Local Banking Competition and Efficiency in the Presence of Offshore Financial Institutions: Evidence from the Caribbean

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Abstract

Offshore banking is a significant aspect of the financial environment in some Caribbean Islands. The objective of this paper is to identify whether domestic banks located in Caribbean offshore centers operate any differently from domestic banks located in islands that do not host offshore banking. Balance sheets and income statements between 1993 and 2004 are used to measure the level of competitiveness and efficiency of banking activity. The results show that domestic banks located in Caribbean offshore financial centers operate in a less competitive manner and are less efficient in their role in providing financial intermediation than local commercial banks located in non-offshore banking islands.

1. Introduction

Offshore financial centers (OFCs) have received increased attention in recent years for opposing reasons. The current global recession has motivated some regulators and international authorities to attribute part blame for the financial crisis on OFCs. The criticism is that low regulatory standards in some OFCs undermine the effectiveness of regulation in major onshore financial jurisdictions. On the other hand central planners of some developing countries embrace offshore banking as a strategy to increase government revenue, create employment, and gain access to international capital markets.

This paper addresses related issues by comparing the business activity of local financial institutions located in Caribbean offshore financial centers (OFCs) to that of financial institutions located in non-OFC Caribbean islands. There is little documented research on offshore banking and its' impact on the local economy, and in particular, the impact on local finance. Rose and Spiegel (2006) argue that close proximity to offshore banking influences local financial markets by increasing the

extent of financial competition. The exercise undertaken by Rose and Spiegel (2006) is different from that done in this study in two aspects. Rose and Spiegel uses a sample of 40 OFCs and uses market concentration ratios and the interest rate spread to proxy for measures of banking competitiveness. This study accounts for differences between offshore financial centers, by using a homogenous sample of OFCs, and further empirically estimates a measure of market competitiveness known as the H-statistic. This study finds that offshore banking is not associated with increased competitiveness of local banks but that local banks located in OFC islands behave less competitively.

A brief description of offshore banking in the Caribbean is given in section 2. The following sections then describe the data used, and the two methodologies employed in the analysis. Section 7 gives some concluding remarks.

2. Overview of Offshore Banking in the Caribbean

Offshore banking is a form of international banking in which banks incorporate or reside in the host country but conduct business with non-residents in foreign currency markets. The establishment of an offshore banking jurisdiction is a form of regulatory competition in an effort to "encourage the development as a responsible off-shore center by providing incentives by way of tax reduction" and "to enable citizens to share in the ownership, management and rewards of any business resulting from there from"[1].

There are three groups of OFCs, primary financial centers, secondary financial centers (or regional financial centers), and booking centers. London, New York and Japan are the primary financial centers of the world as they act as the hub of international banking across the globe. Regional centers can be divided into two groups, funding centers and collection centers. Offshore banks of funding centers such as Hong Kong, Singapore, and Panama are net importers capital and are the primary source of funds to their local economy. Collection centers include countries such as Bahrain that generate excess savings for export.

OFCs of the Caribbean fall into the group of financial centers, called the booking center, in which offshore banks do not conduct banking business with the local economy.[2] The term booking center also refers to the practice that the banking products and services provided by offshore banks do not originate from the host country, but that the offshore banks in the Caribbean act as an intermediary between customers and financial services providers located in other regions. These services include the acceptance of deposits, the issuance of credit, the provisions of various investment products, business planning and structuring to achieve the best after tax returns.

The difference between Caribbean offshore banking and other non-booking offshore financial centers can be seen when comparing the international debt securities issued by residency to that issued by nationality within any one country.[3] For example, resident financial institutions of The Cayman Islands issued US$295 billion worth of debt securities in 2000, as opposed to US$14 billion debt securities issued by nationals. Similarly in The Bahamas, US$3.64 billion were issued by residents,

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[1] Statement of purpose Barbados Offshore Banking Act.

[2] See Errico and Musalem (1999) for a more detailed description of the forms of offshore financial centers.
[3] This data is obtained from the Bank of International Settlements Quarterly Review, September 2009. Residency refers to the country in which the issuer is incorporated, nationality refers to the country of origin of the debt obligation.

while only US$0.425 billion were issued by nationals. This difference in the issuance of debt securities can be compared to Panama in which US$5.71 billion international debt securities were issued by resident institutions and US$5.06 billions were issued by nationals in 2000.

Further, balance sheet activity of offshore banks in Caribbean islands predominantly comprises of interbank fund transactions, as opposed to the export or import of funds. For example, only 10% of the liabilities of U.S offshore branches in the Caribbean are non-bank related. As opposed to the OFC of Panama in which loans issued to the local sector by offshore banks are as high as 35% of OFC bank assets.

The information stated above show the disjoint between offshore banking in the Caribbean and the local economy. This implies that offshore banking should not the business activity of local banks. Furthermore, Caribbean OFCs prohibits offshore banks from conducting business with residents, resident businesses, or local banks. [4] How then may offshore banking influence local finance?

In all Caribbean islands most local banks are subsidiaries foreign banks. These include The Bank of Nova Scotia (BNS), RBTT (formally known as the Royal Bank of Trinidad and Tobago), First Caribbean International Bank, Citibank and Royal bank of Canada. Furthermore local banks in the Caribbean are conglomerates in which a holding company owns both a domestic and an offshore bank located in the same country, or other Caribbean Islands. For example, both BNS and First Caribbean International Bank have offshore on onshore affiliates in Barbados as well as The Bahamas. This structure of the financial

sector in the Caribbean creates mechanisms by which the establishment of an offshore banking sector may impact the activity of local banks. The predominant of which are intra-bank activity done as a means to fund lending in other countries, and avoid domestic regulations, or both. In some instances this flow of funds between bank branches has created negative consequences. (Errico and Musalem 1999; and Williams et al., 2005)

This study statistically evaluate whether local commercial banks of the Caribbean operate any differently in the presence of offshore banking.

4. Theory and Data

This study will move beyond analysis of market concentration ratios as the measure of industry competitiveness. Measures such as the asset share of the largest firms, interest rate spread, or profitability do not effectively reflect the degree of market competition as they may be influenced by government regulations, taxes, or other macroeconomic factors (Claessens and Laeven 2004). An estimation technique following that of Panzar and Rosse (1987), the P-R model, will be used to identify the extent of banking competition in the Caribbean.[5]

Empirical estimation of the P-R model returns a measure of market competition called the H-statistic, which describes the responsiveness of bank revenue to a percent change in its input prices.[6] The sign and magnitude of the H-statistic can be used to identify the degree of

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[4]See http://udel.edu/~leorey/Research/Caribbean%20Banking%20Information.docx for some main aspects of offshore banking legislation in the Caribbean.

[5] I am implicitly assuming that banking in the Caribbean can be modeled as a regional single sector. This assumption can is validated given the fact that local banks in the region are all subsidiaries of the same parent banks, each having affiliates in other countries throughout the region.

[6] A number of studies have used the P-R model to empirically test the extent of banking competition (Mathews, Murinde, and Zhao 2007, Claessens and Laeven 2003).

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competition within the banking sector. An H-statistic equal to one reflects perfect competition in the banking sector. In the case of perfect competition, an increase in cost will leave equilibrium market output unchanged but will result in an equivalent increase in prices.[7] Hence revenue will increase by the same amount, in the long run, as factor prices. A negative H-statistic demonstrates perfect collusion or a monopoly. Intuitively, increases in total cost and marginal cost curves will reduce output, and therefore decrease revenue as prices increase on the elastic portion of the demand curve.

Annual balance sheet and income statements for all commercial banks were obtained for ten Caribbean countries, between 1993 and 2004. The countries included are Antigua & Barbuda, The Bahamas, Barbados, Dominica, Grenada, Jamaica, St. Kitts & Nevis, St. Lucia, St. Vincent, and Trinidad & Tobago. [8] Seven of the ten countries house, or have adopted an offshore banking sector during the time period. The data does not include offshore banks located within the island. Table 1 lists the Caribbean islands that house offshore banking activity and the dates of enactment. The most direct impact of each enactment is the employment created, and government revenues generated from licensing and other fees.[9]

Local banks in the traditional Caribbean offshore centers of The Bahamas and The Cayman Islands show very different business activities when compared to local banks in other Caribbean countries. The international banking component of local commercial banking activity in The Bahamas and The Cayman Islands far exceed their domestic banking activity unlike local banks in other Caribbean countries. Domestic assets account for only 4% of total assets in The Bahamas. Foreign bank assets due from head offices or branches outside The Bahamas totaled US$123,554 million, accounting for 90% of foreign assets. In 2002 liabilities due to head office and branches outside The Bahamas totaled US$115,869 million.

Furthermore, some Class A Banks (local banks) in The Bahamas, such as First Caribbean International Bank, act as the home office for regional branches throughout the Caribbean. In addition, the foreign bank activity of Class A banks in The Bahamas goes beyond its business with its Caribbean affiliates. Foreign assets of local banks throughout the Caribbean sum to US$895 million in 2000, which fails in comparison to the US$56,235 million foreign liabilities of Bahamian local banks due to other head offices and branches in 2000.

Tables 2 and 3 give a snapshot of the balance sheet composition of local commercial banks in the region. The balance sheets show some evidence of differences in banking activity between local banks in Caribbean OFCs compared to those in non-OFC Caribbean islands. International banking activity is a significant aspect of local commercial banking, and is larger for commercial banks located in Caribbean OFC islands.

A further difference is observed in the loan portfolio of local banks. In the case of OFCs Antigua, The Cayman Islands, and The Bahamas domestic loans issued exceeds that of deposits received. In The Bahamas $3,721 million loans are issued domestically in 2000, while resident deposits are $3,369 million, resulting in a loan to deposit ratio of 110%. Similarly in the case of The Cayman

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[7] This assumes a market demand curve with constant price elasticity.
[8] In the case of The Bahamas only the domestic side of the balance sheet is used in analysis due to the share size of its foreign assets and liabilities.
[9] Fee and licensing payments of international business companies in The Bahamas was at least $51 million in 2000, about 1% of the value of GDP.

Islands, domestic loans issued were 25% greater than the value of resident deposits in 1997. The Loan to deposit ratio of local commercial banks in the other Caribbean OFCs, with the exception of Barbados, is between 70% and 80%, compared to 50% in non-OFC Caribbean countries.

Table 1: Offshore Banking Enactment

Country	Statute	Date
The Bahamas	Banks and Trust Companies Regulation Act	1965
Bermuda	Tax Exemption Act	1966
Barbados	Offshore Bank Act	1979
Turks and Caicos	Companies Ordinance	1981
Antigua	International Business Companies Act	1982
The British Virgin Islands	International Business Companies Act	1984
Aruba	Exempt Company Act	1988
The Cayman Islands	Banks and Trust Companies Law	1995
Dominica	Offshore Banking Act	1996
St. Vincent	International Bank Act	1996
St. Kitts	The Financial Services Statutory Rules and Order	1997
St. Lucia	International Bank Act	1999
Grenada	International Companies Act	2002

This table lists the dates in which each Caribbean island enacted offshore banking legislation. There are 72 offshore financial centers (OFCs) listed by the IMF in 2000 of which 15 are Caribbean islands. The sample used for estimation includes seven of these 13 Caribbean OFCs.

Table 2. Asset Composition of Local Commercial Banks in 2000 (% of total assets)

	Total Loans	Government Investments	Cash and Central Bank Deposits	Foreign Assets	Local Securities
Antigua	69	2	7	16	---
The Bahamas	79	8	4	---	0.1
Barbados	55	19	5	10	0.7
Cayman Islands	84	---	2	---	0.5
Dominica	72	6	7	11	---
Grenada	70	5	7	7	---
Jamaica	16	43	15	7	0.6
St Kitts	63	5	6	13	---
St Lucia	80	3	6	3	---
St Vincent	66	7	9	5	---
Trinidad	40	8	10	5	---

The percentage of assets will not sum to 100 because balances with other banks, fixed assets, checks under collection, and other assets are not included in the table. In the case of Trinidad, fixed assets, other assets, and customer acceptances account for 25%. For The Bahamas and The Cayman Islands, the balance sheet asset composition represents the domestic balance sheet and excludes foreign business. Foreign banking activities of local banks of The Bahamas and The Cayman Islands far exceed their domestic banking activity, domestic assets account for only 4% of total assets in The Bahamas. Commercial banks in Eastern Caribbean countries held no local securities in 2000 as the domestic securities exchange for these countries was formed in 2001.

Table 3. Liability Composition of Local Commercial Banks in 2000 (% of Total Liabilities)

	Local Deposits	Foreign Currency Deposits	Balances due to Other Banks	Foreign Liabilities	Capital and Undistributed Profits
Antigua	60.89	14.51	8.93	6.00	4.00
The Bahamas	73.30	---	0.70	---	11.1
Barbados	83.10	---	0.90	4.50	2.70
Cayman Islands(1997)	68.45	---	---	---	24.7
Dominica	80.23	1.84	6.52	0.37	7.00
Grenada	81.48	6.61	0.30	2.50	4.00
Jamaica	74.40	---	5.70	0.50	7.30
St Kitts	55.16	18.46	8.82	7.71	3.00
St Lucia	83.46	0.55	3.07	3.17	4.60
St Vincent	76.89	4.81	1.52	2.51	5.50
Trinidad	56.20	---	3.75	3.81	4.5

Foreign liabilities are balances due to overseas banks. In the case of ECCU countries, balances due to other banks include the ECCB, other local banks, and other ECCB banks. Missing foreign currency deposits indicate that local deposit values include foreign currency deposits.

The rest of the study will test for the degree of market competition and measure the relative efficiency of local banks.

The variables used in empirical estimation will closely follow the work of Bikker et al. (2006), Claessens and Laeven (2004), and Mathews, Murinde and Zhao (2007). The log of interest revenue and total revenue are used as the dependent variables. Labor, physical capital, and financial capital are the input factors of bank production. The ratio of personal expenses to total assets, other operating and administrative expenses to total assets, and interest expenses to total deposits, are used to measure the prices of labor, physical capital, and financial capital respectively. The empirical estimation will control for other bank specific factors that influence revenues and costs. These factors include the extent of leveraging, measured as the value of equity to total assets, and credit risk, measured as the value of loans to total assets.[10] Equity is calculated as bank paid up capital plus retained earnings.[11] The effect of the aggregate performance of the economy on bank revenue is captured by including the growth rate of real GDP per capita. Bank size is proxied for by including total assets as an independent variable. All data are in logs. A country is classified as an OFC if it was included in the Financial Stability Forum's Report of the Working Group on Offshore Centres (2000). An OFC is assigned a value if 1 one year after legal statues concerning offshore activity are enacted, and must have at least one offshore bank.[12]

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[10] Research has included other controls such as the share of non-earning assets to total assets, to account for balance sheet composition, but such variables are excluded from estimation due to the lack of consistency in balance sheet reporting across countries. Other balance sheet activities are reported fairly consistently across countries.

[11] Equity for Jamaica is calculated as share capital plus retained earnings plus unappropriated profits. Which was negative in 1997.

[12] Grenada is not categorized as an OFC in the analysis since no offshore banks were incorporated during the sample period.

5. Methodology and Results

The estimating equation is derived from equation (1) below.

$$log\ R_{it} = \beta_0 + \sum_{k=1}^{K} \beta_k log\ w_{kit} + \sum_{j=1}^{J} \alpha_j\ log\ D_{jit} + \varepsilon_{it} \qquad (1)$$

R_{it} is the measure of revenue of commercial banks located in country i at time t. w_{kit} are the input prices, bank specific factors that influence cost and revenue curves is represented by D_{jit}. The measure of banking competition is $\sum_{k=1}^{K} \beta_k$, the sum of coefficients on the input prices, and is referred to as the H-statistic. The approach identifies the responsiveness of revenue to input prices. An H-statistic between zero and one will demonstrate monopolistic competition within the market.

The test for differences in the extent of banking competition among OFC islands is conducted by interacting the OFC variable with the H-statistic.[13] The estimating equation then becomes

$$log\ R_{it} = \beta_0 + \sum_{k=1}^{K} \beta_k log\ w_{kit} + \sum_{k=1}^{K} \theta_k log\ w_{kit} * OFC\ + \sum_{j=1}^{J} \alpha_j\ log\ D_{jit} + \varepsilon_{it} \qquad (2)$$

The test hypothesis is $H_0 : \sum_{k=1}^{K} \theta_k = 0$, that is, the measure of banking competition among OFC islands is no different than in non-OFC islands. Table 4 below shows the estimation results.

The coefficients are as expected, the H-statistic for both regression estimates are between 0 and 1, which is evidence of monopolistic market competition in the banking sector. This finding is consistent with that found in the literature. There is some measurable difference in the degree of market competition between local banks in OFC countries and non-OFC countries. The H-statistic for local commercial banks located in OFC islands is 0.592, compared to 0.631 in non-OFC islands. These results indicate that local commercial banks in OFC islands, are operating in a less competitive manner when compared to local banks in non-OFC islands.

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[13] The OFC dummy variable is time variant since some countries adopted offshore banking legislation during the sample period.

Table 4. Regression Estimates of Market Competition

	Log Total Revenue		Log Interest Revenue	
Constant	0.804***	0.840**	0.747**	0.773***
	(2.90)	(3.126)	(2.57)	(2.68)
Log Labor Price	0.011	0.033	0.014	0.034
	(0.39)	(0.50)	(0.47)	(0.51)
Log Capital Price	0.097***	0.069**	0.069**	0.050*
	(3.85)	(2.34)	(2.42)	(1.66)
Log Funds Price	0.493***	0.528***	0.615***	0.635***
	(13.37)	(11.90)	(16.81)	(14.11)
Log Labor Price*OFC		0.000		-0.006
		(0.00)		(-0.10)
Log Capital Price*OFC		0.127**		0.093*
		(2.24)		(1.61)
Log Funds Price*OFC		-0.166**		-0.115*
		(-2.52)		(-1.73)
Log Credit Risk	0.308***	0.334***	0.315***	0.335***
	(4.45)	(4.80)	(4.59)	(4.76)
Log Leverage	0.075**	0.065*	0.090**	0.079**
	(2.15)	(1.75)	(2.62)	(2.13)
Log Macroeconomy	0.048	0.058	0.074	0.082
	(0.39)	(0.05)	(0.61)	(0.68)
Log Size of Sector	0.88***	0.882***	0.882***	0.881***
	(21.51)	(20.02)	(21.66)	(19.74)
R squared	0.994	0.994	0.994	0.994
H-stat	0.602	0.631	0.698	0.720
H-Stat OFC		0.592		0.691
p-value		0.05		0.16

Table 4 displays the country specific fixed effects estimate of banking competition within the Caribbean. F-tests could not reject the hypothesis of no time specific fixed effect. The T-statistics of the null hypothesis that the parameter estimates =0 are reported in parenthesis. The degree of banking competition within non-OFC countries is given by the sum of the coefficient estimates on log labor price, log capital price and log funds. Log Labor Price*OFC is an interaction term such that the degree of banking competition between OFC countries is calculated as the degree of competition between non-OFC countries plus the sum of the coefficients on the interaction terms. P-values for the F-test of the hypothesis of whether there is a difference in the extent of market competition, (H-stat)-(H-stat OFC) = 0, is given at the end of the table.*** significant at the 1% level, **significant at the 5% level, * significant at the 10% level, t-stat are in brackets. The revised version of this paper will account for the returned high R-squares in estimation.

6. Data Envelopment Analysis Methodology, Data, and Results

Data envelopment analysis will be used to test whether there is any difference in the extent of efficiency of operations for local commercial banks operating in OFC islands compared to those operating in non-OFC islands. The analysis in the previous section demonstrated that bank revenue in OFC islands respond less to changes in factor prices than commercial banks in non-OFC countries. This difference in the responsiveness to input price changes, may have implications for the efficiency under which banks conduct business.

Banking sector efficiency will be estimated using data envelopment analysis (DEA). Introduced first by Farrel (1957), DEA is a non-parametric technique which makes no assumptions on the production

function or the distribution of variables, but does assume that all banks utilize the same technology and production function. Efficiency is defined as the ability to produce the maximum amount of output using a given level of inputs. Observed input and output decisions are used to calculate the efficiency of each banking sector. An integral part of DEA is the selection of the input and output variables. There are two main approaches in banking literature to describe the input and output decisions of banks, the "intermediary approach" and "production approach". The intermediary approach describes the provision of credit as the main role of banks. Within this approach inputs are measured using the prices of the factors of bank production, labor, physical capital, and funds. The value of loans, deposits, and other earning assets are used as outputs (Maudos et al 2002). Within the framework of banks for production, otherwise known as the profit oriented approach, the primary role of banks is to borrow money from depositors in an effort to make loans and earn profit. Under the profit oriented approach inputs in bank production are measured as employee expenses, interest expenses, and total operating expenses. Output measures include total income, interest income, and non-interest income (Pasiouras et al. 2008 and Yi-Hsing et al. 2007).

The model employed is based on the work of Charnes, Cooper, and Rhodes (1978). Charnes, Cooper, and Rhodes (CCR) model a constant return to scale envelopment surface, in which efficiency is estimated in the absence of market prices. Shadow prices are used to apply weights to input and output decisions.

The model takes the form

$$Max\ E_0 = \frac{\sum_{r=1}^{s} u_r y_{r0}}{\sum_{i=1}^{m} v_i x_{i0}} \tag{3}$$

subject to the constraints

$$\frac{\sum_{r}^{s} u_r y_{rj}}{\sum_{i}^{m} v_i x_{ij}} \leq 1, \tag{4}$$
$$u_r, v_i \geq 0 \tag{5}$$
$$y_{rj}, x_{ij} > 0 \tag{6}$$

Here, u_r and v_i, represent the shadow prices, which vary across firms. Shadow prices are restricted to be non-negative, and are such that no sector's efficiency is greater than one. The subscript 0 represents the particular country being evaluated. Country, j, has a banking sector input vector x_{ij} (i= 1,2,…m) , and output vector y_{rj} (r=1,2,..s). Within the CCR framework input and output choices are aggregated to form an efficiency measure.

The model is transformed into the following optimization problem which is solved using the simplex method.

$$Max\ y_0 = \sum_{r=1}^{s} u_r y_{r0} \tag{7}$$

Subject to

$$\sum_{i}^{m} v_i x_{i0} = 1 \tag{8}$$
$$\sum_{r=1}^{s} u_r y_{rj} - \sum_{i}^{m} v_i x_{ij} \leq 0 \tag{9}$$
$$u_r, v_i \geq \varepsilon$$

Banks' maximize the value of their output y_r, given their constraints. Shadow prices are chosen so that constraint (9) holds, therefore the value of the objective function itself becomes the measure of efficiency. The results will establish a subset of countries that outline the envelopment surface (HCU), and identify the relative efficiency of the remaining countries.

Estimates of technical efficiency is obtained using both the intermediary, and

production approaches to bank decisions. Balance sheet and income statements between 1993 and 2004 of domestic commercial banks in ten Caribbean islands are used to obtain the various input and output variables.[14]

The variables based on the Output (revenue) Approach to banking activity are:

Inputs
1) Interest Expense: interest on deposits, and interest on loans from, the central bank, local banks, the head office and branches abroad, and other local financial institutions

2) Non-Interest Expense: remuneration and training of employees, provision for depreciation, provisions for loan losses, contributions to pension funds, and other costs

Outputs
1) Interest Revenue: interest earned on loans, investments, and balances held at other local and foreign financial institutions

2) Non-interest revenue: includes fees, commissions, service charges, gains on foreign exchange transactions, trading profits on securities, and other income

The variables based on the Intermediary Approach to banking activity are:

Inputs
1) Price of Labor: personal expenses as a share of total assets

2) Price of Physical Capital: other operating and administrative expenses as a share of total assets

3) Price of Financial Capital: interest expenses as a share of total deposits

Outputs
1) Value of Loans: all loans and advances made within the year

2) Other Earning Assets: government treasury bills and securities, foreign assets, and local private securities.

An informal comparison of relative efficiency will be used to identify whether OFCs exhibit any difference in banking efficiency. Tables 5 and 6 below show the average efficiency scores based on the two approaches.

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[14] These countries are Antigua & Barbuda, The Bahamas, Barbados, Dominica, Grenada, Jamaica, St. Kitts & Nevis, St. Lucia, St. Vincent & The Grenadines, and Trinidad & Tobago.

Table 5. Commercial Banks' Average Efficiency Score based on the Intermediary Approach

Year	OFC	Non-OFC	Efficiency Difference (%)	HCUs (OFC is bold)
1993	0.865	0.931	-6.619	**Barbados**, Dominica, Grenada, Jamaica, St Kitts
1994	0.893	0.941	-4.800	**Barbados**, Dominica, Grenada, Jamaica, St Kitts
1995	0.945	0.948	-0.295	**Barbados**, Dominica, Grenada, Jamaica, St Kitts
1996	0.955	0.918	3.720	**Antigua, Barbados,** Grenada, St Kitts, **St. Vincent,** TT
1997	0.947	1.000	-5.300	**Barbados,** Grenada, Jamaica, **St Kitts,** St. Lucia, TT
1998	0.966	0.959	0.783	**Antigua,** Grenada, Jamaica, **St Kitts,** St. Lucia, TT
1999	0.936	0.944	-0.790	Grenada, Jamaica, **St Kitts, St. Lucia**
2000	0.910	0.925	-1.576	Grenada, Jamaica, **St Kitts, St. Lucia**
2001	0.906	0.933	-2.657	Grenada, Jamaica, **St Kitts**
2002	0.919	0.944	-2.514	Grenada, Jamaica, **St Kitts**
2003	0.886	0.936	-5.048	Grenada, Jamaica, **St Kitts**
2004	0.877	0.911	-3.448	**Bahamas,** Grenada, Jamaica, **St Kitts**

Table 6. Commercial Banks' Average Efficiency Score based on the Profit Oriented Approach

Year	OFC	Non-OFC	Efficiency Difference (%)	HCU (OFC is bold)
1993	0.986	0.950	3.600	**Bahamas, Barbados**, Dominica, Jamaica, St. Vincent
1994	0.950	0.967	-1.700	**Bahamas, Barbados**, Dominica
1995	0.924	0.924	0.076	**Bahamas, Barbados**, Dominica, Grenada, St Kitts
1996	0.974	0.966	0.820	**Bahamas, Barbados**, St Kitts, **St. Vincent** ,TT
1997	0.933	0.747	18.550	**Antigua, Bahamas, Barbados, St Kitts,** TT
1998	0.920	0.900	1.992	**Bahamas, Barbados, St Kitts,** TT
1999	0.980	0.873	10.695	**Antigua, Bahamas, Barbados, St Kitts,** TT
2000	0.900	0.858	4.152	**Bahamas, Barbados, St Kitts**
2001	0.887	0.942	-5.486	**Bahamas, Barbados**, Jamaica, **St Kitts,** TT
2002	0.877	0.956	-7.838	**Bahamas, Barbados,** Jamaica, **St Kitts,** TT
2003	0.923	0.993	-6.986	**Bahamas,** Jamaica, **St Kitts**
2004	0.848	0.850	-0.124	**Bahamas, Barbados,** Jamaica, **St Kitts,** TT

TT represents Trinidad and Tobago

7. Results

The most efficient countries (HCU) in any given year are listed in the right most column. These countries are given an efficiency score of one. The DEA analysis illustrates some interesting results. Characterizing banks as providing intermediary services as opposed to firms who seek pure revenue generation has different implications on performance. With regards to the profit oriented approach domestic banks in OFC countries are on average more efficient, and in fact the traditional OFCs of The Bahamas, and Barbados, are almost always among the most efficient countries. This is not the case

however when efficiency analysis is based on the intermediary role of banks. The average efficiency for non-OFCs is almost always larger than the average efficiency for OFC countries in each year, and furthermore the most efficient countries are non-OFC.

8. Conclusion

Offshore banking in the Caribbean is unlike that in most other offshore centers in that the establishment of the offshore financial center is not intended to have any impact on local finance. The paper analyzed whether local banks in Caribbean OFCs behaved any different than those in non-OFC islands.

Econometric techniques are used to compare the competitive structure and the efficiency of banking activity. A measure of the competitive nature of the banking sector was estimated using the approach of Panzar and Rosse (1987). Unlike the results of Rose and Speigel (2006) we find that local banks located in offshore countries of the Caribbean act less competitively than those located in non-offshore countries.

Secondly, data envelopment analysis is used to estimate measures of efficiency of banking activity of local commercial banks. The estimated measures of efficiency of commercial banks located in OFC islands are then compared to the efficiency measures of commercial banks located in non-OFC islands. The DEA also showed a difference in domestic banking activity in OFC and non-OFC countries. Domestic banks located in OFC islands are less efficiently in their role as intermediaries but are more efficient in revenue generation.

Further research should aim to identify the precise mechanisms by which these differences arise.

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