that is, banks' exposures are predominantly domestic debts. Hesse et al. (2014) provide stress test results for sovereign spill-overs on bank stability and find that the impact is non-linear on banks, in terms of both liquidity and solvency. Their

[1] Indeed, global bank regulators are more cognizant of the fact that the procyclicality of risk-based capital framework tends to exacerbate economic shocks in bad times, which ultimately undermines socio-economic stability. In response, new banking regulations (such as, Basel III) have included countercyclical capital buffer and new accepted forms of capital (such as, contingent convertibles) in an attempt break the procyclicality nature of risk-based capital framework.

result suggests that the appropriate design of stress scenarios should incorporate macro-financial linkages. Das et al. (2012) advance similar argument, noting that the complexity and entwining of sovereigns and private sector balance sheets requires a more holistic approach to risk analysis and stress testing that ought to recognize linkages and feedback loops inherent in sovereign risk. Hence, Correa and Sapriza (2014) suggest that breaking the "feedback loop" between the two sectors should be an important policy priority.

Panetta et al. (2011) and Corsetti et al. (2012) study the contagion channels through which sovereign credit risk affects, inter alia, the broader economy. They identify three contagion channels from sovereign credit risk to bank risk: (i) information cascade; (ii) balance sheet exposure; and (iii) asset valuation adjustments. First, in the information cascade model, sovereign downgrades cause households and firms to lower their beliefs about future economic conditions and income levels. As a consequence, they make the necessary adjustment by cutting expenditure, which may include under-servicing their loans. Investors are likely to request higher risk premia which in turn lead to higher borrowing costs and borrower riskiness, unless higher risk premia are offset by looser monetary policy. Second, balance sheet exposure, banks' holding of sovereign debts tend to increase their risk profile when sovereigns are downgraded. This is likely to increase their costs of funds and compresses their interest margin. In turn, banks respond by increasing loan rates, which adversely impacts borrowers' ability to service their loans. And third, asset valuation adjustment, sovereign holdings constitute a significant proportion of assets of banks in the region studied. Sovereign downgrades reduce the profitability of banks due to credit value adjustments. In order to maintain profitability and compensate for asset losses, banks increase their lending rates. The increase in lending rates adversely affects borrowers' ability to service their loan obligations and hence, increases the NLPs of banks.

Altavilla et al. (2017) examine the impact of sovereign stress on bank behaviour and find that public, bailed-out and poorly capitalized banks were more likely to purchase domestic government debt in response to sovereign stress, in support of the "moral suasion" and "carry trade" hypotheses (see also, Uhlig, 2013; Battistini et al., 2014). They also observe that banks decrease lending when there is increased sovereign stress. Similar results are reported in Gennaioli et al. (2018) who argue that the slowdown in bank lending is due to bank losses on public bonds. Other interesting studies on macro-financial spill-overs are provided by Beaton and Desroches (2011), Kirschenmann et al. (2017) and Cotter and Suurlaht (2018).

The existing literature on the sovereign-bank nexus focuses primarily on developed banking markets, in particular Europe. Such a narrow focus does

not provide adequate coverage of an issue that is of importance to macro-prudential analysis. Our work extends the literature to the Central American and Caribbean region, which provides a unique setting to study this phenomenon for several reasons. First, banks have high exposure to sovereigns due to the underdeveloped microstructure of the financial system and high banking reserve requirements. Second, these markets are highly vulnerable to shocks from high global trade exposures and natural disasters. And finally, bank credit is the dominant form of financing for the real, government and household sectors.

Few studies examine banking markets we studied in this paper. Tracey and Leon (2011) and Jordan and Tucker (2013) focus on the impact on non-performing loans (NPLs) on loan growth (Trinidad and Tobago and Jamaica) and economic growth (Bahamas), respectively. Related studies to ours are provided by Beaton et al. (2016) and Wood and Skinner (2018). These authors find that the asset quality of banks in the Caribbean is affected by both systematic (macroeconomic) and idiosyncratic (bank-specific) factors. Beaton et al. (2016) investigate macro-financial linkages in the Eastern Caribbean Currency Union and provide evidence of a feedback loop between bank asset quality and the real sector. These studies, however, did not examine whether sovereign rating risks spill-over to banks.

We extend these works making various contributions. First, our paper, to best of our knowledge, is the first to examine sovereign rating risk spill-over to bank stability in the CAC region. Second, the study captures other spill-over channels to bank stability namely, macro-channels (global trade linkages and vulnerability) and behavioural (bank behaviour). Finally, our empirical model controls for the differences in microstructure of the banking markets studied. In this paper, we measure bank stability by NPLs, a widely used macro-prudential indicator of bank stability.

We use data on the financial statements of 177 deposit-taking entities from 24 countries in CAC for the period from 1999-2014. We estimate our empirical model using the System General Method of Moment (S-GMM) estimator. Consistent with the literature on the sovereign-bank nexus in Europe, an overriding conclusion is that sovereign rating downgrade adversely impacts bank stability. A novel finding is that the sovereign risk spill-over is particularly pronounced in countries with low levels of international reserves, reporting transparency and central bank independence. We argue that high reserves provide conform to the market that the country is still likely, despite the downgrade, to meet its debt obligations. In turn, banks and markets are less affected and continue to function under normal business conditions. Further, banks and markets are less affected when reporting is made transparently and central banks and governments are not connected. In such

environments, banks are less likely to face pressure (moral suasion) from governments to finance their debt and domestic ratings are less dependent on the sovereign rating ceiling. Finally, we do not find that the spill-over intensities differ across banking markets (Caribbean versus Central America), economic conditions (good as opposed to bad), fiscal space (high versus low), and countries' credit rating level (investment grade compared versus non-investment grade).

Our results also reveal that systematic (macroeconomic), idiosyncratic (bank specific) and microstructure factors influence bank stability. GDP growth tends to improve bank stability, while a country's openness provides a channel for global trade shocks to negatively impact bank stability. Banks in small markets in the Caribbean tend to have more vulnerable banks with higher NPLs. Arguably, the small size of these markets allows shocks to bank stability to be persistent. Concerning bank-specific factors, we find that banks with market power tend to have healthier loan books than their peers. We postulate that market power gives banks informational advantage in lending markets. As a result, they can build better quality loan books by cream-skimming the best creditors in the market. We also find that banks with higher operating costs, managerial talent (proxied by the return on assets), and more traditional banks (less transaction-based fee income) operate with lower non-performing loans.

Arguably, one of the most important policy implications of our findings is that bank stability in the CAC region can be enhanced by merely improving market transparency and protecting the operational independence of banking regulators.

The remainder of the paper is organized as follows. Section 2 presents the macroeconomic environment of the banking markets in the CAC region. Section 3 discusses the specification of empirical model and describes the bank data used in the study. Section 4 provides the empirical results and Section 5 concludes.

2. Sovereign and banking risks in the region

The sovereign credit ratings of countries in the CAC region have been, on average, more volatile than not only those of developed countries but also other emerging market countries. This, no doubt, is due to a combination of several factors. Primarily, the CAC region has a relatively high degree of openness, weak fiscal accounts and poor institutional structures (see Table 1). In other words, the region has a relatively high-risk exposure to the global trade network with weak support mechanisms to mitigate economic shocks from affecting the creditworthiness of sovereign governments.

Figure 1 (left-hand panel) shows the historical evolution of the sovereign credit rating for the Caribbean and Central America country groupings for the period from 1999 to 2014. Prior to the 2008 global financial crisis (GFC), the sovereign ratings of the two country groupings were, on average, speculative grade. Since the GFC, however, the sovereign ratings of the two groupings have moved in opposite direction. While sovereign ratings in Central America have generally improved, those in the Caribbean, on average, have worsened. The economic fall-out of the GFC was felt greater in the Caribbean as the decline in external demand for primary products and tourism significantly impacted the fiscal accounts of governments. In fact, five Caribbean governments (Antigua and Barbuda, Belize, Grenada, Jamaica, and Saint Kitts and Nevis) defaulted on their debt obligations in the post-GFC period (IMF, 2012; CTT, 2014; Moody's, 2017). In comparison, none of the Central American governments we studied defaulted on their debts during the sample period.[2] It is important to note that countries in our sample that managed to maintain rating stability post-GFC were able to do so by primarily drawing-down on currency reserves or refinancing debts.

The behaviour of banks' non-performing loans in the Caribbean and Central America shares similar patterns prior to the GFC (see Figure 1, right-hand panel). As one can see, loan defaults continuously declined from high levels in the early 2000s. However, post-crisis the average default rates on bank credit began to diverse and move in opposite direction. While NPLs in the banking sector of the Caribbean increased from a low of roughly 4% to 7% of total lending at end-2014, in Central America they moved from a pre-crisis low of roughly 3.75% to 2% in 2014.

For the period under study, we observe that banks and governments in Central America were more stable relative to those in the Caribbean. From a causal inspection of Figure 1, it appears that banks' non-performing loans and sovereign ratings move in opposite directions but this could be due to other common factors. In the following section, we investigate the relationship in more detail on the bank-level and control for other factors of bank stability.

3. Empirical methodology

3.1. Data description and analysis

We extract annual bank-level data for the Central American and Caribbean region from BankScope for the period from 1998 to 2014. We assume that

[2] Due to data limitations, Nicaragua's debt default in 2008 is not covered in this study.

banks manage their entire set of banking activities on a consolidated basis. Therefore, we work with the consolidated financial statements of banks. Where it is not possible to obtain consolidated statements for a bank, which is likely the case for subsidiaries of foreign-owned banks, we use the bank's unconsolidated financial statement.

Our study focuses on the stability of deposit-taking entities so we exclude non-bank entities from the sample.[3] We also exclude banks and countries from the study for which we were unable to obtain relevant information to compute our measure of bank stability or other variables to parameterize the empirical model. After applying our filters, the final sample covers 177 deposit-taking entities operating in 24 Central American and Caribbean jurisdictions.[4] Of that total, 100 are domestically owned and the rest (77) are subsidiaries of foreign-owned banks.

Table 2 reports summary information for the countries in our sample. At the end of 2014, total assets of the 177 banks in our study amounted to roughly US$14.4 billion which amounts to approximately 130 percent of the combined GDP of the countries. As one can see, the banking systems can be very different in terms of lending activity and riskiness. For instance, in Guyana and St. Lucia the lending business appears very risky with non-performing loans averaging over 15 percent of total loans. We also see important variation in sovereign risks across countries. While the governments of Barbados and Belize have seen their ratings plummet over the considered sample period (by -6 and -4 notches, respectively), Guyana and Trinidad's ratings have improved by most (by 5 and 4 notches, respectively).

3.2. Empirical model

We study the impact of sovereign rating changes on bank stability. To accomplish this task, we first estimate a baseline model that controls for, inter alia, confounding factors and endogeneity bias. We then explore the possibility that the conditioning economic environment may be a moderating factor in the sovereign spill-over-bank stability nexus. Therefore, we extend

[3] We cross-reference the list of financial institutions obtained from BankScope with the registry of licensed banking entities reported by the various central banks to distinguish deposit-taking entities from the other types of financial firms (that are classified by BankScope as commercial banks).

[4] Anguilla, Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Cayman Islands, Costa Rica, Cuba, Dominican Republic, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Panama, Saint Kitts And Nevis, Saint Lucia, St. Vincent and the Grenadines, Suriname, and Trinidad and Tobago.

the baseline model to examine the interaction between sovereign rating change and the conditioning economic environment and the resulting impact on bank stability. We now discuss these models in turn.

We estimate the following baseline model:

$$NPL_{ijt} = \alpha_0 + \alpha_1 NPL_{ijt-1} + \beta \cdot Rating_{jt} + \Phi C_{jt} + \Psi X_{ijt-1} + \vartheta_i + \varepsilon_{ijt} \quad [1]$$

where NPL refers to banks' non-performing loans as a percentage of total loans (using the logistic transformation)[5], $Rating$ is the credit rating of the government, C and X are vectors of systematic and idiosyncratic variables, respectively, ϑ controls for time-invariant heterogeneity (bank fixed effects) in our data set and ε captures the errors in our estimation. We index individual banks with i, countries where banks are located with j, and time with t. The variables used in our model are discussed below and their definitions are provided in Table 3.

The sovereign credit rating ("Rating") is the rating on the central government's long-term foreign currency debt. We transformed the rating scale of two major agencies (Moody's, Standard and Poor's) into a numerical equivalent, where a higher number indicates a better rating. It ranges from 1 for a rating of C to 21 for a triple-A rating.[6] We introduce the sovereign credit rating variable into our model as a cumulative change to capture the dynamic effects of changes in sovereign ratings on bank stability. Our main coefficient of interest is β and it measures the impact of changes in sovereign credit ratings on banks' NPLs, controlling for the macroeconomic and bank-specific factors.

As mentioned previously, our objective is to examine the impact of sovereign credit rating shocks on bank stability. In order to do so, we control

[5] Given that the NPL ratio is bounded between zero and one, the logit-transformed value, $\ln(\frac{NPL/L}{1-NPL/L})$, is used to create an unrestricted variable in the regressions. As a consequence, we have to transform the regression coefficients, when inferring the economic impact on the non-performing loan ratio according to $\partial y/\partial x=\beta/(1/y+1/(1-y))$, where y is the non-performing loan ratio, x an independent variable, and β the estimated coefficient. Evaluated at the mean of the non-performing loan ratio (0.051), this implies that the coefficients have to be multiplied by a factor of 0.048.

[6] For Anguilla, Antigua and Barbuda, Guyana, Haiti, St. Kitts and Nevis, and St. Lucia, a rating was not available and we inferred it from an auxiliary regression in which we regressed sovereign ratings on a constant and the ratio of government debt to GDP for the other countries with available information. We then used the implied rating for missing countries, i.e. the fitted values of the regression using the public debt ratios observed in the countries without a rating.

for the influence of confounding factors. We consider both systematic (macroeconomic) and idiosyncratic (bank-specific) factors. The systematic factors we include in vector C in our model are: real GDP growth; inflation; lending rate; trade openness; and indicator variables for the global financial crisis, government debt default, hurricane strike and island jurisdictions. We expect that banks operating in small islands and states that are vulnerable to natural disasters are more likely to be less stable than other banks.

With respect to idiosyncratic (bank-specific) factors, vector X in our model includes bank market power, net interest margin, non-interest income, operating cost, capitalization, liquidity and ROA.[7] These factors are likely to determine the ability of banks to effectively manage their loan books. For instance, banks with market power might have better performing loan books because their dominant market position allows them to reduce the costs of adverse selection in lending markets. Moreover, market power affords banks the opportunity to cream-skim the best creditors in markets. Other factors that seem important determinants are bank capitalization and bank profitability. One might argue that these banks' charter values are higher and thus they have less incentives to take on risks.

The regressions are estimated with the dynamic System Generalized Method of Moments (S-GMM) panel methodology, which is a consistent estimator in our setting (small time, large cross-sectional dimension). For the estimator to be valid, it has to pass the misspecification tests on the validity of instruments and the absence of second-order autocorrelation in the residuals. We use the two-step system GMM estimator to improve estimation efficiency by adding a second equation to the differenced version of the estimator and use the Windmeijer (2005) finite-sample correction to reduce the possibility of spurious precision. Finally, we use a parsimonious set of instruments across all specifications (number of instruments < number of cross-sections) to reduce the possibility of instrument proliferation (Roodman, 2009).

It is possible that our model suffers from an identification problem due to endogeneity in that high levels of NPLs in the banking sector may affect sovereign credit ratings. While this may be true at the macro-level, we argue that endogeneity is less likely a problem at the micro-level because an individual bank's loan book is unlikely to be considerable so as to affect sovereign ratings. Further, we address the potential endogeneity problem in our model by using the dynamic System Generalized Method of Moments (S-GMM) estimator, which can accommodate both endogeneity bias and

[7] Market power is proxied by the Lerner Index and we follow the approach of Birchwood et al. (2017) to estimate the index.

heterogeneity in the data caused by unobservable factors affecting individual banks.

We extend the baseline model to capture the possibility that sovereign rating shocks may not have a symmetric impact on bank stability across different environments in our sample. For instance, the spill-over intensity might be magnified in countries where governments have little fiscal space or during recessions. Spill-overs might also be amplified in countries with weaker market microstructures. We account for impact asymmetries by interacting $Rating$ with a variable that captures the conditioning environment in our sampled countries. We estimate the following extended model:

$$NPL_{ijt} = \alpha_0 + \alpha_1 NPL_{ijt-1} + \left(\beta + \beta^* \cdot D_{jt}\right) Rating_{jt} + \Phi C_{jt} + \Psi X_{ijt-1} + \vartheta_i + \varepsilon_{ijt} \quad [2]$$

where D is an indicator variable that takes a value of one if a country is experiencing a specific type of environment and zero otherwise. All other mathematical notations are as previously defined.

We consider seven different types of environment and estimate a separate model for each one. These are: (i) fiscal space (Heritage Foundation's government spending index is below the 25th percentile of the distribution); (ii) sovereign rating is non-investment grade (Moody's rating below Baa3); (iii) region (dummy variable, D, with a value of one for banks in Central America and zero otherwise); (iv) recessions (real GDP growth is negative); (v) low levels of international reserves (import cover is below the 25th percentile); (vi) central bank independence (supervisory independence index of Barth et al. (2013) is below the 25th percentile); and (vii) low market transparency (transparency index of Barth et al. (2013) is below the 25th percentile).

The coefficient β^* in our extended model indicates whether the impact of rating changes is different depending on whether a country's environment is subject to one of seven (7) above-mentioned conditions. More specifically, the impact of sovereign rating changes on NPLs is equal to the estimated β coefficient for countries not subject to any one of the above-mentioned conditions ($D = 0$). For those that are subject to these conditions ($D = 1$), the aggregate effect of a sovereign rating change on bank stability is the sum of the estimated coefficients β and β^*.

4. Empirical results and discussion

Table 4 reports the estimation results for the baseline and extended models. The results for the baseline model are reported in column (1), while the remaining columns contain the results for the extended models. We refer

readers to Table 3 for the information on the definitions and summary statistics for the variables used in our empirical models.

We start discussing the baseline specification and subsequently the augmented regressions. The misspecification tests on the absence of second order autocorrelation and the validity of instruments support our regressions. There is also evidence of significant persistence in non-performing loans, which confirms our dynamic specification. This is not surprising because bad loans are more than likely a consequence of accumulated bad loans over time. It means that once loans are non-performing, they are likely to remain in that state in subsequent periods before they are written off.

The estimation results for the baseline model support our main argument of a spill-over of sovereign rating changes to bank stability. The main coefficient of interest, β, is significantly negative: an improvement (deterioration) in sovereign ratings is associated with a decrease (increase) in banks' non-performing loans. More specifically, we find that a sovereign downgrade of one notch tends to increase NPLs of banks by 0.25 percentage points (p.p.) in the short-run (-0.051*0.048=0.0025). Relative to an average NPL ratio of 5.1 percent of total loans, this is also economically significant. Taking into account the persistence in NPLs, the impact is more than double in the long-term. The significance of our findings is robust to model specifications that is, both the baseline and extended models confirm the existence of spill-overs from sovereign rating changes to bank stability. However, as will be discussed below, the economic and microstructural background of countries matters.

Our findings support the argument that bank stability oversight ought to incorporate macro-financial linkages and spill-over channels (see Bernanke 1989, Gertler and Gilchrist 1998, Panetta et al. 2011, Corsetti et al. 2012, De Bruyckere et al. 2012, Angeloni and Wolff 2012, Das et al. 2012, Louzis et al. 2012, Hesse et al. 2014). The contagion is likely to work through a number of channels that can reinforce each other depending on the initial conditions in the countries studied in this paper. According to the "information cascade" channel, sovereign downgrades cause households and firms to cut down expenditures due to lower expectations about future incomes. As a result, they may adjust expenditure by underservicing their outstanding loans, increasing loan defaults in the process. The "balance sheet exposure" channel postulates that banks' holding of sovereign debts increases their risk profile and funding costs when sovereigns are downgraded. This compresses interest margins to which banks respond by increasing loan rates which adversely affects borrowers' ability to service loans. Third, the "asset valuation adjustment" channel stipulates that sovereign downgrades entail a weakening of bank balance sheets through losses on holdings of sovereign debt. As before, to

maintain profitability and compensate for asset losses, banks increase loan rates with adverse consequences on borrowers' repayment capacity.

Another contagion channel is based on the idea that sovereign ratings tend to impose a "sovereign ceiling" on the rating of domestic firms and banks, particularly in small and opaque markets. A negative outlook about sovereigns can hereby lead to a general deterioration of domestic credit ratings and reinforce the initial shock. In environments where public debt is high and central bank independence is low, economic agents may anticipate that the government will force banks to buy their bonds by, inter alia, raising bank reserve requirements. Such a situation would give rise to the "moral suasion" hypothesis (Uhlig, 2013; Battistini et al., 2014; Altavilla et al, 2017) and households and firms may refrain from depositing money into banks adversely affecting their funding liquidity (Reinhart and Rogoff, 2011). Banks may be forced to ration credits (reduce lending) by raising lending rates, which ultimately negatively impacts debtors' ability to service their debts.

Concerning our macroeconomic control variables, we find a positive relationship between real GDP growth and bank stability (low NPLs). This procyclicality of bank stability justifies banking regulations on countercyclical capital buffers. Other important macro-variables that influence bank stability are country exposure to the global trade network ("openness") and geographical size ("island dummy"). The global trade network is yet another potential spill-over channel to bank stability. Moreover, economic shocks in one country are likely to cascade and propagate to other countries through the trade network. Our findings support this argument in that banks in countries with large exposure to global trade partners tend to have more unstable banks (higher NPLs). The finding supports the global coordinated approach to macro-prudential supervision and oversight.

We find that loan books of banks operating in small island states in the Caribbean are riskier than those in Central America. We surmise that the small market size of these countries causes economic shocks to be persistent and hence, tend to have a prolonged negative impact on the loan books of banks. Interestingly, we find that hurricane strikes ("hurricane") do not affect bank stability in CAC region which is similar to the findings reported by Brei et al. (2019) for the Eastern Caribbean Currency Union. As they show, hurricanes have not been followed by deterioration in loan quality and capital but rather by deposit withdrawals used by households and firms to finance the recovery. Thus, an explanation of our result is that the region has a long history in dealing with natural disasters and as such, these events are ingrained in the psyche of the people – a part of life.

Our findings also reveal that market microstructure ("market power") and bank-specific factors ("non-interest expense", "ROA" and "non-interest

income") influence bank stability. We confirm our a priori expectation that banks with market power, operating in more concentrated markets, have less risky loan books. Arguably, market power provides banks with an informational advantage, which reduces the adverse selection costs they incur in lending markets. As a result, they can build better high-quality loan books than their peers in less concentrated markets. Banks can also obtain informational advantage by investing in information gathering. An indication of this could be our finding that banks with higher non-interest expenses are banks who invest in such activity and thus have lower non-performing loans. Moreover, we find that more profitable banks (high ROA) have lower NPLs which could be an indication for better managed banks are more prudent at managing and taking risks (Stakic, 2014; Godlewski, 2005).

Another interesting finding is that banks with higher levels of income from transaction-based fee business (measured by non-interest income to total assets) have riskier loan books. We argue that the shift to transaction-based banking reduces banks' inventive or regulatory requirement to monitor the performance of their loan books. This gives rise to two important issues that are of concern to regulators. First, banks have lower informational advantage in the lending market, which contributes to low quality loan books. Second, the process of financial disintermediation increases. In both instances, the banking system becomes less stable and credit provision more volatile. Bolton et al. (2016) and Hardie and Howarth (2013) provide supporting evidence.

The spill-over effects can arguably vary and depend on, inter alia, the economic conditions existing at the time of sovereign downgrade or the degree of investor confidence. We explore this line of research by interacting the sovereign rating variable ("Rating") with a number of measures on differences in the conditioning environment in the countries studied. The results are shown in Table 4, Columns 2-8.

In the first two experiments, we test whether the spill-over effects depend on government fundamentals. For this with include interactions for countries with (i) fiscal space and (ii) sovereign ratings below non-investment grade. Against our expectation, the spill-over intensity of sovereigns to banks is not affected by these two factors (the coefficient β^* is insignificant). Next, we test whether the impact of sovereign risk spill-over differs across Caribbean and Central American countries, but we do not find a significant difference. In the next column, we test whether sovereign rating downgrades have a stronger impact on banks' NPLs during recessions. Again, we do not find significant differences in the spill-over intensity across good and bad economic conditions. Thus, so far, our experiments suggest that the impact of sovereign risk on banks is similar across countries with different fiscal, geographic and economic conditions.

Next, we investigate whether external country vulnerability (measured by the import cover ratio) amplifies the spill-over intensity. Interestingly, we find that banks in countries with low foreign currency reserves to imports are affected more by the sovereign rating risk than banks in high reserves countries. We postulate that a country having high reserves at a time of a downgrade softens adverse effects of the downgrade. In other words, high reserves provide conform to the market that the country is likely, despite the downgrade, to meet its debt commitment. As a result, the sovereign downgrade has little or no material impact on banks and their loan pricing. This leaves borrowers' ability to service their debt less affected.

With respect to the microstructure of the banking market, two variables are of statistical significance: reporting transparency and central bank independence. Only in markets with low levels of transparency or central bank independence, banks tend to experience higher rates of NPLs when sovereign ratings deteriorate. Intuitively, one would expect the quality of banks' loan books will be lower in less transparent markets where information asymmetries will be relatively high. In such markets, the discipline exercised by bank outsiders is low and banks may have incentives to underreport bad loans or 'extend and pretend' loans. The argument is analogous to the information-based pricing models in the market microstructure literature where dealers' pay-offs are directly related to market transparency (see O'hara, 1995). Further, investor sentiments might be more prone to bad news about governments when markets are opaque and little is known about the financial records of governments and banks.

It is not obvious why low central bank independence exacerbates the adverse effects of sovereign spill-over to bank stability. We argue that central bank independence is likely be low in markets where the financial regulation process is characterized by regulators whose decisions are influenced by external stakeholders (such as, governments, politicians and influential market players). In such a setting, therefore, it is possible that the spill-over is made worse by special interests who prevent the normal market adjustments to sovereign downgrades to occur. If central bank independence is low, regulators are likely to accede to governments' preference for banks holding more sovereign debts at the expense of financial stability. Our argument is consistent with the literature on the political economy of financial regulation (see Avgouleas and Donald, 2019). Our finding is also consistent with the "moral suasion" hypothesis in which governments exercise pressure on banks to buy their bonds by, perhaps, forcing central banks to raise bank reserve requirements (Uhlig, 2013; Battistini et al., 2014; Altavilla et al, 2017).

5. Conclusions

We extend the literature on macro-financial linkages by empirically examining sovereign risk spill-over to bank stability in the CAC region. Our empirical results reveal that sovereign rating downgrades adversely impact bank stability and the spill-over is exacerbated in countries where market transparency, central bank independence and foreign currency reserves are low. This represents an important policy insight from our work: even though the banking systems in CAC countries are inherently vulnerable to spill-overs from sovereign and trade network exposures, bank stability can be enhanced by improving market transparency and strengthening central bank independence.

Further, we find that bank stability is influenced by bank-specific and systematic factors. More profitable banks and those with informational advantage in lending markets appear to operate with healthier banking books, whereas banks with higher transaction-based fee business have riskier banking books. On the macro-level, we find evidence of procyclicality of bank stability and that a country's degree of exposure to the global trade network negatively impacts bank stability. The latter result provides support for a coordinated approach to macro-prudential regulation and oversight.

References

Aikman, A., A.G. Haldane, and B.D. Nelson. (2014). "Curbing the credit cycle'" *Economic Journal*., 125(585), 1072-1109.

Altavilla, C., Pagano, M., & Simonelli, S. (2017). Bank exposures and sovereign stress transmission. *Review of Finance*, 21(6), 2103-2139.

Angeloni, C. and G.B. Wolff (2012). Are banks affected by their holdings of government debt? (No. 2012/07). Bruegel working paper.

Andrian, L., Mercer-Blackman, V., Presbitero, A., and A. Rebucci (2013). *Vulnerability, Debt and Growth in the Caribbean: A Fan Chart Approach*. Inter-American Development Bank.

Arellano, M. and O. Bover (1995): "Another look at the instrumental variable estimation of error-components models," *Journal of Econometrics*, 68(1), 29-51.

Avgouleas, E. and D. Donald. 2019. The Political Economy of Financial Regulation. Cambridge University Press. United Kingdom: Cambridge,

Barth, J.R., G. Caprio Jr and R. Levine. 2013a. "Bank regulation and supervision in 180 countries from 1999 to 2011". *Journal of Financial Economic Policy*. Vol. 5(2): 111 – 219.

Battistini, N., Pagano, M., & Simonelli, S. (2014). Systemic risk, sovereign yields and bank exposures in the euro crisis. *Economic Policy*, *29*(78), 203-251.

Beaton, K. and B. Desroches (2011). Financial Spillovers Across Countries: The Case of Canada and the United States. Bank of Canada Discussion Paper 2011-1.

Beaton, K., Myrvoda, A. and S. Thompson (2016). Non-Performing Loans in the ECCU: Determinants and Macroeconomic Impact. IMF Working Paper No. 16/229

Bernanke, B. and M. Gertler. (1989). "Agency costs, net worth, and business fluctuations". *The American Economic Review*. Vol. 79 (1), 14-31.

Bernanke, B., Gertler, M., and S. Gilchrist. (1999). "The financial accelerator in a quantitative business cycle framework." In Handbook of Macroeconomics, Vol. 1. Part C, 1341-1393. Edited by J. B. Taylor and M. Woodford. Elsevier, North Holland.

Birchwood, A., Brei, M., & Noel, D. M. (2017). Interest margins and bank regulation in Central America and the Caribbean. *Journal of Banking & Finance*, *85*, 56-68.

Brei, M., P. Mohan & E. Strobl (2019). The impact of natural disasters on the banking sector: Evidence from hurricane strikes in the Caribbean. *The Quarterly Review of Economics and Finance*, vol. 72(C), 232-239.

Bolton, P., Freixas, X., Gambacorta, L. and P.E. Mistrulli (2016). Relationship and Transaction Lending in a Crisis. *Review of Financial Studies*, vol. 29(10), 2643-76.

Cantero-Saiz, M., Sanfilippo-Azofra, S., Torre-Olmo, B., and C. López-Gutiérrez (2014). Sovereign risk and the bank lending channel in Europe. *Journal of International Money and Finance*, 47, 1-20.

Chavan, P., and L. Gambacorta (2018). Bank lending and loan quality: an emerging economy perspective. *Empirical Economics*, 1-29.

Cifter, A., Yilmazer, S., and E. Cifter (2009). Analysis of sectoral credit default cycle dependency with wavelet networks: Evidence from Turkey. *Economic Modelling*, *26*(6), 1382-1388.

Claessens, S. and N. Van Horen (2015). The impact of the global financial crisis on banking globalization. *IMF Economic Review*. Vol. 63(4): 868-918.

Correa, R. and H. Sapriza (2014). Sovereign debt crises. in The Oxford Handbook of Banking, Second Edition. Edited by A. Berger, O. Molyneux, and J. Wilson. Oxford University Press.

Corsetti, G., Kuester, K., Meier, A. and G. J. Müller (2014). Sovereign risk and belief-driven fluctuations in the euro area. *Journal of Monetary Economics*, 61, (53).

Cotter, J. and A. Suurlaht (2018). Spillovers in Risk of Financial Institutions. Working Papers 201805, Geary Institute, University College Dublin.

CTT (2014). Resolving sovereign debt distress in the Caribbean. Presentation at SALISES conference, Central Bank of Trinidad and Tobago.

Das, U., Lu,Y., Papaioannou, M. and I. Petrova (2012). Sovereign Asset and Liability Management - Conceptual Issues and Country Experiences. IMF Working Paper 12/241.

De Bruyckere, V., Gerhardt, M., Schepens, G., and R. Vander Vennet (2013). Bank/sovereign risk spillovers in the European debt crisis. *Journal of Banking & Finance*, *37*(12), 4793-4809.

De Marco, F. (2017). Bank lending and the European sovereign debt crisis. *Journal of Financial and Quantitative Analysis*. Forthcoming.

Duncan, N. T. and D. Woods (2007). What about us? The Anglo-Caribbean democratic experience. *Commonwealth & Comparative Politics*, *45*(2), 202-218.

Gennaioli, N., Martin, A., and S. Rossi (2014). Sovereign default, domestic banks, and financial institutions. *The Journal of Finance*, 69(2), 819-866.

Gennaioli, N., Martin, A., and S. Rossi (2018). Banks, government bonds, and default: What do the data say?. *Journal of Monetary Economics*, forthcoming.

Godlewski, J. C. (2005). Bank Capital and Credit Risk Taking in Emerging Market Economies. *Journal of Banking Regulation*, 6(2), 128–145.

Hardie, I. and D. Howarth (2013). Market-Based Banking and the International Financial Crisis. Oxford Scholarship Online.

Hesse, H., Salman, F. and C. Schmieder (2014). How to Capture Macro-Financial Spillover Effects in Stress Tests?. IMF Working Papers 14/103.

Honohan, P. and T. Beck (2007). *Making finance work for Africa*. The World Bank.

IMF (2012). A Survey of Experiences with Emerging Market Sovereign Debt Restructurings. International Monetary Fund.

Jordan, A. and C. Tucker (2013). Assessing the Impact of Nonperforming Loans on Economic Growth in The Bahamas. *Monetaria*, CEMLA, vol. 0(2), 371-400,.

Kirschenmann, K., Korte, J. and S. Steffen (2017). The zero risk fallacy? Banks' sovereign exposure and sovereign risk spillovers. ZEW Discussion Papers 17-069.

Lawrence, E. (1995). Default and the life cycle model. *Journal of Money, Credit and Banking* 27, 939–954.

Louzis, D. P., Vouldis, A. T., and V.L. Metaxas (2012). Macroeconomic and bank-specific determinants of non-performing loans in Greece: A comparative study of mortgage, business and consumer loan portfolios. *Journal of Banking & Finance*, *36*(4), 1012-1027.

Moody's (2017). Sovereign Default and Recovery Rates, 1983-2016. Moody's Investors Service.

Mukherji, J. (2016). Why Do Central American Sovereigns Have Low Ratings?. S&P Global Ratings.

O'hara, M. (1995). Market Microstructure Theory. Blackwell Publishing. Malden: MA.

Perotti, R. (1996). Fiscal consolidation in Europe: Composition matters. *The American Economic Review*, *86*(2), 105-110.

Ozili, P. (2017). Non-performing loans and Financial Development: New Evidence. Working Paper, University of Essex, United Kingdom.

Popov, A., and N. Van Horen (2014). Exporting sovereign stress: Evidence from syndicated bank lending during the euro area sovereign debt crisis. *Review of Finance*, *19*(5), 1825-1866.

Panetta, F., Correa, R., Davies, M., Di Cesare, A., Marques, J. M., Nadal de Simone, and A. Zaghini (2011). The impact of sovereign credit risk on bank funding conditions. CGFS Paper.

Quagliariello, M. (2007). Banks' riskiness over the business cycle: a panel analysis on Italian intermediaries. *Applied Financial Economics*, *17*(2), 119-138.

Ratha, D., De, P.K. and S. Mohapatra (2011). Shadow sovereign ratings for unrated developing countries. *World Development*, 39(3), 295-307.

Reinhart, C. M. and K.S. Rogoff (2011). From financial crash to debt crisis. *American Economic Review*, *101*(5), 1676-1706.

Rinaldi, L., and A. Sanchis-Arellano (2006). Household debt sustainability: what explains household non-performing loans? An empirical analysis. ECB Working Paper.

Roodman, D. (2009). Practitioners' Corner: A Note on the Theme of Too Many Instruments," *Oxford Bulletin of Economics and Statistics*, 71(1), 135-158.

Salas, V. and J. Saurina (2002). Credit risk in two institutional regimes: Spanish commercial and savings banks. *Journal of Financial Services Research*, 22(3), 203-224.

Stakic, N. (2014). Determinants of the Nonperforming Loans Level Movement in the Banking Sector of Serbia. *Bankarstvo*, 43(4), 122–145.

Tracey, M. and H. Leon (2011). The Impact of Non-performing Loans on Loan growth. International Monetary Fund, Resident Representative Office in Jamaica.

Uhlig, H. (2013). Sovereign default risk and banks in a monetary union. *German Economic Review,* Vol. 15, 23–41.

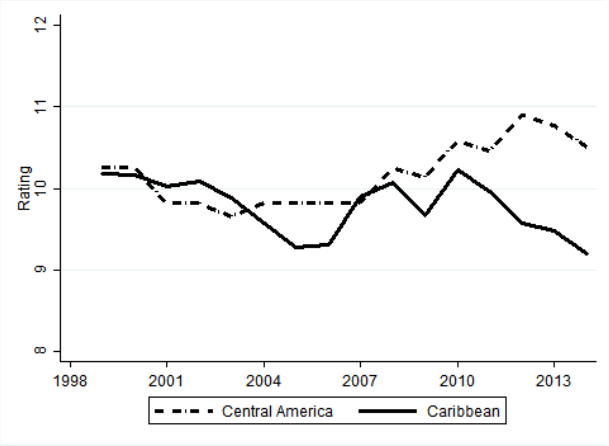
Windmeijer, F. (2005). A Finite Sample Correction for the Variance of Linear Efficient Two-Step GMM estimators, *Journal of Econometrics*, 126, 25–51.

Wood, A. and N. Skinner (2018). Determinants of non-performing loans: evidence from commercial banks in Barbados. *The Business and Management Review*, Vol. 9(3).

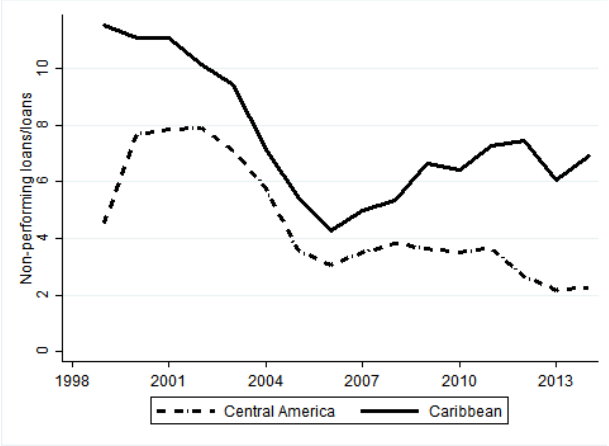
Figures and tables

Figure 1: Bank credit risks and government ratings

(A) Government ratings



(B) Non-performing loan ratio



Note: The vertical axis shows government ratings and the non-performing loan ratio for Central America and the Caribbean over the period 1999-2014. Government ratings refers to the long-term foreign-currency rating converted into integers (1=lowest rating, …, 21=highest rating). For details on the included countries, see Table 2. Medians across country groups and years are shown.

Source: BankScope; Standard and Poor's; Moody's. Authors' calculations.

Table 1: Economic and market structure for selected region

	Govern-ment debt	**Trade openness**	**Bank credit**	**Financial markets**	**Central bank inpendence**	**Trans-parency**
Africa	31.7	80.2	23.2	59.5	1.9	5.2
Asia	48.0	102.4	57.3	98.5	1.9	5.3
Caribbean Islands	66.2	105.4	50.4	39.2	1.3	4.7
Central America	36.9	93.8	44.7	22.1	1.3	4.1
Europe	58.8	116.6	84.0	50.7	2.4	5.2
North America	92.7	46.1	50.1	121.3	2.5	6.0
South America	48.3	56.3	36.4	53.5	1.3	5.3
World average	**54.7**	**85.8**	**49.4**	**63.5**	**1.8**	**5.1**

Note: "Government debt" is central government debt over GDP, "Trade openness" the sum of exports and imports over GDP, "Bank credit" credit provided by banks to the private sector over GDP, "Financial markets" is stock market capitalization over GDP, "Central bank independence" is an index on a scale of 0-3 (higher value means higher independence), and "Transparency" is an index on a scale of 0-6 (higher value indicates higher level of reporting transparency). The sample includes 175 countries. All values for the reported regions are unweighted averages across countries over the years 1999-2014.

Sources: WDI; Barth et al. (2013). Authors' calculations.

Table 2: Characteristics of the database (1999–2014)

	No. of banks	Total assets, end-2014		Total loans	NPLs	ROA	Sovereign rating in year		
		Billion USD	% of GDP	% of assets	% of loans	% of assets	2000	2014	Δ
Anguilla	2	0.6	368.1	58.6	11.2	1.1	11	11	0
Antigua & B.	1	0.4	29.6	64.1	6.7	1.4	8	8	0
Aruba	2	1.4	57.8	67.6	9.5	1.8	13	13	0
Bahamas	5	8.5	102.9	69.5	7.6	1.3	15	13	-2
Barbados	3	13.1	306.8	61.4	6.3	1.7	15	9	-6
Belize	1	0.5	43.4	72.1	3.9	6.4	10	6	-4
Bermuda	3	22.6	403.1	23.5	11.6	1.0	20	19	-1
Cayman Islands	5	11.7	363.6	33.5	2.1	1.6	18	18	0
Costa Rica	17	36.9	79.2	63.1	5.1	1.3	10	10	0
Cuba	4	7.5	12.4	35.1	12.8	1.4	5	5	0
Dom. Republic	13	24.8	42.2	57.0	2.3	1.9	6	8	2
El Salvador	9	11.9	59.5	60.0	4.8	1.0	11	11	0
Grenada	3	0.7	88.2	61.9	6.3	0.9	4	5	1
Guatemala	20	33.0	62.0	54.6	4.3	1.4	10	10	0
Guyana	3	1.4	43.1	36.1	17.7	1.4	5	10	5
Haiti	5	3.5	42.4	34.2	2.7	1.3	11	12	1
Honduras	18	14.7	80.1	61.4	4.7	1.2	8	8	0
Jamaica	10	12.3	84.7	35.8	6.6	1.5	7	6	-1
Panama	38	113.6	267.0	62.6	2.6	1.4	12	13	1
St Kitts & Nevis	2	1.3	167.2	39.3	8.4	1.6	4	7	3
St Lucia	5	2.6	224.3	60.2	18.3	1.0	10	10	0
St Vincent	1	0.3	44.6	69.8	2.4	1.5	8	8	0
Suriname	1	0.3	9.9	52.4	2.0	-1.0	6	8	2
Trinidad	6	23.0	99.8	50.1	3.5	2.2	12	16	4
Average/sum*	177*	14.4	128.4	53.5	6.8	1.5	10.0	10.2	0.2

Note: Unweighted averages across banks per country. "Average/sum*" indicates unweighted averages or sums (*) over countries. "Sovereign rating" refers to the long-term foreign-currency rating converted into integers (1=lowest rating, …, 21=highest rating). For Anguilla, Antigua and Barbuda, Guyana, Haiti, St. Kitts and Nevis, and St. Lucia, the rating was inferred from an auxiliary regression (see footnote 6).

Sources: BankScope; WDI; Standard and Poor's; Moody's; IMF-IFS; Central bank reports. Authors' calculations.

Table 3: Variable definitions and summary statistics

Variable	Definition	Obs.	Mean	Std. Dev.	Min	Max
Non-performing loans	Ln(NPL ratio/(1-NPL ratio))	1388	-3.52	1.22	-6.93	-0.12
Sovereign rating	Cumulative change in long-term foreign-currency ratings	1388	0.15	1.43	-6.00	5.00
Market power	Lerner Index	1388	0.25	0.13	0.00	0.78
Net interest margin	Net interest income/total assets	1388	1.56	1.33	-1.75	17.68
Non-interest income	Non-interest income/total assets	1388	5.46	4.13	-2.35	24.84
Non-interest expense	Non-interest expense/(net interest income + non-interest income)	1388	64.24	20.78	1.42	210.36
Capital ratio	Total equity/total assets	1388	12.23	6.12	0.77	58.22
Liquid assets	(Cash and due from banks + loans and advances to banks)/total assets	1388	18.06	10.79	0.00	99.53
ROA	Net income/total assets	1388	1.43	1.55	-9.33	13.89
GFC dummy	=1 if 2009-12	1388	0.33	0.47	0.00	1.00
Island dummy	=1 if island	1388	0.34	0.47	0.00	1.00
Default dummy	=1 if government default	1388	0.01	0.12	0.00	1.00
Hurricane dummy	=1 if hurricane strike	1388	0.03	0.17	0.00	1.00
GDP growth	IMF-IFS	1388	3.81	3.65	-18.41	20.28
Inflation	IMF-IFS	1388	5.80	3.70	-1.67	39.28
Lending rate	IMF-IFS	1388	13.12	6.33	-4.44	48.00
Openness	Trade/GDP	1388	99.71	32.45	16.66	205.22

Note: The sample goes from 1999 to 2014.

Sources: BankScope; WDI; Standard and Poor's; Moody's; IMF-IFS; Central bank reports. Authors' calculations.

Table 4: Regression results for non-performing loans

Y = NPL	(1) Baseline	(2) Fiscal space	(3) Non-investment grade	(4) Central America	(5) Recession	(6) Import cover	(7) Central bank indepen-dence	(8) Trans-parency
NPL, t-1	**0.571*** **	**0.572*** **	**0.577*** **	**0.569*** **	**0.572*** **	**0.581*** **	**0.574*** **	**0.562*** **
	(0.064)	**(0.064)**	**(0.064)**	**(0.064)**	**(0.064)**	**(0.067)**	**(0.064)**	**(0.067)**
Sovereign rating	**-0.051** **	**-0.070** **	**-0.072** **	**-0.064*** **	**-0.052** **	-0.025	-0.020	-0.022
	(0.022)	**(0.029)**	**(0.029)**	**(0.025)**	**(0.023)**	(0.023)	(0.022)	(0.024)
Sov. rating*D		0.048	0.049	0.054	0.003	**-0.105** **	**-0.086** **	**-0.097** *
		(0.048)	(0.032)	(0.047)	(0.026)	**(0.050)**	**(0.042)**	**(0.056)**
Market power	**-2.274** **	**-2.307** **	**-2.152** **	**-2.293** **	**-2.293** **	**-2.038** **	**-2.226** **	**-2.428** **
	(0.939)	**(0.934)**	**(0.913)**	**(0.944)**	**(0.952)**	**(0.893)**	**(0.912)**	**(0.980)**
Net int. margin	-0.017	-0.016	-0.020	-0.015	-0.017	-0.024	-0.020	-0.013
	(0.049)	(0.049)	(0.048)	(0.048)	(0.049)	(0.049)	(0.050)	(0.050)
Non-int. income	**0.032*** **	**0.032*** **	**0.032*** **	**0.032*** **	**0.033*** **	**0.032*** **	**0.033*** **	**0.033*** **
	(0.011)	**(0.012)**	**(0.011)**	**(0.012)**	**(0.012)**	**(0.011)**	**(0.012)**	**(0.012)**
Non-int. expense	**-0.017** **	**-0.018** **	**-0.016** **	**-0.017** **	**-0.017** **	**-0.016** **	**-0.017** **	**-0.018** **
	(0.007)	**(0.007)**	**(0.007)**	**(0.007)**	**(0.007)**	**(0.007)**	**(0.007)**	**(0.008)**
Capital ratio	0.008	0.009	0.008	0.009	0.008	0.007	0.008	0.008
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.00)
Liquid assets	0.008	0.008	0.007	0.007	0.008	0.008	0.008	0.009
	(0.007)	(0.007)	(0.006)	(0.007)	(0.007)	(0.006)	(0.006)	(0.007)
ROA	**-0.077** **	**-0.079** **	**-0.076** **	**-0.074** **	**-0.077** **	**-0.083** **	**-0.080** **	**-0.079** **
	(0.032)	**(0.033)**	**(0.032)**	**(0.032)**	**(0.032)**	**(0.032)**	**(0.034)**	**(0.034)**
GFC dummy	0.043	0.047	0.039	0.034	0.046	0.059	0.062	0.045
	(0.046)	(0.045)	(0.046)	(0.046)	(0.046)	(0.046)	(0.048)	(0.048)
Island dummy	**0.303*** **	**0.316*** **	**0.315*** **	**0.319*** **	**0.302*** **	**0.292*** **	**0.285*** **	**0.294*** **
	(0.109)	**(0.110)**	**(0.108)**	**(0.110)**	**(0.108)**	**(0.107)**	**(0.110)**	**(0.110)**
Default dummy	0.158	0.157	0.155	0.145	0.158	0.143	0.161	0.206
	(0.140)	(0.141)	(0.137)	(0.141)	(0.138)	(0.137)	(0.136)	(0.148)
Hurricane dummy	0.065	0.056	0.053	0.070	0.069	0.049	0.061	0.076
	(0.107)	(0.109)	(0.108)	(0.106)	(0.109)	(0.110)	(0.108)	(0.108)
GDP growth	**-0.031*** **	**-0.031*** **	**-0.031*** **	**-0.031*** **	**-0.031*** **	**-0.030*** **	**-0.029*** **	**-0.031*** **
	(0.008)	**(0.008)**	**(0.008)**	**(0.008)**	**(0.008)**	**(0.008)**	**(0.008)**	**(0.008)**
Inflation	-0.004	-0.003	-0.005	-0.005	-0.004	-0.005	-0.005	-0.005
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Lending rate	-0.001	-0.001	0.000	0.001	-0.000	0.001	0.001	0.002
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Openness	**0.003** **	**0.003** **	**0.003** **	**0.003** *	**0.003** **	**0.003** **	**0.003** **	**0.002** *
	(0.001)	**(0.001)**	**(0.001)**	**(0.001)**	**(0.001)**	**(0.001)**	**(0.001)**	**(0.001)**
Constant	-0.408	-0.384	-0.465	-0.416	-0.395	-0.565	-0.497	-0.424
	(0.729)	(0.735)	(0.718)	(0.719)	(0.739)	(0.716)	(0.725)	(0.741)
Observations	1388	1388	1388	1388	1388	1388	1388	1388
Banks	177	177	177	177	177	177	177	177
Hansen	0.484	0.490	0.510	0.458	0.501	0.521	0.491	0.438
AR2	0.420	0.421	0.414	0.421	0.421	0.412	0.413	0.425
No. instruments	108	109	109	109	109	109	109	109

Note: The sample period goes from 1999 to 2014. All estimations are based on the Arellano and Bover (1995) system GMM estimator. Robust standard errors are reported in brackets. The interaction variable D in columns (2)-(8) is a dummy for (2) fiscal space (government spending index (Heritage Foundation) < 25th percentile of the distribution); (3) sovereign rating is non-investment grade (Moody's rating < Baa3); (4) Central America; (5) recessions (real GDP growth < 0); (6) low levels of international reserves (import cover < 25th percentile); (7) central bank independence (supervisory independence index (Barth et al., 2013) < 25th percentile); and (8) low market transparency (transparency index (Barth et al., 2013) < 25th percentile). The null hypothesis of the Hansen test is that the instruments are valid. The null hypothesis of the AR2 test is that errors in the first-difference regression exhibit no second-order serial correlation. No. instruments indicates the number of instruments used in the regressions. ***, **, * indicate significance at the 1%, 5%, and 10% level, respectively.