WP/15/96

IMF Working Paper

What Drives Interest Rate Spreads in Pacific Island Countries? An Empirical Investigation

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INTERNATIONAL MONETARY FUND

 WP/15/96

IMF Working Paper

Asia and Pacific Department

What Drives Interest Rate Spreads in Pacific Island Countries? An Empirical Investigation[1]

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Authorized for distribution by Patrizia Tumbarello

May 2015

Abstract

Growth has been sluggish in Pacific island countries (PICs). High cost of credit is likely one of the reasons. While the small scale, geographic dispersion, and vulnerability to shocks increase the cost and risk of credit in this country group, there is considerable variability in interest rate spreads both across countries and over time. This paper examines the determinants of lending rates and interest rate spreads in a panel of six PICs, extending the literature that was largely descriptive in nature or focused on a single country. Our results are in line with economic theory. We find that the size of the economy is negatively correlated with spreads, confirming the importance of scale. Inflation appears to have only marginal impact on spreads. High loan loss provisions and nonperforming loans increase the cost of credit. So does banking system concentration. Higher institutional quality is associated with lower spreads.

JEL Classification Numbers: E43

Keywords: interest rates; banking systems; Pacific island countries

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[1] We thank Michael Andrews, Luis Breuer, Joseph Crowley, Matt Davies, Hoe Ee Khor, Erik Lundback, Patrizia Tumbarello, James Walsh, and Rhoda Weeks-Brown for their comments and inputs. We would also like to thank the country authorities for providing us with the data used in this paper. This paper has benefited from comments from the IMF's Small Islands Club and the IMF's APD Discussion Forum, as well as from Rosanne Heller's editorial comments.

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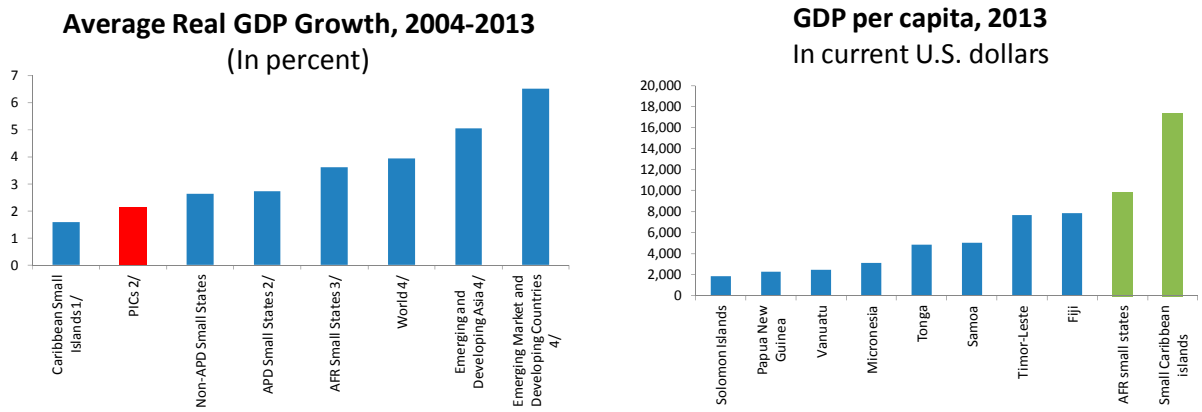
I. INTRODUCTION

Over the last 10 years GDP growth has been disappointingly slow in Pacific island countries (PICs), barely keeping up with population growth. As a result, their standard of living has remained below that in small states in other parts of the world (Figure 1). This gap may be partly attributed to the unique challenges facing PICs—such as remoteness, population dispersion, and proneness to natural disasters—in addition to small size.[2]

Figure 1: International Comparison of Economic Development



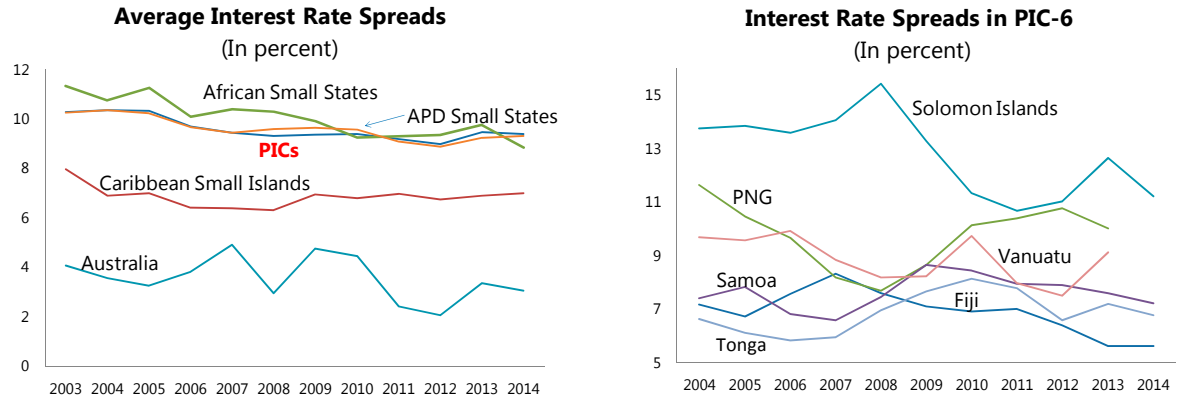
Sources: IMF, World Economic Outlook Database, and IMF staff calculations
1/ Antigua and Barbuda, The Bahamas, Barbados, Dominica, Grenada, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, and Trinidad and Tobago
2/ PICs: Fiji, Kiribati, Marshall Islands, Micronesia, Palau, Papua New Guinea, Samoa, Solomon Islands, Timor-Leste, Tonga, and Vanuatu. APD small states: PICs without Papua New Guinea, and with the addition of Bhutan and Maldives. Corrected for outliers.
3/ Cabo Verde, Comoros, Mauritius, São Tomé and Príncipe, Seychelles, and Swaziland
4/ As defined by *World Economic Outlook*

One of the reasons for the slow growth in PICs could be the high cost of credit. The link between credit availability and growth is suggested by both theory and empirical studies. The literature survey by Levine (1997) pointed out that the efficiency of financial intermediation can affect economic growth. Empirically, a link between interest rate spreads and GDP per capita, as well as growth (via total factor productivity), has been demonstrated by Greenwood and others (2013) for a broad group of advanced, emerging, and developing economies. The spreads between lending and deposit rates in the PIC region are among the highest in the world (Figure 2). Concerns about the cost of credit as a barrier to growth have been expressed by several studies (e.g., International Monetary Fund (2013)). In addition, as reported by Rebei (2014), policymakers believe that persistently high spreads could hamper the effectiveness of the credit channel for monetary policy transmission and thus would affect the appropriate monetary policy stance. While the small scale, geographic dispersion, and vulnerability to shocks increase the cost and risk of credit in PICs, there is considerable variability in interest

[2] Tumbarello, Wu, and Cabezon (2013)

rate spreads both across countries and over time, suggesting that policies could influence the spreads.

Figure 2: International Comparison of Interest Rate Spreads



Sources: IMF, International Financial Statistics, and IMF staff calculations

In this paper we examine the determinants of interest rate spreads in PICs, including both country characteristics and variables that can be influenced by policymakers. To make sure that lessons learned from this investigation apply to the PICs, we limit our sample to countries in the region rather than relying on results derived from broader groupings. This is our key contribution. While the broad literature on interest rate determinants is vast, there is not a single cross-country empirical study looking at the PIC region. There is sufficient variability in our sample to draw robust conclusions. Due to data limitations, this study focuses on six Pacific island countries (PIC-6).[3] Where relevant, comparisons are drawn against small states in Africa and the Caribbean—which are arguably the most relevant comparators for PICs—as well as other Pacific economies.

II. The Banking Systems in the Pacific Islands: A Few Stylized Facts

Banking sectors in Pacific island countries tend to be small, highly concentrated, and dominated by foreign banks.[4] Banks operating in PICs are also generally highly profitable, with noninterest income—especially foreign exchange transaction commissions and fees—accounting for a large component of revenue. Commercial banks dominate financial systems, with provident funds being the only other institutions of comparable size.

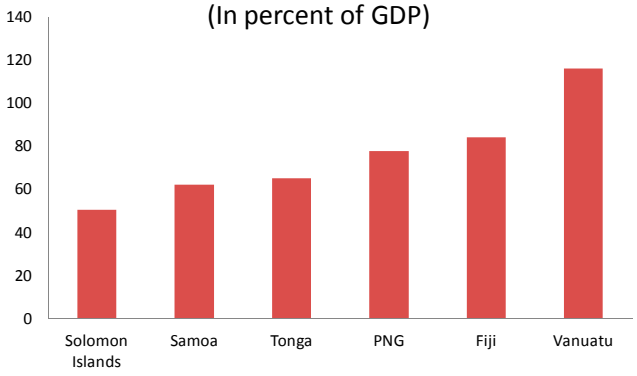
[3] The countries are Fiji, Papua New Guinea, Samoa, Solomon Islands, Tonga, and Vanuatu.

[4] A list of the banks operating in each country can be found in Sheridan and others (2013).

Size

The size of the banking sector in the PIC-6 varies considerably, with total bank assets ranging from 50 percent of GDP in Solomon Islands to over 100 percent in Vanuatu (Figure 3). The size of bank assets is closely mirrored by the scope of lending activity: at the end of 2013, commercial bank loans amounted to only 18 percent of GDP in Solomon Islands compared with 75 percent in Vanuatu. More broadly across PICs, the amount of outstanding loans relative to the size of the domestic economy tends to be limited, even when compared with African small states and the Caribbean small islands. On average, banks in PICs extend less credit than their small state counterparts (Figure 4).

Figure 3: PIC-6—Total Assets of the Banking Sector, 2013
(In percent of GDP)



Sources: Country authorities, IMF staff calculations

The other side of the same coin is the low degree of financial intermediation in the economy. The low level of commercial bank deposits as a percentage of GDP suggests that a significant portion of the population remains underbanked. While the introduction of mobile banking—based on local mobile phone telecommunication networks—in recent years is expected to help increase financial inclusion and improve access to banking services, many Pacific island countries lag behind other small states in this regard (Figure 5).

Figure 4: Outstanding Bank Loans, 2013
(In percent of GDP)

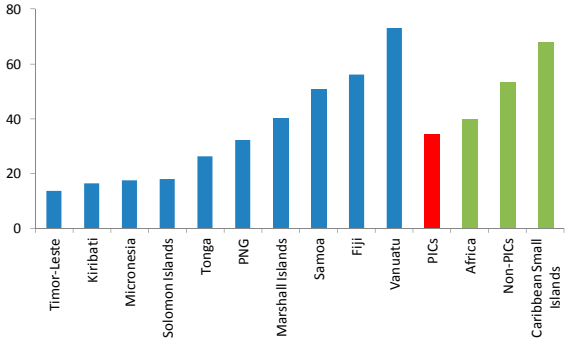
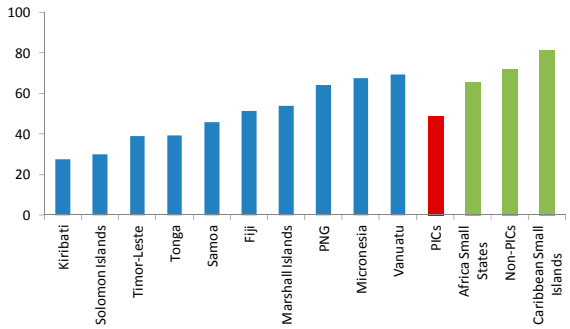


Figure 5: Outstanding Bank Deposits, 2013
(In percent of GDP)



Source: IMF, Financial Access Survey

Presence, ownership, and market concentration

Overall, few banks operate in Pacific island countries, with some variation across countries. As of mid-2014, Fiji and Palau—PICs with relatively developed financial sectors—each had seven banks, while on the low end, Kiribati and Tuvalu were only served by one bank. In most PICs

the total number of commercial banks is lower than the average number of banks operating in comparable countries (Figure 6).[5]

Large foreign banks dominate the financial landscape, operating through branches or wholly owned subsidiaries, with local banks holding relatively low market shares.[6] As an illustration, the Australian banks ANZ and Westpac are present in all PIC-6 and hold large shares of the market. Anecdotal evidence suggests that at least some of the domestically incorporated banks have also benefited from foreign direct investment.

A corollary of the small size of the banking sector is a high degree of market concentration and limited competition. Based on Herfindahl-Hirschman Index (HHI) values—a measure of market concentration calculated using market shares of loans and deposits—the banking sector in the PIC-6 appears to exceed the conventional threshold of what would be considered to be highly concentrated markets (Figure 7).[7]

Figure 6: Commercial Banks in Pacific Island Countries, 2014
(Number of banks)

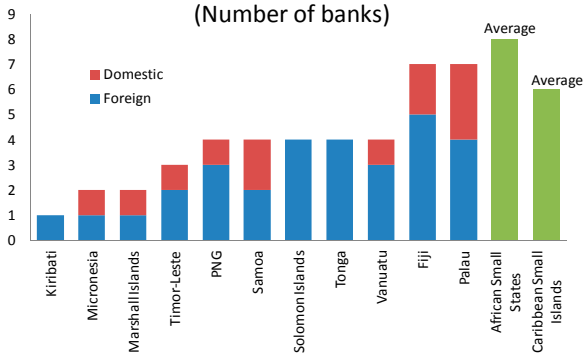
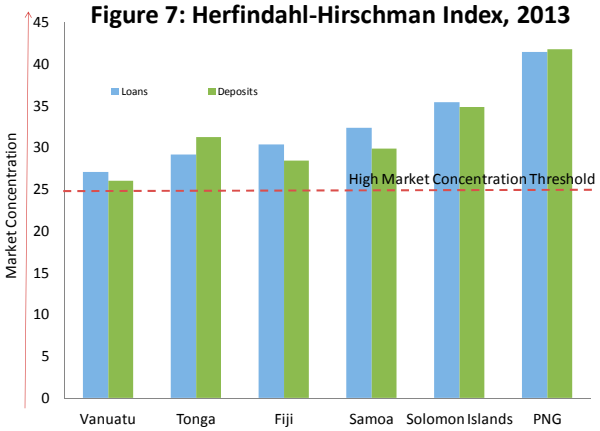


Figure 7: Herfindahl-Hirschman Index, 2013



Sources: IMF, Financial Access Survey, country authorities, and IMF staff calculations.

Profitability and Business Model

Overall bank profitability in PICs is relatively high, exceeding the range typically observed in advanced economies, and comparing favorably with emerging market economies and small

[5] The number of banks in Solomon Islands may decline with the announcement by Westpac, an Australian bank with a broad presence in PICs, of its plans to sell off its operations in Samoa, Cook Islands, Solomon Islands, Vanuatu, and Tonga by mid-2015 to PNG's Bank South Pacific, which already has presence in Solomon Islands.

[6] Davies, Vaught, and Cabezon (forthcoming).

[7] HHI is defined as the sum of squared market shares of individual banks. $HHI = \sum_{i=1}^{n} \left(L_i / L \right)^2$, where L_i is the amount of loans provided (or deposits collected) by bank i, n is the number of banks, and L is the total over all banks. It ranges from $1/n$ to one and tends to zero as the market approaches perfect competition. A value of one corresponds to a monopoly. The U.S. Federal Trade Commission considers markets with a measure of above 0.25 as "highly concentrated markets." See, for instance, "Horizontal Merger Guidelines," U.S. Department of Justice and the Federal Trade Commission (2010).

states in other regions.[8] Data on returns on assets and on equity show that banks in the PIC-6 have consistently outperformed regional banks and those in the Caribbean small islands for the better part of the last decade (Figures 8 and 9).

Figure 8: Return on Assets
(In percent)

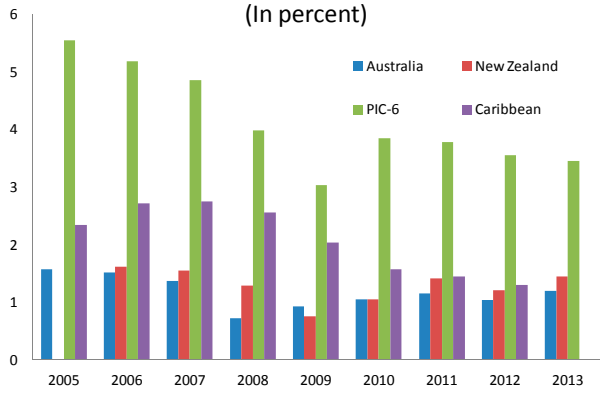
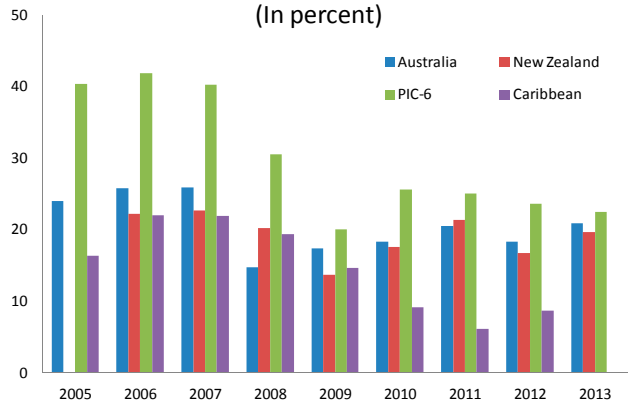


Figure 9: Return on Equity
(In percent)



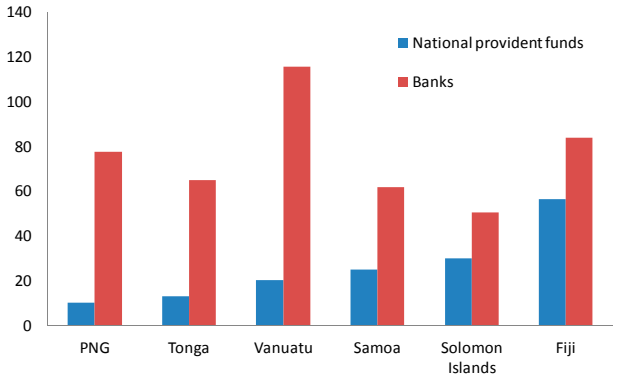
Sources: Country authorities; IMF staff calculations; Davies, Vaught and Cabezon (forthcoming),;and IMF Financial Soundness Indicators database.

High returns reflect not only wide spreads but also significant profits from other operations. In 2013, noninterest income of commercial banks in the PIC-6 was equivalent, on average, to around two-thirds of interest income. Forty percent of it was derived from foreign exchange transaction fees and commissions.

Role of National Provident Funds

National provident funds are large pools of financial savings. While we do not include them in our empirical model due to data limitations for our sample period, their role as systemically important financial institutions and providers of funds to commercial banks and to businesses (and sometimes households) should be acknowledged. On average, total assets of PIC-6 national provident funds stand at over one-fourth of GDP, and over a third of banks' total assets. Cross-country variation is significant, as exemplified by the contrast between Papua New Guinea, where the assets of the National Superannuation Fund are equivalent to just 13 percent of banking assets, and Fiji, where the National Provident Fund's assets are almost 70 percent of banking assets.

Figure 10: Total Assets, 2013 1/
(In percent of GDP)



Sources: National provident funds' annual reports, and IMF staff calculations
1/ The national provident fund number for Vanuatu is for 2011, and for Samoa, June 2012. Tongan numbers reflect the latest publicly available numbers from the Retirement Fund Board and the National Retirement Benefits Fund.

[8] Davies, Vaught, and Cabezon (forthcoming).

National provident funds attract a large portion of private saving in many PICs. Limited investment opportunities in the domestic economy and constraints on offshore investments owing to balance of payments concerns mean that these funds tend to hold their assets in long-term government debt securities and bank deposits.[9] This practice, combined with their generally large size, means that provident funds' actions in PICs' small financial sectors can affect deposit rates. From the lending perspective, these funds also act as a source of financing for the private sector in some countries, although in a number of cases, this is only limited to consumer financing.

III. LITERATURE REVIEW

Cross-country empirical literature regarding the determinants of interest rate spreads is extensive. In one of the larger, frequently cited studies, Demirguc-Kunt and Huizinga (1999) used panel data for 80 advanced, emerging, and developing economies. Using bank-specific, banking sector, and country level data, they found that important determinants of spreads include characteristics of individual banks, the structure of the banking sector, bank taxation, deposit insurance regulation, macroeconomic conditions, and institutional indicators. Specifically, the scale of bank operations and banking sector concentration have significant effects on spreads, controlling for banking activity, leverage, and the macroeconomic environment. Foreign banks have higher spreads than domestic banks in emerging markets, while the reverse is true in advanced economies.[10] Moreover, higher reserve requirements are not fully passed onto bank customers, particularly in emerging markets. Narrowing the scope to middle- and low-income countries, Tennant and Folawewo (2009) indicated that higher public sector borrowing, discount rates, inflation, and reserve requirements are associated with higher spreads. This literature provides broad guidance for the choice of important drivers of spreads to consider. At the same time, it does not attempt to take into account the unique features of Pacific island countries, which may limit the applicability of its findings to the region.

Crowley (2007) examined interest rate spreads in English-speaking African countries and found that higher spreads were associated with lower inflation, higher number of banks, and greater public ownership of banks. The paper found no statistically significant relationship between the size of the economy—a proxy for the scale of bank operations—and interest rate spreads, but found a positive relationship between real GDP and net interest margins, an alternative measure of interest rate spreads. The paper posited that since larger economies allow a higher degree of specialization among banks, and thus greater financial access for riskier borrowers, this could lead to a higher share of banks' loan portfolios being allocated to retail and specialized lending. As a result, net interest margin could be higher without any individual lending rate changing. The paper also showed that higher interest rates on deposits were associated with lower interest rate spreads, but with greater net interest margins.

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[9] Yang and others (2011)

[10] Bank level data are not available for most of the Pacific islands, so we cannot include bank-specific variables in our empirical analysis. Also, the shares of foreign banks in the banking systems are similar among the Pacific islands (the majority of banks are foreign), thus we do not include this factor in our regression.

Studies on Caribbean island countries may be more germane for the PICs, since the two regions share a number of common characteristics (Fairbairn and Worrell (1996)). Randall (1998) applied an accounting framework to decompose interest rate spreads into shares attributable to various determinants, and found that reserve costs, operational costs, and loan loss provisions accounted for over 75 percent of observed spreads. Furthermore, a separate regression revealed that the statutory minimum deposit rate, capital controls, and operating costs have a statistically significant impact on spreads. Moore and Craigwell (2002) pointed out that, in addition to real GDP and several standard banking sector variables (loans, operating expenses, loan loss provisions), the market power of banks (proxied by the deviation of the interest rate on loans from the net marginal cost of providing loans) also plays an important role in driving the interest rate spreads.

The relevant literature on the Pacific island countries is sparse. Davies, Vaught, and Cabezon (forthcoming) discuss possible reasons for high spreads in the region. Such reasons include low and volatile growth, capital and exchange controls, political risks, natural disasters, underdeveloped financial markets, weak institutional setups, and ineffective contract enforcement. However, the role of these factors is not tested empirically.

The few empirical studies that exist on Pacific island countries have been conducted only in a single country setting. One of them is Jayaraman and Sharma's (2003) study on Fiji. Employing the accounting framework similar to that of Randall (1998), they find that the spreads are driven by after-tax profit margins, administrative costs, and loan loss provisioning expenses. They note the short span of time series data as a constraint on quantitative analysis. More recently, Rebei (2014) conducted a panel study on Solomon Islands using 12 years of bank-level quarterly data. His analysis showed that interest rate spreads in Solomon Islands are affected by the scale of operations (loan growth), administrative costs, banking industry concentration, the policy rate, and GDP growth. These studies provide valuable insights, but their applicability to the other Pacific islands might be limited, particularly given that Fiji and Solomon Islands represent two extremes in terms of economic development and the magnitude of interest rate spreads, and the other countries fall in between.

Our key contribution is that we bridge descriptive regional studies and single-country empirical investigations. We conduct a quantitative analysis of interest rate spread determinants in six Pacific island countries for which adequate data are available using a common framework and derive implications for the whole region.

IV. METHODOLOGY

In our empirical exercise, we use two measures of interest rate spreads. The first one is the difference between the weighted average lending rate and the weighted average deposit rate,[11] which is the measure most frequently used in the literature (see, for example, Moore and Craigwell (2002) and Tennant and Folawewo (2009)). The second one is the ratio of net interest income to total loans. That measure is similar to the net interest margin used by Demirguc-Kunt

[11] Variable definitions and data sources are listed in Table I, while Table II provides summary statistics for key variables.

and Huizinga (1999) and Rebei (2014), except that we divide net interest income by loans rather than total assets to relate it only to assets on which the interest income is earned and thus obtain a number comparable to interest rate difference.

Our preferred measure is the interest rate differential, as it directly captures the cost of credit to the borrower, which is a key factor affecting investment and consumption decisions—and that is ultimately why we are studying the issue in the first place. However, there are two problems associated with that measure. First, it is affected by the mix of loans. If the composition of lending shifts to riskier loans—unsecured credit, more marginal borrowers and projects, etc.—the average lending rate will rise even if there is no change in pricing on individual products. Similarly, if more funding comes from longer-term deposits, which pay higher interest rates, its measured cost will go up and spreads will go down. Second, as Davies, Vaught, and Cabezon (forthcoming) point out, the quality of interest rate data in the region is not always satisfactory.

For these reasons, we use the net interest income ratio in robustness checks. According to Demirguc-Kunt and Huizinga (1999), that measure may be described as an ex post measure of lending profitability as it incorporates actual interest received on loans. To the extent that differences in lending rates on different kinds of loans accurately capture differences in default probabilities, and actual defaults are in line with expectations, this measure would correct the problem associated with the lending mix. However, for a variety of reasons, including unexpected shocks, ex post default experience may well be different from ex ante probabilities. Moreover, for multiyear loans, today's interest receipts reflect contractual terms agreed sometime in the past. Thus, the net interest income ratio as a measure of spread is also subject to conceptual issues. In addition, the quality of the data may be problematic. Hence, both measures are imperfect, but in different ways, and we use them to complement one another.

The factors that could influence the spreads can be divided into three main categories—macroeconomic, banking sector, and institutional variables. The explanatory variables are selected based on their importance in the literature and data availability.

Macroeconomic factors include GDP, GDP per capita, real GDP growth, and inflation. A country's GDP is a measure of the size of its economy, whereas its GDP per capita captures its level of development.[12] Both of them are expected to have a negative effect on spreads as the larger and more developed economies tend to have higher overall efficiency in the banking sector. This reflects economies of scale, spreading fixed costs over larger loan amounts; greater opportunities for diversification, reducing the riskiness of the loan portfolio; and more sophisticated banking operations, lowering their cost. Real GDP growth, which reflects the state of the economy, shapes the conditions of the loan market and, hence, affects the spreads. The direction of its impact is not clear ex ante, however. Faster growth may spur demand for credit, prompting the banks to raise lending rates. However, more favorable economic conditions lower the probability of default and raise the value of the collateral, which may lead to a reduction in lending rates. Finally, higher inflation would cause banks to increase the interest rates in order to maintain the real value of their profit margins. Higher inflation is also often an indicator of broader economic uncertainty, for which the banks seek compensation via higher spreads.

[12] Both are measured in constant PPP U.S. dollars.

Banking sector characteristics are also important factors in determining the interest rate spreads. The first variable is the size of bank loans to GDP, which depicts the scale of banks' operations. On the one hand, spreads could be reduced as banks obtain economies of scale. On the other hand, the larger amount of loans could signal the rise in credit demand, which would in turn increase the spreads. Thus, the effect of the banking sector size on spreads is ambiguous. Another important characteristic is the quality of bank assets, which could be captured using loan loss provisions or nonperforming loans (NPL).[13] Weaker asset quality gives rise to a need to make up past losses by charging higher rates. It may also reflect greater risk in lending, with higher spreads required to compensate for their risks in lending. For both of these reasons we expect higher loan loss provisions or NPLs (as a ratio to total loans) to be associated with wider spreads.

We also consider banking sector concentration, as more oligopolistic systems give pricing power to the banks. Following Rebei (2014), we measure concentration with the Herfindahl-Hirschman Index.[14] As explained in Section II, the HHI ranges between zero and one, with the value of zero indicating a perfectly competitive market, while one corresponds to a monopoly. For the same number of banks the HHI will be lower if market power is distributed uniformly than if the system is dominated by one or two large banks. If all banks are of equal size, the HHI declines with the number of banks, but in a nonlinear fashion, with the marginal impact of adding another bank declining with the number of banks already open.[15]

Finally, a country's institutions may also affect spreads. For instance, if the legal framework does not strongly facilitate lending and repayment, the risks and the costs of banks' lending activities could increase, leading to higher spreads. The institutional variables that we use are the country's rank in contract enforcement and the country's degree of economic freedom. The former measure focuses narrowly on the feature particularly important for banking business. It comes from the World Bank's Doing Business survey (World Bank, 2013). The latter is the broad Index of Economic Freedom published by the Heritage Foundation (Heritage Foundation, 2014), which covers several aspects of the rule of law (including property rights), limits on government intervention, regulatory efficiency, and market openness.

The relationship between the spreads and different factors is estimated using the following regression:

$$S_{i,t} = \beta X_{i,t-1} + \delta_i + \varepsilon_{i,t}$$

where $S_{i,t}$ is the difference between the lending and deposit rates of country *i* in year *t*. $X_{i,t-1}$are macroeconomic and banking sector variables for country *i* in year *t*-1. The first lag is used in order to mitigate the endogeneity between the spreads and the explanatory variables. δ_i and

[13] Loan loss provisions are affected by the country's prudential regulations, and a country may have higher loan loss provisions because of stricter regulation and not because its banks have riskier loans. However, practices in reporting NPLs also vary widely across countries. We use these two measures to complement one another.

[14] We use shares in total loans, but using shares of total deposits instead has little impact on the results.

[15] We use several additional banking sector variables in robustness checks.

$\varepsilon_{i,t}$are the country-specific intercept and the error term, respectively. Thus we rely on panel fixed-effects estimates, since we cannot be sure our variables fully capture country-specific characteristics. Since institutional variables vary little over time, we do not include them in the fixed-effects regressions.

We estimate this relationship on a sample of six Pacific island countries for years 2003-13.[16] Given the limited degrees of freedom, we are disinclined to include all potential explanatory variables into a single regression. Instead, we use several specifications with different combinations of explanatory variables.

We have an alternative specification with the ratio of net interest income to loans as the dependent variable:

$$NIL_{i,t} = \beta X_{i,t-1} + \delta_i + \varepsilon_{i,t}$$

where $NIL_{i,t}$ is the net interest income- to -loan ratio for country *i* in year *t*.

In addition, we use a regression with the lending rate ($L_{i,t}$)as the dependent variable and the contemporaneous deposit rate ($D_{i,t}$) as one of the explanatory variables, since the lending rate may be of particular interest for some readers as a key driver of investment and consumption.

$$L_{i,t} = \beta_1 D_{i,t} + \beta_2 X_{i,t-1} + \delta_i + \varepsilon_{i,t}$$

The fixed- effects specifications allow us to observe the country-specific intercepts for each of the six Pacific island countries, in which the country's time-invariant characteristics are embedded. We then calculate correlations between those intercepts and the institutional variables in order to investigate whether the institutional environment can help explain cross-country differences in spreads for given values of macroeconomic and banking sector variables.

V. RESULTS

Tables IIIa and IIIb report the results of regressions for interest rate spreads. In columns (1) through (3), the dependent variable is the difference between lending and deposit rates. In columns (4) through (6), the dependent variable is the ratio of net interest income to loans. GDP level, per capita GDP, and real GDP growth are included in the regressions one at a time. Inflation is included in all specifications. The difference between Tables IIIa and IIIb is in the variable used to capture the quality of bank assets—loan loss provisions in the former and non-performing loans in the latter.

The results in Table IIIa show that, as expected, the coefficients on GDP level and on per capita income are negative and statistically significant, implying that countries whose economies are larger and more developed tend to have lower spreads. Our regressors explain about a third of time-series variation in spreads in our sample. At the same time, real GDP growth was not

[16] To repeat, the countries are Fiji, Papua New Guinea, Samoa, Solomon Islands, Tonga, and Vanuatu. The choice of countries is dictated by data availability. Net interest income is not available for Papua New Guinea, reducing the sample to five countries for that measure of spreads.

statistically significant in the regressions, likely reflecting the offsetting channels through which growth may influence spreads as noted in the previous section. Inflation was statistically significant only in the regressions for the interest rate differential but not for the alternative measure of spreads. In both cases the coefficient is positive, but the magnitude is rather small—inflation would have to decline by one percentage point or more to reduce the spread by 10 basis points. Such a minor effect might be the result of changes in inflation being passed through in almost equal measure into lending and deposit rates, with little impact on spreads. The messages are broadly similar in Table IIIb, although economic size and inflation lose significance in some specifications, and the goodness of fit is somewhat lower.

As for the banking sector variables, almost all specifications show the importance of the banking sector asset quality and concentration in determining the spreads. The coefficients on the asset quality measures, both the loan loss provisions and NPLs (shown in Table IV), are positive and significant, suggesting that weaker credit quality and thus larger loan losses would raise the cost of lending, pushing up the spreads. We also find, consistent with Rebei (2014), a positive, significant coefficient on the HHI concentration measure. This indicates that limited competition in the banking sector tends to be associated with larger spreads. However, the ratio of bank loans to GDP does not appear to be a robust determinant of spreads, exhibiting statistical significance in only one specification.

We have explored a number of other explanatory variables, both in search of significant determinants of spreads and as robustness checks. Among others, we included the ratio of capital to assets and the required reserves ratio. Neither ratio came out statistically significant, while the coefficients on our main explanatory variables were little affected and remained significant. High capital ratios may be an indication of well- run, well- regulated banks, which would allow them to charge lower rates and still stay profitable (while a poorly capitalized bank might gamble for resurrection); or fairly conservative banks, which would not engage in risky lending chasing high returns. Nevertheless, high capital ratios may be the *result* of banks being able to earn high margins (e.g., exploiting their connections or market power).[17] Hence, the link between capital ratios and spreads is ambiguous, and thus it is not surprising that we do not find a significant relationship.[18]

The finding that the required reserves ratio (RRR) is not significant either may appear more puzzling, since the RRR drives a wedge between the lending and deposit rates in the basic textbook model of spreads. It should be noted, however, that the bulk of PIC banks tend to have significant excess liquidity most of the time, and thus RRR is not binding. Moreover, for most countries there is not much variation in the RRR over time. And finally, RRRs may be lowered in *response* to a liquidity shock—the same shock that drives the spreads up (in particular, the 2008-09 global financial crisis) —and then raised again as the situation normalizes and spreads go down, resulting in a negative correlation.[19] The empirical findings in the previous literature

[17] While our timing convention aims to mitigate reverse causality, the high degree of persistence in spreads and capital ratios means that the problem cannot be resolved fully.

[18] Rebei (2014) also found that the impact of capital ratios on spreads was insignificant.

[19] The point made in Footnote 15 applies here as well, although reserve ratios may be less inertial than capital ratios, and technically the issue here is a common factor rather than reverse causality. A common factor may

(continued…)

are also inconclusive. For example, Demirguc-Kunt and Huizinga (1999) found a negative impact of reserve requirements on the net interest margin, while Mugizi and others (2011) found a positive impact of reserve requirements on the difference between lending and deposit rates. In addition to including further explanatory variables, we have checked the robustness of our findings by excluding one country at a time from our baseline regressions. Our results have passed that test, with key coefficients retaining their statistical significance.

We also experiment with putting the lending rate directly on the left-hand side of our equations, since ultimately it is the lending rate that affects consumption and investment decisions. With deposits being the main source of funding for banks and the deposit rate determining the cost of that funding, we put the contemporaneous deposit rate on the right-hand side of lending rate regressions. The results—shown in Table IV—are largely consistent with findings of the spreads regressions.

In line with those findings, the lending rate regressions show significant effects of total GDP and GDP per capita, loan loss provisions, and banking sector concentration. The coefficient on NPLs is slightly smaller in this specification and is not statistically significant. In contrast, the coefficient on inflation is larger and more robustly statistically significant than in the spread regressions. This is not surprising given that one could expect a passthrough from inflation into both the lending and deposit rates, with only a secondary effect on the spread.[20]

We also obtain a somewhat higher, more significant coefficient on the loans-to-GDP ratio. This may indicate that expansions in the banks' loan portfolios tend to be driven by demand, with banks reacting by increasing both the volume and the price of credit. At the same time, to finance those expansions, the banks have to draw more deposits by raising returns on them. This softens the impact on spreads. One last thing to note about the lending rate regressions is that the coefficient on the deposit rate is highly statistically significant, but considerably smaller than one. This reflects the fact that deposits are an important, but not the only source of bank funding, and thus the passthrough from deposit to lending rates is less than one-for-one.

Finally, we bring institutions into the picture. As noted before, institutional variables move slowly over time, and thus we cannot include them in fixed-effects regressions. However, we can explore their role by looking at correlations between the average values of these variables and country-specific intercepts from our baseline regression (Table III, column 1). A higher intercept means that the country will have higher interest rate spreads for identical values of macroeconomic and banking sector variables.

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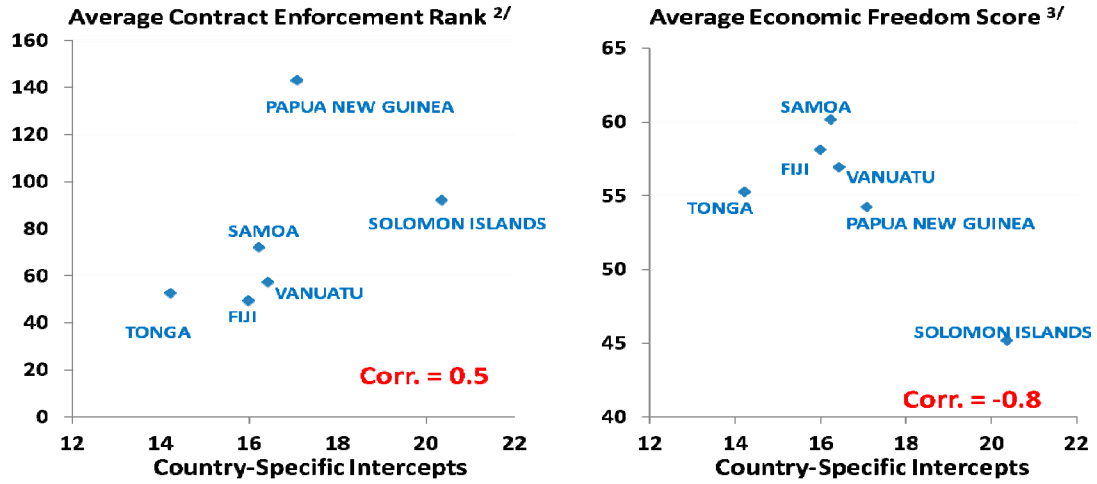
confound the relationship between capital ratios and spreads as well, as a negative shock may reduce capital ratios and prompt the banks to reassess repayment prospects and lead them to charge higher rates.

[20] If anything, what is surprising is that inflation passthrough into the lending rate falls well short of one. This result may be a consequence of fixed-effects estimation. There is little doubt that lending rates, on average, tend to be higher in high-inflation countries (compare, for example, Solomon Islands and Fiji), but those persistent differences would be captured in fixed effects. Besides, deviations from average inflation rates may not be fully passed through, particularly if they are expected to be temporary.

Figure 11, which shows correlations between country- specific intercepts and two institutional variables, highlights the importance of the country's institutional environment. A positive correlation between the intercepts and the average rankings in contract enforcement suggests that countries with stronger protection of creditor rights tend to have lower spreads, other things being equal. Similarly, a negative correlation between the intercepts and the average index of economic freedom indicates that institutions more supportive of property rights and individual enterprise may bring about lower spreads.

Figure 11: Correlations Between Institutional Variables and Country-Specific Intercepts [1/]



1/ Country-specific intercepts are obtained from the interest rate spreads regression (column 2 in Table III). Countries with higher intercepts have higher spreads, other things being equal.
2/ Positive correlation suggests that countries with stronger protection of creditor rights have lower spreads.
3/ Negative correlation suggests that countries with more economic freedom have lower spreads.
Sources: World Bank; Heritage Foundation; and IMF staff estimates.

The coefficient on the HHI is statistically significant in almost all of our regressions, but how do we interpret its magnitude? As was noted above, the index ranges from zero to one. Thus, our baseline regression implies that, if a banking system goes from a monopoly to perfect competition, the spreads will go down 7 percentage points. Of course, this mental experiment is too dramatic, but it gives an indication of the importance of market power for spreads. To calibrate the effect of changing banking concentration to the conditions in PICs, Figure 12 draws the interest rate spread as a function of the number of banks assuming that all banks are of equal size and everything else is kept the same.[21]

As shown in Figure 12, the marginal impact of adding another bank declines with the number of banks already in the system.[22] Adding a third bank to existing two reduces the spreads on

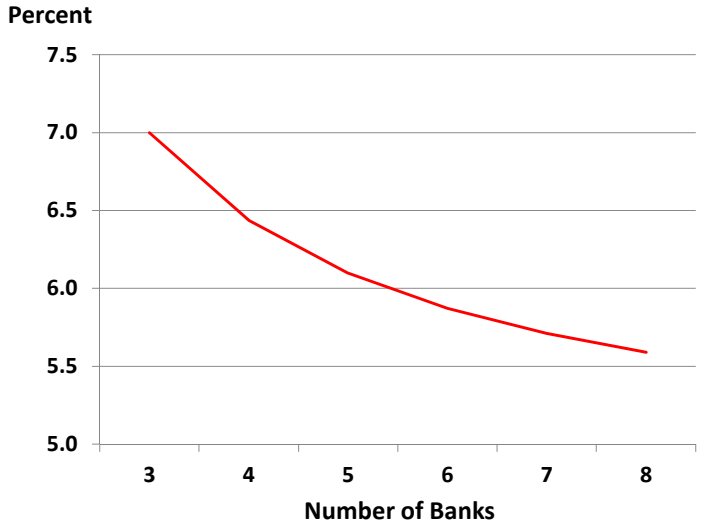
[21] Our regression gives the slope of this curve at each point. Its position, for illustrative purposes, is chosen so that the PIC-6 average spread, which was about 7 percent in 2013, would correspond to the number of banks – three – associated with the average HHI value for the region.

[22] This nonlinearity is built into our choice of the functional form (i.e., using the HHI to represent banking sector concentration). However, it seems to be confirmed by the data. If we plot the residuals from our baseline regression

(continued…)

average by 120 basis points (assuming all banks end up with equal market shares); adding a fourth lowers them by a further 60 basis points; a fifth by 35 basis points; and the impact of further additions becomes progressively smaller. Thus one does not need to increase the number of banks dramatically to reap the bulk of potential benefits of greater competition. At the same time, given the current levels of bank concentration, an entry of one or two new institutions would have a noticeable impact on spreads. It should be noted that concentration could be reduced not only via new entry but also by redistributing market shares more equally among the incumbents.[23]

Figure 12: Interest Rate Spreads as a Function of the Number of Banks



Source: IMF staff estimates.
Note: Banks are assumed to be of equal size.

with the HHI omitted against the number of banks, one can clearly see a decreasing marginal impact of an additional bank. The results are available from the authors upon request.

[23] While most countries in our sample have four banks at the moment, their average HHI at 0.34 corresponds to three equal-sized banks.

VI. Conclusions and Policy Implications

Our analysis identifies the following robust, statistically significant determinants of interest rate spreads:

- *Economic size* (the country's GDP), suggesting that the higher level of sophistication, greater opportunities for diversification, and economies of scale available in larger, higher-income countries reduce spreads;
- *Inflation*, which erodes the real value of interest margins, prompting the banks to raise the spreads. Higher inflation may also be an indicator of broader economic uncertainty, for which the banks seek compensation. While the quantitative impact of inflation on spreads is found to be small, the notable decline in inflation in the region in the last few years may explain a broad reduction in spreads observed during that period;
- *The quality of bank balance sheets*, as indicated by loan loss provisions or non-performing loans, with lower spreads in stronger banking systems;
- *Banking sector concentration*, with greater competition reducing spreads.

The last result suggests that, while the elevated spreads in the PICs partly reflect the cost and risk of doing business in these countries, the oligopolistic nature of the banking systems also plays a role. The effect is nonlinear, with an entry of a new bank (and corresponding redistribution of market shares) having a major effect on spreads in countries hosting very few banks, but only a marginal impact where competition is already strong. Of course, the small number of banks does not necessarily signal regulatory barriers to entry, with small market size serving as a natural barrier. At the same time, regulation and supervisory practices may incur advantage on the incumbent. High bank profitability in the region suggests that there is room for new entrants.

Data also indicate that the quality of institutions (in particular, the strength of contract enforcement) affects spreads. In that regard, while difficult to quantify, communal ownership of land and frequent government changes could also contribute to the high spreads in the PICs. Communal land tenure limits collateral availability, while high government turnover increases political and economic uncertainty and countries' risk premium.

The results of our quantitative analysis are in line with economic theory. They suggest that the following measures could help reduce interest rate spreads:

- Improving macroeconomic stability to reduce uncertainty;
- Strengthening bank balance sheets via more aggressive debt collection, writing off nonperforming assets, eliminating connected and directed lending, and better regulation and supervision;

- Increasing competition in the banking system by leveling the playing field and eliminating barriers to entry where they exist;[24]
- Improving economic institutions, particularly ensuring clear property rights (including land tenure), appropriate collateral regimes, compilation of credit history, and strong contract enforcement.

Certain factors, such as PICs' relatively high vulnerability to the adverse effects of natural disasters,[25] contribute to macroeconomic instability and uncertainty—which in turn feed into structurally higher interest rate spreads—and may be particularly difficult to address through policy alone. The policy changes advocated above are also not easyand are replete with implementation challenges. . However, the benefits are likely to be high. Lower lending rates would improve access to credit, including for small and medium-sized enterprises, and stimulate economic activity and inclusive growth.

Further insights into policy options to increase the efficiency of the financial sector and promote financial access and inclusion could be gained through a better understanding of the impact of national provident funds on banking sector variables, including interest rate spreads. With continuous improvement in reporting and further data accumulation, current work could be extended to take into account the role of national provident funds in PICs. Similarly, future work could also look more closely at the role played by development banks and/or state-owned banks and investigate their impact on the cost of financing.

[24] There are obvious natural limits to the number of banks that a small economy can sustain. The results suggest, however, that at the current levels of concentration, the degree of competition could be increased, and a relatively small dilution of market power (via the entry of an additional bank or a more uniform distribution of market shares among existing banks) would have a noticeable impact on spreads.

[25] See for instance, Cabezon, Hunter, Tumbarello, and Wu (forthcoming)

References

Cabezon, Ezequiel, Leni Hunter, Patrizia Tumbarello, and Yiqun Wu, forthcoming, "Strengthening Macro-Fiscal Resilience to Natural Disasters and Climate Change in the Small States of the Pacific"

Crowley, Joseph, 2007, "Interest Rate Spreads in English-Speaking African Countries," IMF Working Paper 07/101

Davies, Matt, JohnVaught, and Ezequiel Cabezon, forthcoming, "Interest Rates, Bank Profitability, and Capital Adequacy in the South Pacific," International Monetary Fund, manuscript.

Demirguc-Kunt, Asli, and Harry Huizinga, 1999, "Determinants of Commercial Bank Interest Margins and Profitability: Some International Evidence," *The World Bank Economic Review*, Vol. 13, No. 2, pp. 379-408.

Fairbairn,Te'o I. J. and DeLisle Worrel, 1996, "South Pacific and Caribbean Island Economies: A Comparative Study", Brisbane, Australia and Suva, Fiji: The Foundation for Development Cooporation and South Pacific Forum Secretariat.

Greenwood, Jeremy, Juan M. Sanchez, and Cheng Wang, 2013, "Quantifying the Impact of Financial Development on Economic Development", *Review of Economic Dynamics*, Elsevier for the Society for Economic Dynamics, Vol. 16, No. 1, pp.194-215.

Heritage Foundation, 2014, "2014 Index of Economic Freedom", http://www.heritage.org/index/.

International Monetary Fund, 2013, "Asia and Pacific Small States: Raising Potential Growth and Enhancing Resilience to Shocks", (Washington: International Monetary Fund). Available via the internet at http://www.imf.org/external/np/pp/eng/2013/022013a.pdf.

Jayaraman, T.K. and Rajesh Sharma, 2003, "Determinants of Interest Rate Spread in the Pacific Island Countries: Some Evidence from Fiji", USPEC Working Paper Series, No. 2003/4 (Suva, Fiji: University of the South Pacific).

Levine, Ross, 1997, "Financial Development and Economic Growth: Views and Agenda", *Journal of Economic Literature*, Vol. 35, No. 2, pp. 688-726.

Moore, Winston, and Roland Craigwell, 2002, "Market Power and Interest Rate Spreads in the Caribbean", *International Review of Applied Economics*, Taylor & Francis Journals, Vol. 16, No. 4, pp.391-405.

Mugizi, Francisco M. P., Ndanshau, Michael O.A., and Jehovaness Aikaeli, "The Determinants of Interest Rate Spreads in Developing Countries: Evidence on Tanzania, 1991-2009" (July 24, 2011). University of Dar es Salaam Department of Economics Working Paper 02/11.

Randall, Ruby, 1998, "Interest Rate Spreads in the Eastern Caribbean", IMF Working Paper 98/59, (Washington: International Monetary Fund).

Rebei, Nooman, 2014; "Determinants of Interest Rate Spreads in Solomon Islands"; IMF Working Paper 14/105 (Washington: International Monetary Fund).

Sheridan, Niamh, Patrizia Tumbarello, and Yiqun Wu, 2012, "Global and Regional Spillovers to Pacific Island Countries," IMF Working Paper 12/154.

Tennant, David and Abiodun Folawewo, 2009, "Macroeconomic and Market Determinants of Interest Rate Spreads in Low and Middle Income Countries", *Applied Financial Economics*, Vol. 19, No. 6, pp.489-507.

U.S. Department of Justice and the Federal Trade Commission, 2010, "Horizontal Merger Guidelines". Available via the internet at http://www.justice.gov/atr/public/guidelines/hmg-2010.pdf.

World Bank, 2013, *Doing Business 2014: Understanding Regulations for Small and Medium-Size Enterprises*, October 29 (Washington: World Bank).

Yang, Yongzheng, Matt Davies, Shengzu Wang, Jonathan Dunn, and Yiqun Wu, 2011, "Monetary Policy Transmission Mechanisms in Pacific Island Countries," IMF Working Paper 11/96, April (Washington: International Monetary Fund).

TABLE I: DATA DEFINITIONS AND SOURCES

Variable	Definition	Data Sources
Interest rate spreads	Difference between weighted average rates on loans and weighted average rates on deposits	IMF, International Financial Statistics, country authorities
Weighted average lending rate	Average interest rates on loans weighted by the volume of loans extended across different sectors.	IMF, International Financial Statistics, country authorities
Weighted average deposit rate	Average interest rates on deposits weighted by different types of deposits.	IMF, International Financial Statistics, country authorities
Net interest income to loans	Net interest income divided by average assets, net of depreciation and provisions	Country authorities
GDP (in constant PPP dollars)	Sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products, in constant PPP dollars.	World Bank Databank
GDP per capita (in constant PPP dollars)	Gross domestic product divided by midyear population in constant PPP dollars.	World Bank Databank
Real GDP growth	Annual change in real GDP	IMF, World Economic Outlook Database
Inflation	Percentage change in CPI	IMF, World Economic Outlook Database
Loans to GDP	Amount of bank loans as percentage of nominal GDP	Country authorities; IMF, World Economic Database; Financial Access Survey
Loan loss provision	Banks' reserves allocated against loan loss divided by gross loans	Country authorities
NPL	Nonperforming loans as a percentage of total loans	Country authorities
Banking concentration (HHI)	The sum of the squared values of the market shares of all banks within a given country's financial sector. Market share is calculated using a bank's share of total loans or deposits.	Country authorities
Capital-to-assets ratio	Bank capital as a ratio of banks' total assets	Country authorities
Reserve requirement	The minimum percentage of customer deposits that banks are obligated by statute to hold as reserves.	Countries' central bank websites; IMF country staff reports; Carmen Reinhart: www.carmenreinhart.com/user_uploads/Reservereq.xls, accessed on October 28, 2014

TABLE II: SUMMARY STATISTICS

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Interest rate spreads	77	8.46	2.41	5.12	14.92
Weighted average lending rate	77	10.99	2.24	5.84	16.96
Weighted average deposit rate	77	2.53	1.89	0.21	6.77
Net interest income to loans	60	8.96	3.14	4.67	20.02
GDP (in constant PPP dollars)	78	21.32	1.04	20.15	23.71
GDP per capita (in constant PPP dollars)	78	8.26	0.44	7.38	9.00
Real GDP growth	78	3.01	3.74	-7.96	12.85
Inflation	78	5.46	3.67	-0.21	17.32
Loans to GDP	73	36.41	17.09	7.72	74.98
Loan loss provision	72	4.24	2.70	1.10	15.13
NPL	66	6.69	4.50	0.50	19.50
Banking concentration (HHI)	68	0.34	0.05	0.22	0.45
Capital-to-assets ratio	72	13.67	3.27	7.23	21.26
Reserve requirement	78	7.16	3.04	3.00	15.00

TABLE IIIA: IMPACT OF MACROECONOMIC AND BANKING SECTOR VARIABLES ON SPREADS

	Dependent Variable: Difference between Lending and Deposit Rates			Dependent Variable: Net Interest Income to Loans		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Log of GDP (PPP)	-2.64***			-6.40***		
	(0.95)			*(0.93)*		
Log of GDP Per Capita (PPP)		-3.15**			-8.99***	
		(1.35)			*(1.34)*	
Real GDP Growth			-0.00			-0.08
			(0.04)			*(0.06)*
Inflation	0.07*	0.08**	0.1**	0.05	0.05	0.09
	(0.04)	*(0.04)*	*(0.04)*	*(0.05)*	*(0.05)*	*(0.08)*
Loans to GDP	0.04*	0.03	-0.01			
	(0.02)	*(0.02)*	*(0.01)*			
Loan Loss Provision	0.21***	0.20***	0.15**	0.26***	0.28***	0.21**
	(0.06)	*(0.06)*	*(0.06)*	*(0.06)*	*(0.06)*	*(0.10)*
Banking Concentration	7.01**	6.77**	5.28*	6.73	8.35*	15.50**
	(3.10)	*(3.16)*	*(3.29)*	*(4.26)*	*(4.24)*	*(5.99)*
Observations	*57*	*57*	*57*	*45*	*45*	*45*
No. of Countries	*6*	*6*	*6*	*5*	*5*	*5*
Fixed Effects Within R^2	*0.33*	*0.31*	*0.22*	*0.67*	*0.66*	*0.27*
OLS Adjusted R^2	*0.87*	*0.87*	*0.85*	*0.90*	*0.89*	*0.77*

* Significant at the 10 percent level
** Significant at the 5 percent level
*** Significant at the 1 percent level
Note: The regressions are estimated using fixed effects model on the country-level data across six countries for the 2001-2013 time period.
All explanatory variables are one-period lagged. Standard errors are given in parentheses.

TABLE IIIB: IMPACT OF MACROECONOMIC AND BANKING SECTOR VARIABLES ON SPREADS

	Dependent Variable: Difference between Lending and Deposit Rates			**Dependent Variable: Net Interest Income to Loans**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Log of GDP (PPP)	-1.74			-4.88***		
	(1.05)			*(0.91)*		
Log of GDP Per Capita (PPP)		-1.88			-6.72***	
		(1.46)			*(1.30)*	
Real GDP Growth			0.01			-0.07
			(0.04)			*(0.05)*
Inflation	0.06	0.07*	0.09**	0.07	0.08	0.13**
	(0.04)	*(0.04)*	*(0.04)*	*(0.05)*	*(0.05)*	*(0.06)*
Loans to GDP	0.03	0.02	-0.00			
	(0.02)	*(0.02)*	*(0.02)*			
NPL	0.06	0.07*	0.07*	0.22***	0.22***	0.27***
	(0.04)	*(0.04)*	*(0.04)*	*(0.04)*	*(0.04)*	*(0.05)*
Banking Concentration	6.63*	6.37*	5.32	1.68	2.79	5.06
	(3.54)	*(3.58)*	*(3.57)*	*(4.22)*	*(4.25)*	*(5.48)*
Observations	*55*	*55*	*55*	*43*	*43*	*43*
No. of Countries	*6*	*6*	*6*	*5*	*5*	*5*
Fixed Effects Within R^2	*0.22*	*0.20*	*0.18*	*0.72*	*0.71*	*0.51*
OLS Adjusted R^2	*0.85*	*0.85*	*0.84*	*0.91*	*0.91*	*0.85*

* Significant at the 10 percent level
** Significant at the 5 percent level
*** Significant at the 1 percent level
Note: The regressions are estimated using fixed effects model on the country-level data across six countries for the 2001-13 time period.
All explanatory variables are one-period lagged. Standard errors are given in parentheses.

TABLE IV: IMPACT OF MACROECONOMIC, BANKING SECTOR VARIABLES, AND CONTEMPORANEOUS DEPOSIT RATE ON LENDING RATE

Dependent Variable: Weighted Average Lending Rate

	(1)	**(2)**	**(3)**	**(4)**
Deposit Rate	0.41**	0.48***	0.31*	0.37**
	(0.16)	*(0.16)*	*(0.16)*	*(0.16)*
Log of GDP (PPP)	-3.82***		-3.33***	
	(0.90)		*(0.96)*	
Log of GDP Per Capita (PPP)		-4.43***		-3.72***
		(1.30)		*(0.7)*
Inflation	0.10***	0.11***	0.10***	0.11***
	(0.03)	*(0.04)*	*(0.04)*	*(0.04)*
Loans to GDP	0.06***	0.04**	0.06**	0.04*
	(0.02)	*(0.02)*	*(0.02)*	*(0.02)*
Loan Loss Provision	0.12**	0.12**		
	(0.06)	*(0.06)*		
NPL			0.05	0.06
			(0.04)	*(0.04)*
Banking Concentration (HHI)	5.69**	5.43*	4.81	4.58
	(2.76)	*(2.92)*	*(3.01)*	*(3.14)*
Observations	*57*	*57*	*55*	*55*
No. of Countries	*6*	*6*	*6*	*6*
Fixed Effects Within R^2	*0.61*	*0.56*	*0.55*	*0.51*
OLS Adjusted R^2	*0.87*	*0.86*	*0.86*	*0.84*

* Significant at the 10 percent level
** Significant at the 5 percent level
*** Significant at the 1 percent level
Note: The regressions are estimated using fixed effects model on the country-level data across six countries for the 2001-13 time period.
All explanatory variables are one-period lagged. Standard errors are given in parentheses.