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A Look at the Puerto Rico Financial Industry

By

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Abstract

This dissertation examines market concentration and its implications on the financial industry of Puerto Rico, focusing on the depositary, non-depositary, and cooperative sectors. Despite a decrease in the number of institutions from 2004 to 2019, research on this topic has been limited. The study consists of two chapters: Chapter 1 covers data collection, challenges, and the methodological framework, establishing a robust foundation for analysis. Chapter 2 explores patterns in market concentration, market power, profitability, and efficiency within Puerto Rico's financial industry. Through meticulous analysis, this chapter reveals significant trends shaping the industry. By examining concentration levels, market power dynamics, and performance indicators, the research provides valuable insights into the changing financial landscape. The dissertation contributes to knowledge on Puerto Rico's financial industry, offering a resource for policymakers, experts, and researchers. The findings can inform decision-making to foster a more competitive and sustainable financial sector.

To my Mom.

You began this journey with me.
We celebrated the wins together as
I progressed through it. You knew and
understood the sacrifices I had to
endure along the way.

You witness my struggles and failures,
but your love and support for me
was unyielding and unrelenting.

You will not be able to physically
witness the culmination of this journey
with me, however I know that you are
watching over me from above.
You are and forever will be
in my heart.

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Introduction

Market concentration is a metric used to gauge the level of concentration of market shares among a limited number of companies. It is commonly used to indicate the competitive intensity within a given market. From 2004-2019 the number of institutions decreased in the Puerto Rico financial industry, yet research on this topic has been notably scarce. This dissertation will focus on quantifying the degree of concertation and the market power implications on the financial industry of Puerto Rico. Specifically, the depositary, non-depositary, and cooperative sectors.

This dissertation consists of two chapters. The first chapter, "Chapter 1: Data Collection and Challenges- The data acquisition process, integration, and methodological framework", it highlights the meticulous steps undertaken to gather relevant data and establishes a robust foundation for the subsequent analysis. "Chapter 2: Decoding the Patterns: Concentration and Performance Trends in Puerto Rico's Financial Industry Revealed", It presents a thorough exploration of the observed patterns in market concentration, market power, profitability, and efficiency within Puerto Rico's financial industry. Through meticulous analysis and interpretation of the gathered data, this chapter sheds light on the underlying dynamics shaping the industry and uncovers significant trends that have emerged over the studied period.

By examining concentration levels, market power dynamics, and key performance indicators, this research provides valuable insights into the changing landscape that has been the Puerto Rico financial industry. The dissertation seeks to unravel the relationship between market concentration and financial industry performance, offering a comprehensive understanding of the competitive environment and its implications for stakeholders.

The significance of this research lies in its contribution to the existing body of knowledge on the financial industry of Puerto Rico. By addressing the scarcity of research on market concentration trends, this dissertation provides an invaluable resource for policymakers, industry experts, and researchers seeking to comprehend the dynamics of the financial sector in Puerto Rico. Moreover, the findings of this study can inform future decision-making processes aimed at fostering a more competitive and sustainable financial industry within the region.

Chapter 1: Data Collection and Challenges- The data acquisition process, integration, and methodological framework.

1.1: Data Collection and Challenges

During the past decades, the narrative behind the mismanagement of government agencies and agency funds has been widely documented in Puerto Rico's news outlets and international media. These shortcomings have led to government spending cuts, erosion in the quality of government services, and ultimately federal government oversight,[1]. Data availability, integration, accessibility, lack of personnel, and technological barriers are the main challenges for this study. The agencies that house the data lack the resources and funding to prioritize record keeping[2]. In some cases, there were missing years of reporting, mainly attributed to the transition from hard copy to digitalization and the relocation of departmental offices. Another challenge was the integration of the different reporting formats and changes in reporting standards required through the years for each regulating body. Bureaucracy, strict inter-office procedures, various sources and formats of data, and accessibility prove to be complicating factors. This chapter will present the challenges faced while gathering data and describe the sample data. I will also show the variable descriptions, the econometric models, and the methodologic process of the investigation.

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[1] See PROMESA Act 2016.

[2] I spoke with personnel from different institutions and organizations while gathering data. I received the same feedback from them.

Puerto Rico has no databases housing financial statements from financial institutions. There are two regulating agencies: the Public Corporation for Supervision and Assurance for Cooperatives in Puerto Rico (henceforth COSSEC)[3] and the Office of the Commissioner of Financial Institutions of the Puerto Rico Government (henceforth OCIF)[4].

Under Act 114 of 2001, the Public Corporation for Supervision and Assurance for Cooperatives in Puerto Rico (COSSEC) was founded in 2001. COSSEC serves as a regulatory, supervisory, and oversight agent of member institutions of the "cooperative movement." This organization ensures up to $250,000 in deposits per customer, like the Federal Deposit Insurance Corporation (FDIC) for deposit-bearing institutions in the United States.   They are also responsible for cooperative banking institutions' economic solvency and stability. Member institutions are responsible for submitting quarterly financial statements to COSSEC. Although individual financial statements are not available to the public, COSSEC does publish a yearly aggregated report for the sector. These are the same reports provided to OCIF and are presented as such in the annual summary review published by OCIF for the industry. COSSEC does not provide access to individual financial statements, not even to OCIF itself.

Although very popular on the island as a financial services alternative, according to the FOMB Fiscal plan for 2020, the sector has been under siege by internal and external factors that have placed increased systemic risks of under-capitalization. Among those risks are the composition of their investment portfolios[5], cross-deposits among institutions, and

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[3] Spanish for "Corporación Publica para Supervisión y Seguro de Cooperativas de Puerto Rico".
[4] Spanish for "Oficina del Comisionado de Instituciones Financieras de Puerto Rico".
[5] As part of their investment portfolio, they hold bonds and instrumentalities of the Government of Puerto Rico. The effects of a possible default on these are a risk included in the analysis.

shortcomings of administration and governance of institutions and COSSEC. Hence, they have

been included under the purview of the Puerto Rico Oversight, Management, and Economic

Stability Act (PROMESA) of 2016[6]. COSSEC stands as a public corporation[7], but in hindsight is a

regulating body within a regulating body. The Director of OCIF serves as Chairman of the board

of directors of COSSEC. The board also includes the Secretary of the Puerto Rico Department of

Treasury[8] and the Government Development Bank of Puerto Rico[9], among others[10]. The

relationship between OCIF and COSSEC is interesting but only partially clear up to this point.

The Office of the Commissioner of Financial Institutions of the Puerto Rico Government

(OCIF) was founded in 1985 to provide a fiscal framework to the financial industry. They are

responsible for regulating, supervising, and overseeing the financial institutions operating

within the island[11]. Specifically, OCIF reports for depositary and non-depositary institutions. The

depositary institution's report includes commercial banks with operations on the island, as well

as two government banking institutions: Government Development Bank ("Banco

Gubernamental de Fomento") and the Economic Development Bank ("Banco de Desarrollo

Económico"). Depositary institutions generally provide a wide array of financial services.

From holding currency deposits to personal and commercial loans to credit lines and

investment and retirement accounts. Commercial banks aim to generate profits, but they are

mainly responsible for providing access to credit to individuals and corporations alike. The Non-

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[6] See *2020 Fiscal Plan for COSSEC* certified by the FOMB.
[7] State own corporation.
[8] Better known as "Departamento de Hacienda" in Spanish.
[9] Better known as "Banco Gubernamental de Fomento" in Spanish.
[10] For the entire composition of the Board of Directors of COSSEC see https://www.cossec.com/cossec_new/junta/
[11] See Office of the Commissioner of Financial Institutions of the Puerto Rico Government (OCIF) *Historic Review*.

depository institution's report is divided into four categories: financing, leasing, mortgage, and small loans. Non-depository institutions fundamentally have a different business model than institutions that handle deposits. They have a less diverse product suit and specialize in one or two lending categories. OCIF provides yearly consolidated industry data and individual financial statements of depository institutions. The institutions included in the annual report are mostly publicly traded banks, except for the Cooperative Banks of Puerto Rico. OCIF also includes International Banking Entities (IBEs) organized as units under the International Banking Center Act (Act No. 52 of 1989)[12]. The financial statements for these institutions (IBEs) are only handled at an executive level within OCIF. According to the act which created them, their annual performance is only provided on a consolidated or aggregated basis. Therefore, it is excluded from the results presented in the public annual reports[13].

1.2: Sample Data Composition

Since only aggregated data was publicly available, after corresponding with both OCIF and COSSEC directly. After several requests and months of dialogue and negotiation between myself and the institutions, a request for individual data was processed.

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[12] *Office of the Commissioner of Financial Institutions of the Puerto Rico Government (OCIF). (2021). PR Statistics by Banks in Puerto Rico for 2021.*
https://ocif.pr.gov/DatosEstadisticos/Datos%20Estadisticos/Datos%20Estad%C3%ADsticos%20Financieros%20por%20Bancos.pdf

[13] See "Commercial Banks*" line in the All Financial Institutions - Total Assets Report published on the OCIF webpage.

The data reconnaissance process yielded only aggregated values. After months of corresponding with OCIF and COSSEC, they agreed to share historical individual de-identified data. OCIF provided deidentified individual financial statements for registered depository and non-depositary institutions from 1996-2019. They also offered partial balance sheets[14] from 1983 to 1995. COSSEC provided deidentified individual financial statements for its members between 2004 and 2019. Data was organized, and three independent data sets were created, one for each sector. The depositary sector comprises commercial banks and two government banking institutions; the non-depositary industry includes specialized leasing, credit, and lending institutions; the cooperative sector, or credit unions, is composed mainly of savings, loan, and credit institutions. Because they share similar business models, depositary and cooperative institutions were combined to create one data set. A second set was created with the combination of the three sectors to create a data set for the industry. The industry dataset spanned from 2004 to 2019, yielding 3,830 observations from 361 institutions.

Table 1 and 2 show the same set of variables; the variability between the sets originates from the combinations of sectors. Table 1 contains descriptive statistics for the industry data set, and Table 2 collects descriptive statistics for the depositary and cooperative sectors. Sets include cash, which reports coins and currencies on hand or in transit, clearings, and other cash items. Net loans & leases receivables report the number of loans and leases held for sale at fair value less the allowances for loan and lease losses. Total assets comprised cash, net loan and leases, other current assets, securities held, premises and fixed assets, other real estates, mortgage servicing rights, personal property held for lease, and other assets.

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[14] The partial balance sheet only included total assets, deposits, and liabilities.

Total liabilities report on the sum of accounts payable and accrued liabilities, loan payables, deposits, mortgage payables, other account payables, total current liabilities, and long-term liabilities. Deposits, which provide a guarantee for leases. Allowances for loan and lease losses (L&L) is a balance sheet account, formerly known as reserves for bad debt, and is a valuation reserve for estimated L&L losses—total equity capital, which combines owner's and stockholder's equity. Total interest income reports all interest, fees, and charges associated with all assets reportable as loans. Total non-interest income consists of other fee income and all other noninterest income—net interest income comprised of total interest income less interest expense. Total income combines total interest income and total non-interest income.

Salaries and employee benefits add up gross salaries, wages, overtime, bonuses, incentive compensation and extra compensation, social security taxes, state and federal unemployment taxes, contributions to retirement plans, premiums on health benefits, and other payroll expenses. Interest expense combines interest paid on any borrowing, including bonds, loans, convertible debt, or lines of credit. Other non-interest expenses include all other non-interest expenses not included on other accounts. Provisions for loan and lease losses are a reserve of cash to cover losses on problem loans. Unlike "allowances for loan and lease losses," the provision is recorded on the income statement and recognized as an expense—net income before tax which reports on a bank's pretax operating income.

To provide more context to the sample data, Table 3 shows the descriptive statistics for Puerto Rico's FDIC-registered depository institutions from 2004 to 2019.[15]. The set includes total

[15] Federal Deposit Insurance Corporation. (2022). *Statistics on Depositary Institutions*. Quarterly Financial Data - SDI. https://www7.fdic.gov/sdi/download_large_list_outside.asp

interest income, defined as the sum of interest income from loans and leases, investments, interest on bank balances, the sale of federal funds, and the interest on trading account assets earned by the institution. Total non-interest income, which includes the sum from income from fiduciary activities, service charges on deposit accounts, trading gains (or losses) and fees from foreign exchange transactions, other foreign transaction gains (or losses), other gains (or losses) and fees from trading assets and liabilities. Total income, which combines total interest income and total non-interest income. Total interest expense, which includes the total interest expenditure by the institutions. Net interest income is defined as total Interest income minus total interest expense. It provides the difference between interest and dividends earned on interest-bearing assets and interest paid to depositors and other creditors. Provisions for Credit Losses are defined as the estimated amount needed to make the allowance for loan and lease losses adequate to absorb expected loan and lease losses. Additional non-interest income, which is the combination of investment banking, advisory, brokerage, underwriting, venture capital revenue, net servicing fees, net securitization income, insurance commission fees, and income, net gains (or losses) on sales of loans, net gains (or losses) on sales of real estate owned, net gains (losses) on sales of other assets (excluding securities) and other noninterest income. Total non-interest expense comprises salaries and employee benefits, premises and fixed assets (net of rental income), and other noninterest expenses. Salaries and employee benefits include the total expenditure on salaries and employee benefits. Additional non-interest expense contains the sum of all other operating expenses of the institution, including net (gains) or losses on other real estate owned (OREO), loan sales, fixed assets sales, amortization of intangible assets, or other itemized expenses. Pre-tax net operating income

comprises net income (loss) before income taxes, extraordinary items, and other adjustments minus gains (losses) on securities not held in trading accounts.

To provide further context to the industry, Table 4 details summary statistics for U.S. depositary institutions from 2004-2019, data derived from Compustat via Wharton Research Data Service[16]. This set includes 1,198 depositary institutions from 2004 to 2019, with 10,804 observations. Institutions with missing values in any of the variables were excluded[17]. Among the variables included are total assets (AT), comprised of the total value of assets reported on the balance sheet. Cash: cash & due from banks total (CDBT); this item represents the unweighted average of all interest and non-interest-bearing cash and due from banks, restated up to six years.

Current Operating Earnings Before Income Tax (COEIT), this item includes Total Current Operating Revenue less Total Current Operating Expense. Total Deposits (DPTC) comprise the total demand, savings, and time deposits held for individuals, partnerships, and corporations. Earnings Before Interest and Taxes (EBIT), which is comprised of Sales minus Cost of Goods Sold (COGS) minus Selling, General & Administrative Expenses (XSGA) minus Depreciation & Amortization (DP). Interest and Related Income (IDIT) comprises revenue from all earning assets. Loans - Net of Total Allowance for Loan Losses (LNTAL), which contains the total dollar value of all domestic and foreign loans in the bank's loan portfolio as of the date of the balance sheet, less unearned income, and reserve for possible loan losses. Total Liabilities (LT) include

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[16] Wharton Research Data Services. (2021, December 26). *WRDS*. Query 5048969, for Comp_bank_daily. https://wrds-www.wharton.upenn.edu/query-manager/query/5048969/

[17] Variable definition according to Compustat via Wrds.

current liabilities, long-term debt, and other noncurrent liabilities, including deferred taxes and investment tax credits. Net Interest Income (NIINT) is the sum of the total interest and dividends received from earning assets less the total interest paid using debt and deposit accounts. Provision for Loan/Asset Losses (PLL) represents an expense charged to earnings that increases the allowance for possible losses on assets owned due to the decline in value of collateralized or foreclosed assets. Reserve for Loan/Asset Losses (RLL) consists of all the value adjustment reserves. Total Current Operating Expenses (TCOE) represent all operating expenses charged against the bank's operating revenue. Total Current Operating Revenue (TCOR) encompasses the sum of all operating income the bank reports. Stockholders' Equity (TEQ) represents a company's common equity, preferred equity, and nonredeemable noncontrolling interest. Total Non-Interest Income (TNII) includes all operating revenue, securities gains and losses, and non-recurring revenue.

Interest and Related Expense (XINT), which incorporates the periodic expense to the company of securing the short- and long-term debt. Staff Expense Total (XLR) includes the summation of salaries, wages, pension costs, profit sharing and incentive compensation, payroll taxes, and other employee benefits. This item excludes commissions. Expenses Noninterest Total (XNITB), which details the expenses of a bank not attributed to the interest expense of deposit accounts and borrowed money. Pensions and Benefits Expense (XPRB), which incorporates the total supplementary compensation paid to all officers and employees of the bank.

1.3: Methodology

To assess the levels of total asset concentration on depository institutions, I measure Herfindahl-Hirschman Index (HHI) [18] for the period 1983-2019. Using first data from OCIF and since I only had partial data (total assets and total deposits) for depository institutions for the years 1983-1995, I proceeded to create aggregated per year variables and measure asset concentration levels by creating a Herfindahl-Hirschman Index (HHI)[19] from 1983-2019.   To observe HHI trends, Figure 1 highlights depository institutions sector trends for aggregated variables of total assets,1983-2019. Figure 2 highlights the industry trends for the years 2004-2019. Figure 3 compares OCIF and FDIC aggregated time series for 1993-2021. Figure 4 shows aggregated time series figures for non-depository and cooperative banking institutions for 1996-2019. Figure 5 shifts attention from the Puerto Rico market and concentrates on US depository institutions where similar aggregated time series variables were created.

The methodology for developing the HHI indices created for this research follows Rhoades (1993). The HHI serves as a proxy for a number of institutions and market concentration. It does so by accounting for the market share of all participating firms, squaring the market share, and adding those squares as presented:

$$HHI_{st} = \sum_{i=!}^{n} (MS_i)^2$$

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[18] Rhoades, S. A. (1993). The Herfindahl-Hirschman Index. *Federal Reserve Bulletin*, *March*, 188–189. https://fraser.stlouisfed.org/files/docs/publications/FRB/pages/1990-1994/33101_1990-1994.pdf

[19] The Herfindahl-Hirschman Index is widely implemented among the bank and financial institution literature, see Berger (1995), Berger & Hannan (1989), Berger & Roman (2015) and Akins, Li, Ng & Rusticus (2016).

Where;

    - MS_i = market share of firms i

    - n = number of firms in the market

To assess the effects of concentration between 1996-2019, which had complete availability of data points. Separate HH indexes were created for each sector and another for the industry, with the total income variable for the actual revenue market share.

Following a modified version of Grullon et al. (2019) model, I performed panel regressions to test the effect of concentration on banks' profitability and efficiency, return on asset (ROA), asset utilization, and asset utilization and Lerner Index[20] for operational efficiency and competitiveness. Additionally, I control for other banks' characteristics.

$$ROA_{ij} = \alpha + \beta_1(HHI_{it}) + \beta_2(InsPY_{it}) + \beta_3(Bank\ Controls_{it}) + \varepsilon_{it}$$

The dependent variable *ROA* is the return on assets, defined by the ratio of net income before taxes and total assets under management. The main explanatory variables are *HHI* and *InsPY*, where *HHI* is the Herfindahl-Hirschman Index as a proxy for market concentration. *InsPY*

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[20] Since the industry includes essentially two business models, depositary and non-depositary, the iteration of the Lerner Index implemented in Grullon (2019) allows for both analyses. A different form of the Lerner Index is introduced later. This version is tailored towards depositary institutions, targeting the effects on the depositary and cooperative sectors.

is the number of registered institutions per year. *i* and *t* denote institutions and years, respectively. All independent variables are in logs.

Additional regressions were performed with Lerner Index (*Lerner*) and asset utilization (AssetUtil) as dependent variables. *Lerner* is defined by net income before taxes divided by total income, and *AssetUtil* is defined by total income divided by total assets under management.

$$Lerner_{ij} = \alpha + \beta_1 log(HHI_{it}) + \beta_2 log(InsPY_{it}) + \beta_3 log(Bank\ Controls_{it}) + \varepsilon_{it}$$

$$AssetUtil_{ij} = \alpha + \beta_1 log(HHI_{it}) + \beta_2 log(InsPY_{it}) + \beta_3 log(Bank\ Controls_{it}) + \varepsilon_{it}$$

Bank controls include total assets as a proxy for institution size and several interaction variables. Interaction variables aim to measure the interconnection between a specific set of variables. Interaction variables labeled *inter1* and *inter2* measure interactions between the depositary and non-depositary institutions and total assets, respectively. Variables *inter3* and *inter4* measure the interaction between HHI and depositary and non-depositary institutions. Interaction variables are only used within the industry file.

Since the depositary and cooperative sectors have similar business models, further testing was performed using another iteration of the Lerner Index[21] (Berger, Klapper & Turk-

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[21] Berger, A. N., Klapper, L. F., & Turk-Ariss, R. (2009). Bank competition and financial stability. *Journal of Financial Services Research*, *35*(2), 99–118. https://doi.org/10.1007/s10693-008-0050-7

Ariss, 2009). This provides a deeper understating of market power dynamics within these two sectors.

Where Lerner (DI_Lerner), is defined as:

$$DI\_Lerner_{ij} = \frac{P_{TAit} - MC_{TAit}}{P_{TAit}}$$

Where P_{TAij}, is the price of total assets represented by the ratio of total revenues to total assets for bank i at time t. The marginal cost of total assets, MC_{Tait}, for bank i at time t is derived from the log function of cost:

$$ln\,Cost_{it} = \beta_0 + \beta_1\,log(Q_{it}) + \frac{\beta_2}{2}log(Q_{it}^2) + \sum_{k=1}^{3} Y_{kt}\,log(Wk_{it})$$
$$+ \sum_{k=1}^{3} \phi_k\,log(Q_{it})\,log(Wk_{,it}) + \sum_{k=1}^{3}\sum_{j=1}^{3} log(Wk_{it})log(Wj_{it}) + \varepsilon_{it}$$

Where Q_{it} is the total assets for bank i at time t, and $W_{k.it}$ is the proxy for three specific input prices, labor, funds, and capital. W_1 is the ratio of labor to total assets, W_2 is the ratio of interest expense to total deposits, and W_3 is the ratio of operating and administrative expenses to total assets. Estimations are performed with firm and year-fixed effects. Marginal cost is then calculated as:

$$MC_{TAij} = \frac{Cost_{ij}}{Q_{it}}\left[\beta_1 + \beta_2\,log(Q_{it}) + \sum_{k=1}^{3} \phi_k\,log\,(W_{k,it})\right]$$

Chapter 2: Decoding the Patterns: Concentration and Performance Trends in Puerto Rico's Financial Industry Revealed.

2.1 General Industry Trends from 2004 to 2019:

The Puerto Rico financial industry[22] mainly comprises three sectors: depositary institutions, non-depositary institutions, and cooperative banking institutions. These have been decreasing in terms of institution count and total assets. In 2004 the industry had 269 institutions between the three sectors. At the end of 2019, it was down to 206. As an industry, the loss amounted to -23.4% (-63 institutions) from 2004 to 2019; from the peak of 2007, 270 in total, it has lost -25.3% (-70 institutions). Industry total assets followed suit, shedding approximately $35.435 billion in assets during the same period. Panel A of Figure 2 highlights the decrease in institution count and total assets. On a percentage basis, the sector most affected by this decline was the depositary institution sector, which had lost -31.3% (-5 institutions), closely followed by non-depositary institutions with a loss of -29.4% (-35 institutions). The cooperative sector lost -17.1% (-23 institutions) within the same time frame. Panel A of Figure 4 presents the institution count per sector.

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[22] Industry results are based on data from OCIF and COSSECC.

During that same time frame, the market share of revenues has seen marginal changes year over year. The market share means, and medians per sector have been 72.55%, 19.39%, and 7.66% for means and 72.55%, 18.55%, and 8.45% for medians for depositary, non-depositary, and cooperative institutions, respectively. The maximum and minimum market share for depositary institutions was 77.2% in 2007 and 67.3% in 2004, respectively. As for non-depositary institutions' the peak market share was 26.9% in 2004, and the bottom was 17.1% in 2014. Cooperative institutions saw a market share top of 10.7% in 2016 and a bottom of 5.2% in 2004. However, the composition is considerably different when considering the market share composition in 2004 vs. 2019. In 2004, depositary institutions owned 67.3% of the market share. At the end of 2019, that figure had increased by 5.3 percentage points, or 7.88%, to 72.6% of the market. Using the same two years as reference (2004 vs. 2019), cooperative institutions owned a 5.8% market share in 2004. They observed a 3.2 percentage points increase, or 55.2%, to 9.0% of the market at the end of 2019. The gains in market share observed by depositary and cooperative institutions came at the expense of the non-depositary institutions, which experienced a loss of -31.6% from 26.9% in 2004 to 18.4% in 2019, a -8.5 percentage point differential. Panel B of Figure 2 highlights sector market share and industry per year count.

The loss of institutions across sectors directly hindered the industry's capacity for overall asset retention. Over that period, the industry lost 28.3% or approximately $35.4 billion in assets under management. The mean and median of total assets for the industry were $103.2 and $102.4 billion, respectively. The peak in total assets came in 2005 at $133.8 billion, and the

low reached in 2017 at $80.2 billion. This represented a loss of assets under management of -28.2% from 2004 to 2019 and a -40.0% loss from the peak 2005.

Deposits suffered a similar fate peaking in 2008 at $75.6 billion and bottoming in 2016 at $54.4 billion. However, from 2004 to 2019, deposits increased from $55.9 to $65.6 billion, translating to a 17.5%+ percentage change from one year to the other. The mean and median for deposits for that time frame were $61.6 and $59.5 billion, respectively. Panel C of Figure 2 displays the aggregate time series for total assets and deposits.

Revenues, measured by total income, peaked in 2007 before the great financial crisis and bottomed in 2017. The mean and median came in at $6.2 and $5.8 billion, respectively. When comparing 2004 to 2019, the industry observed a decrease of $1.9 billion or approximately -25.7%. Net interest income also bottomed in 2017 and topped in 2014—however, net income before taxes bottomed in 2009 and topped in 2019. The mean and median net interest incomes were $3.397 and $3.323 billion, respectively.

Expenses, measured by salaries, employee benefits, interest & non-interest expenses, and other expenses, behave similarly bottoming in 2017. However, salaries, employee benefits, and interest expenses peaked in 2007. In comparison, non-interest expenses and other expenses peaked in 2009. The most significant expense was the expenses incurred on interest (interest expense). They accounted for an average of 18% of expenses. An essential expense metric for baking institutions is loan and lease loss provision(s). It provides a context of the expected losses a baking institution may encounter in the upcoming future. They peaked in 2009 and bottomed in 2019, with $1.7 billion and $148 million, respectively. Visualizations for aggregated time series variables of total income and expense distribution, as well as net

interest income and net income before taxes, can be observed in Panels E and F of Figure 2, respectively.

Two critical years to observe during the time series. One was the period around the GFC[23], which shocked the institutions and global economies because of systemic contagion. The second, in 2017, was the impact of two major hurricanes. Although regional in nature, the events created a localized economic shock to the entire island's economy and the financial industry.

In September 2017, the island was directly impacted by two major hurricanes, Irma[24] and Maria[25]. Both storms were categorized as "major hurricanes" according to Saffir-Simpson Hurricane Wind Scale[26]. Irma came in on the lower range of Category 5 winds (157-180 mph winds), and Maria on the upper range of Category 4 winds (140-150 mph winds). The storms devastated the island's economy, power grid, and infrastructure. These natural disaster events triggered a massive funding response from the US Government via Federal Emergency Management Agency (FEMA). According to FEMA, the funding response was approximately 25

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[23] Great Financial Crisis.

[24] Cangialosi, J. P., Latto, A. S., & Berg, R. (2018). *Hurricane Irma Tropical Cyclone Report (AL112017)*. Retrieved from https://www.nhc.noaa.gov/data/tcr/AL112017_Irma.pdf

[25] Pasch, R. J., Penny, A. B., & Berg, R. (2018). *Hurricane Maria Tropical Cyclone Report (AL152017)*. Retrieved from https://www.nhc.noaa.gov/data/tcr/AL152017_Maria.pdf

[26] Saffir-Simpson Hurricane Wind Scale. (2022). Retrieved from https://www.nhc.noaa.gov/aboutsshws.php

billion[27] dollars for recovery. The funds were mainly targeted for emergency work, individual assistance, and restoration of the electric power system[28].

Table 4 presents cash on the balance sheet, loans and leases, and deposits as a percentage of total assets for the industry. For context, the storms affected the island during the first weeks of September 2017. OCIF and COSSECC data close at the end of each natural year. Hence the effects are visible from the year 2017 and on. In the years leading up to 2017, from 2005-2017, the industry has been shedding assets year after year, hence the increase in the percentage of cash to TA. A possible explanation for this can be attributed to a reduction in TA rather than an increase in cash. The result of cash to TA for 2017 could be a combination of both factors, a continuation of TA decreasing and cash increasing because of the initial disbursement of emergency funds, hence the spike to 13.81%.

In contrast, during the years leading up to 2017, 2012-2016, the percentages of deposits to TA are somewhat stagnant, with only a -3.94 percentage points differential or -6.3%. Total assets during those same years decreased by approximately -15.4%. Actual deposits decreased by about -10.0% from 2012-2016. Therefore, the decrease in assets outpaces deposits decrease for those years. Deposits bottomed in 2016, and TA bottomed in 2017. After bottoming, each increased roughly at a $4 billion clip each year to the end of 2019. A combination of higher cash balances on hand, deposits to TA, and a leaner balance sheet in terms of TA should provide a

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[27] FEMA and the Government of Puerto Rico Establish New Agreements for the Reimbursement of Recovery Funds. (2021). Retrieved April 22, 2022, from https://www.fema.gov/press-release/20210922/fema-and-government-puerto-rico-establish-new-agreements-reimbursement

[28] FEMA Approves More Than $140 Million in Assistance to Puerto Rico | FEMA.gov. (2021). Retrieved April 22, 2022, from https://www.fema.gov/press-release/20210318/fema-approves-more-140-million-assistance-puerto-rico

framework for a healthy lending environment. Data for loans and leases (L&L) provide different results as they decline, in terms of L&L to TA at a rate of -5.65% from 2012-2016 and -23.21% from 2012-2019. L&L represented 68.44% of TA in 2012, and at the end of 2019, they were 52.55% of TA. It could be inferred that much of the emergency response funding ended on banking institutions' balance sheets, but institutions did not redeploy capital via loan growth.

2.2 Measuring Industry Concentration:

As we know, during 2004-2019, the Puerto Rico financial industry decreased in size, per total assets, and the number of institutions in operation or institution counts. This, in turn, translated into a decline in revenues, as measured by total income. Throughout the entire income series, the industry's bottom came in 2017, and the peak occurred in 2007, as seen in Panel H of Figure 2.

I then examined concentration levels and their variability over time with this information. As mentioned in Chapter 1, I created a Herfindahl-Hirschman Index (HHI) by adding up all the revenues from the firms per year and dividing the firm's total revenues for the year over the industry's aggregate for that year. That provided the market share for that firm for the year. Next, the market share was squared and added yearly. Which in turn provided the index value for the year. The US Department of Justice[29] considers the index range between 1,500 to 2,500 "moderately concentrated" and more than 2,500 "highly concentrated." Panels B of Figure 4 provides, D, E, F, and G of Figure 2 provide context to the industry's HH index for

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[29] [29] Antitrust Division, U.S. D. O. J. (2018). Herfindahl-Hirschman Index. Retrieved April 23, 2022, from https://www.justice.gov/atr/herfindahl-hirschman-index

total income; the industry observed a +130.75% increase in the concertation index of total income. The index went from 650.82 in 2004 to 1501.77 in 2019 and an average index value of 1015.50 for the whole series. These results are consistent with Grullon, G., Larkin, Y., & Michaely, R. (2019), who observed concertation levels increasing from 1994-2014. When examining specific year ranges, the index rises an average of +28% every three to four years. 2010, 2015, and 2017 stand out as the more significant year-over-year increases, with estimated gains of +16%, +18%, and +19%. Three years of negative (decrease) concentration occurred in 2011, 2016, and 2019. The value of the index for that year decreased an estimated -3%, -8%, and -8%, respectively. Table 5 summarizes the year-over-year changes in HH indexes of total income for the industry and individual sectors. Employing DOJ's criteria on HHI results, the PR industry can be considered "moderately concentrated."

However, when looking at the HHI of total assets for the industry, the starting point was from a higher base of 836.26 and ended much higher at 2,283.73 or +173.09% in the index. The average value for the index was 1236.22. The average spread between the HHI for income and the HHI for total assets was +217 index points per year. Hence industry assets are concentrated to a higher degree than industry incomes. Even though industry assets topped in 2005 and bottomed in 2017, the index values increased yearly during that same span. Using DOJ's guidelines, industry assets are on the upper bound of "moderately concentrated."

When I looked at total deposit trends, several highlights were present. A peak in industry deposits in 2008—by 2011, deposits had fallen by -21.7%. They had little change until 2013, when the decline continued, and lost an additional -7.3% to its lowest point in the series in 2016. From 2017-2019 deposits grew by +18.34%. The concentration index for deposits

began at a much higher base than the total income and assets indexes, at 1072.96. During the time series 2004-2019, the deposit index increased +198.3% to the maximum index value in 2019 of 3,200.78. The average value for the deposit index was 1719.85, and the spread between the index for total income and the index for deposits was +700.04 index points per year. By DOJ's guidelines, industry deposits are "highly concentrated."

2.3 Sector-Specific Aggregate Trends:

Having already identified industry trends, we now focus on sector-specific trends. Figure 4 highlights sector trends for aggregated variables. By now, the research has shown that concentration and institution consolidation have been present at an industry level during the time series. When evaluating individual sector concentration for total income, we observe the depositary sector outpacing the industry's concentration level by an average of +884 points in index values terms, 1,927 vs. 1043. In contrast, the index for the cooperative sector maintains an average index value of 222, which underperforms the industry average by -821 index points. Finally, the non-depositary sector underperforms to a lesser degree the industry by an average of -243 index points.

Total assets Individual sector concentration follows a similar trend. The depositary sector outpaces the industry by +541 index points, and the cooperative sector underperforms the industry average by -1,041. However, the non-depositary sector offers a slightly different result, outpacing the industry by +365 index points. The pattern changes on the deposits index side, as the non-depositary sector outpaces the industry by +4,432 and the depositary sector by +4,064. This effect is due purely to the constitution of the non-depositary business model. As

appropriately named, these institutions do not naturally carry deposits, but a few do. Primarily to strengthen their balance sheet and reduce risk exposure. Since the sector retains a minuscule market share of deposits effect manifests to a greater degree at the index level. The non-depository sector accounted for less than 1% of the deposit market share from 2004-2014. It sustained the 1% mark from 2015-2019, as seen in Panel K of Figure 4. Nevertheless, the trend for the cooperative sector remains consistent with the other indexes as they underperform the industry by -1,544. Tables 7, 8, and 9 showcase the industry's and individual sectors' index values for total income, assets, and deposits, respectively.

Another pattern can be observed in the loans-to-total assets ratio, a proxy for balance sheet loan concentration or loan exposure. Panel D of Figure 4 presents this ratio. The loan-heavy business model of non-depository institutions is very pronounced compared to the depository and cooperative sectors, which operate under a more diversified business model. Key to point out that before GFC, all three sectors were losing assets, but all observed increasing loan-to-total asset ratios. Hence, they grew the loan concentration to their total assets until 2006. This was more pronounced in the depository and non-depository sectors. The cooperative sector lagged in adjusting the pattern. An explanation for this could be that the GFC hampered their ability to extend new credit, and their dependence on the local market ultimately cost them recovery time. After 2008 the depository and non-depository sectors continued increasing their loan exposure while the cooperative sector remained stagnant. After 2016 and through the end of the time series, depository institutions decreased their loan exposure. Alternately, non-depository and cooperative institutions continued to increase their loan exposure during that same span.

Another trend to observe is the ratio of the interest expense-to-total deposit, which serves as a proxy for the cost of funds or cost of capital for financial institutions. In 2006 the cooperative sector paid approximately 3.2% in interest expense to total deposit ratio, half the amount paid by the depositary sector. Even as the cooperative sector carried about 10% of the deposit market share, they paid less for them when compared to the depositary sector. From 2008-2013 the depositary sector increased its deposit HHI concentration by +631 points. The cooperative observed an increase to a much lesser degree of +27.8 points. As observed in Panel G of Figure 2. During that span, the spread of interest expense to total deposits collapsed from approximately +3.2% to -0.5%. The spread continued negative until the end of the time series. After 2013, when the spread turned negative, the depositary sector concentrated by +1,879.8 points, while the cooperative sector index decreased by -25.9 points. It could be inferred that deposit concentration allowed the depositary to pay less interest expense. Interest expense to deposit ratio and spread can be observed in Panel H and I of Figure 4.

A defined view of the industry and more detailed sector patterns allow more significant trends to surface. When considering depositary institutions own approximately +80% of total assets and +90% of total deposits market shares, respectively, and considering that the more pronounced increases in concentration indexes for total assets and deposits were in 2016-2017, with +27.33% and +22.2%, respectively. At the same time, losing approximately $2.7 billion in total assets in that same span. But at the same time, reducing their loan exposure via the drop in loan-to-total asset ratio, -7.62 percentage points. And the highest increase in cash-to-total asset ratio, +4.26 percentage points. One can infer that the influx of federal funds received to

mitigate the damages caused by Irma and Maria was used by institutions to de-risk their balance sheet while increasing their available capital.

2.4 Evidence of Performance and Efficiency:

As mentioned in Chapter 1, I used regression analysis to examine the relationship between several factors. These included industry and sector concentration, size as proxied by the firm's total assets, return on assets, the Lerner Index, and asset utilization.

I first looked at aggregated values of ROA; ROA is defined by the ratio of net income before taxes and total assets under management. At the industry level, it shows variability throughout the series. Understandably with the bottom in 2009 and volatility from that point until 2017. From 2017-2018 it increased +1.75 percentage points. This shows that the industry benefited from emergency funds for hurricane emergency mitigation. Looking at individual sectors, the sector that observed the more drastic effect was the non-depositary sector. It saw a drop in ROA from 2016-2017 of -5.88 percentage points, but from 2017-2018 saw a jump of +10.14 percentage points. When comparing depositary and cooperative institutions, ROA moves parallel throughout the series, the cooperative sector edging slightly higher than the depositary. However, that trend inverts after 2017, when the cooperative sector flatlines, and the direction for the depositary sector continues to expand. Industry and sector trends can be observed in Panel K of Figure 2 and Panel E of Figure 4, respectively. Important to point out that while the depositary sector increased its ROA, its loan-to-total asset ratio decreased, so the ROA expansion cannot be attributed to loan growth.

Looking at regression results for ROA, total assets show positive relation with ROA, but not at a statistically significant level. Interaction variables 1 and 2 offer the same results in significance levels. One could infer that size does not significantly influence ROA in any sector. HHI does present a negative relationship with ROA at a 5% significance in both the 1st and 2nd ranges, with more robust coefficients in the 2nd range of the series. Interaction variables 3 and 4 present positive and significant results with more robust coefficients in the 2nd range of the series. The negative coefficients of the HHI and the positive coefficients of inter 3 and 4 could indicate that ROA is negatively impacted by increases in concentration but only in the cooperative sector. Depositary and non-depositary sectors do present a positive effect on ROA from concentration via inter3 and inter4. Regression results are shown in Panels A and B of Table 10.

Additionally, I looked at aggregated values for the Lerner Index at the industry level. Lerner Index is defined by net income before taxes divided by total income. Lerner shows volatility through the series, with the high of the series in 2017-2018 and the low in 2008-2009. The series declined from 2004-2009, and the move totaled -25.67 percentage points. Similarly to the ROA series, it observed the most significant increase from 2017 to 2018. In that year, the Lerner Index increased by +31.51 percentage points. At the sector level, the non-depositary sector demonstrates higher volatility through its series, presenting two distinct drop-offs, one in 2007 and the other in 2017, the low point being in 2017 of -25.34. The most significant increase of the index was in 2017-2018, when the index increased +80.02 percentage points. Alternately the cooperative sector showed more stability throughout the series, even though the GFC in which they sustained positive values. However, they lagged the other sectors in their recovery

after 2017. One thing to point out, the cooperative sector outperforms the depositary sector almost entirely throughout the series; this pattern inverts from 2017 onward. Industry and sector trends for the Lerner Index are presented in Panel I of Figure 2 and Panel F of Figure 4.

Regression results for the Lerner Index show a positive relationship with total assets at the 1% level, specifically in the 2nd range. Inter1 presents similar results, with slightly higher positive coefficients in the 2nd range. Alternately inter2 shows a negative relationship at a 5% level in the 2nd range but insignificant in the 1st range. This indicates that for depositary institutions, size does provide market power advantages. However, the same cannot be said for the non-depositary sector.

HHI presents negative coefficients at the 5% level on the complete sample and more robust negative coefficients in the 1st range at the 1% level. Compared with inter3, complete sample data provides positive coefficients and significance at the 5% level. No statistical significance was observed in the 1st range, but robust positive coefficients were present in the 2nd range at the 5% level. Indicating that concentration positively affects the market power dynamics within the depositary sector, predominantly in the 2nd range. Inter4 presents more robust positive coefficients within the non-depositary sector in the complete sample and the 1st range at the 1% levels and 10% in the 2nd range. This indicates that the non-depositary sector concentration also has provided the sector participant with market power advantages.

Lastly, I looked at the aggregated industry values for the asset utilization ratio, defined as total income divided by total assets. Conversely to the other series, the higher values are present at the beginning of the series, specifically from 2006-2007, with the peak in 2007. The lows for the series were in 2012, and those lows were retested in 2016. However, from 2016-

2019 the series increased +12.95%. The difference between the higher and lower bounds of the series was -1.98 percentage points.

Looking at sector trends independently shows that the lack of asset diversification in the non-depositary sector allows for higher utilization. As a result, the sector doubles and triples the asset utilization observed in the other sectors. Interestingly the cooperative sector has been consistently more efficient with its utilization than the depositary sector throughout the series. However, the pattern converges from 2017 to the end of the series. Industry and sector trends are shown in Panel I of Figure 2 and Panel G of Figure 4, respectively.

Regression results for the 1st and 2nd range and the complete sample present negative coefficients but no statistical significance for total assets. However, inter1 and inter2 present negative significant coefficients. For inter1, in the complete sample and 2nd range. For inter2, in the complete sample, the 1st and 2nd ranges. Indicating that asset utilization is negatively affected by the size of depositary and non-depositary sectors. HHI presents negative but not significant coefficients. Inter3 further confirms this "no significant" effect on depositary institutions. Inter4 does show significance at a 10% level in the complete sample data. One could infer that concentration seems to provide asset utilization advantages for non-depositary institutions.

Conclusion

This investigation documents the Puerto Rico financial industry's concentration and financial performance patterns from 2004-2019, specifically within the depositary, non-depositary, and cooperative sectors. These patterns have been documented in the financial literature, but not with Puerto Rico as a focus. From the beginning, I set out to accomplish three main objectives:

- To quantify the concentration and consolidation levels of the financial industry in Puerto Rico, specifically the depositary, non-depositary, and cooperative sectors.

- To provide visibility on market share fluctuations in the Puerto Rico financial industry over the years.

- To measure if levels of concentration have provided market power advantages to the remaining players of Puerto Rico's financial industry.

Even though these objectives presented multiple challenges during the investigation, they were carefully investigated, and the research proves it.

Furthermore, the study posed three primary research questions or hypotheses. These were meant to guide the investigation and provide a clear direction for the research. It was my task as a researcher to answer these questions:

- Is there measurable concentration within the financial industry of Puerto Rico?

- What have been the effects of concentration, if any, on profitability and efficiency?

- Has industry concentration provided market power advantages to remaining industry players?

In Section 2.1: Measuring Industry Concentration, of Chapter 2, the research provides a detailed account of concentration indexes of total income, assets, and deposits. Tables 5, 6, 7, 8, and 9 provide exact values for each Herfindahl-Hirschman (HHI) index created for the series. Puerto Rico's financial industry lost 63 or 23.4% of institutions from 2004-2019. This resulted in readings in the HHI of total income increasing by +851 points or +130.8%. In the HHI of total assets by +1,447 points or +173.1%. Lastly, in the HHI of deposits, the index increased by +2,127 points or +198.3%. These indexes peaked within the last three years of the series, 2017-2019. So, Puerto Rico's financial industry has, in fact, been concentrating.

In Section 2.3: Evidence of Performance and Efficiency, of Chapter 2, the research offers an in-depth analysis of profitability trends via a discussion of return on assets at the industry and sector levels. The industry experienced its most profitable years during 2017-2018, when two notable factors were present. First, it observed its highest levels of concentration across the indexes. Second, it benefited from the influx of disaster relief funding received to mitigate recovery efforts in the aftermath of hurricanes Irma and Maria. Throughout the series, the sector with the highest overall ROA was the non-depository sector but also the most volatile. The cooperative sector had a higher ROA than the depositary sector until 2016-2017 when that pattern inverted until the end of the series. Regression results for ROA at the industry level present a negative relationship with HHI. However, when considering inter3 and inter4, which both showed positive relationships with ROA, one could infer that the negative effect comes from the cooperative sector, not the depositary and non-depository sectors, as ROA benefited from concentration in both cases.

Additionally, in Section 2.3: Evidence of Performance and Efficiency, of Chapter 2, the research thoroughly examines efficiency by analyzing asset utilization trends for the industry and individual sectors. Industry trends show a marginal decline in asset utilization from 2006-2010 of -4.76%. From 2010-2016 the series is range bound around the +5.57% average. However, from 2016-2019 asset utilization increases +12.95%. At the sector level, the non-depositary sector produces a higher asset utilization ratio when compared to the other sectors. This can be attributed primarily due to their lack of asset diversification. The cooperative sector shows to be more efficient than the depositary sector during most of the series. However, this pattern converges in the latter part, specifically 2017-2019. Regression results show that asset utilization is negatively impacted by the size factor within the depositary and non-depositary sectors. The non-depositary sector, however, has shown to be more efficient as it becomes more concentrated.

Lastly, when considering whether concentration has provided market power to the industry, in Section 2.3: Evidence of Performance and Efficiency of Chapter 2, the research thoroughly examines Lerner Index trends at the industry and sector levels. The series presents high volatility at the industry level ranging from -6.46% to +33.99%. And consistently with patterns observed in the previous series, its higher values are shown in the latter years, specifically 2017-2019, when concentration indexes were at their highest. Regression outputs present a positive relation between Lerner Index and size, specifically in the 2nd range. This factor is significantly present within the depositary sector via inter1 but appears to be a negative factor within the non-depositary sector. Indicating that size does provide market power advantages to the depositary sector. However, this effect is not present within the non-

depositary sector. When considering the impact of inter3 and inter4, concertation does show to be a contributing factor for the Lerner Index. For the depositary sector, inter3, it does so in the 2nd range. For the non-depositary sector, inter4 is present within the complete sample and the 1st and 2nd ranges.

The research has presented solid evidence to answer the three questions initially directed the investigation. First, concentration has benefited the industry with market power advantages, especially the depositary sector. It is also evident that disaster relief funds have benefitted the industry and, to a greater extent, the depositary sector. Finally, further studies should include observing the effects of deposit concentration on the cost of capital and its implications for competitiveness.

Appendix A

Variable	Definition	Source
Aggregated Variables	Are defined by the sum of all the values of all the institutions across the specific variable and totaled for each year.	OCIF, COSSECC, FDIC & Compustat.
Asset Utilization (FDIC)	Is defined as Total Income (FDIC) divided by Total Assets (asset), winsorized at 1% and 99% of annual value.	FDIC
Assets - Total (Compustat); AT	This item includes the sum of: Current Assets - Total (ACT) + Property, Plant and Equipment (Net) - Total (PPENT) + Investment & Advances - Equity (IVAEQ) + Investment & Advances - Other (IVAO) + Intangible Assets - Total (INTAN) + Assets - Other - Total (AO).	Compustat via WRDS
AssetUtil (OCIF)	Is defined as Total Income (OCIF) divided by Total Assets (OCIF), winsorized at 1% and 99% of annual value.	OCIF
Current Operating Earnings Before Income Tax (Compustat); COEIT	This item includes Total Current Operating Revenue Less Total Current Operating Expense; income before income taxes and securities transactions.	Compustat via WRDS
Deposits - Total (Compustat); DPTC	This item includes the sum of: Deposits - Demand - Customer (DPDC) + Deposits - Savings - Customer (DPSC) + Deposits - Time - Customer (DPTIC).	Compustat via WRDS
Deposits-to-Liabilities Ratio (FDIC)	Is defined by Total Deposits (dep) divided by Total Liabilities (liab) winsorized at 1% and 99% of annual value.	FDIC
Expense Distribution (OCIF)	Reports on the sum of interest expense (RIPR0409), provisions for loan and lease losses (RIPR0411) and salaries (RIPR0413) and employee benefits (RIPR0414).	OCIF

Variable	Definition	Source
Herfindahl-Hirschman Index (HHI)	The HHI, serves as proxy for number of institutions and market concentration. It does so by accounting for the market share of all participating firms, squaring the market share and adding them. It was created for total income, total assets, total loans and total deposits and the equivalent variables across the different data sets.	OCIF, COSSECC, FDIC & Compustat.
InsPY	Number of institutions per year in data set.	OCIF, COSSECC, FDIC & Compustat.
inter1	Interaction variable #1, measures interaction between depositary institutions and Total Assets within the industry file.	OCIF
inter2	Interaction variable #2, measures interaction between non-depositary institutions and Total Assets within the industry file.	OCIF
inter3	Interaction variable #3, measures interaction between Herfindahl-Hirschman Index (HHI) and depositary institutions, within the industry file.	OCIF
inter4	Interaction variable #4, measures interaction between Herfindahl-Hirschman Index (HHI) and non-depositary institutions, within the industry file.	OCIF
Lerner (FDIC)	Is defined as Pre-Tax Net Operating Income (idpretx) divided by Total Income (FDIC), winsorized at 1% and 99% of annual value.	FDIC
Lerner (OCIF)	Is defined as Net Income Before Tax (OCIF) divided by Total Income (OCIF), winsorized at 1% and 99% of annual value.	OCIF

Variable	Definition	Source
Loans - Net of Total Allowance for Loan Losses (Compustat); LNTAL	This item includes the sum of: Commercial or industrial loans + Foreign loans + Loans to financial institutions + Loans to individuals for household, family, and other consumer expenditures + Loans for purchasing or carrying securities + Other loans + Total real estate loans.	Compustat via WRDS
Loans and Leases (FDIC); lnlsnet	Total loans and lease financing receivables, net of unearned income.	FDIC
Loans-to-Assets Ratio (FDIC)	Is defined by loans and lease financing receivables, net of unearned income (lnlsnet) divided by Total Assets (asset), winsorized at 1% and 99% of annual value.	FDIC
Net Income Before Tax (NIBT)	Reports the bank pretax operating income.	OCIF (RIPR0416)
Net Interest Income (Compustat); NIINT	This item includes total interest and dividends received from earning assets less total interest paid for use of debt and deposit accounts. It is the sum of: This item is Interest and Dividend Income - Total less Interest Expense - Total.	Compustat via WRDS
Net Interest Income (NII)	Total interest income (RIPR0406) less interest expense (RIPR0409).	OCIF (RIPR0410)
Pre-Tax Net Operating Income (idpretx)	Net income (loss) before income taxes and extraordinary items and other adjustments minus gains (losses) on securities not held in trading accounts.	FDIC
ROA (FDIC)	Is defined as Pre-Tax Net Operating Income (idpretx) divided by Total Assets (asset), winsorized at 1% and 99% of annual value.	FDIC

Variable	Definition	Source
ROE (FDIC)	Is defined as Pre-Tax Net Operating Income (idpretx) divided by Total Equity Capital (eqtot) on a consolidated basis note: 1) beginning March 2009, includes the non-controlling (minority) interests in consolidated subsidiaries for CALL report and TFR filers.), winsorized at 1% and 99% of annual value.	FDIC
ROE (OCIF)	Is defined as Net Income Before Tax (OCIF) divided by Total Equity/Capital (RCPR1433), winsorized at 1% and 99% of annual value.	OCIF
Stockholders Equity - Parent (Compustat); SEQ	This item includes Capital surplus + Common/Ordinary Stock (Capital) + Nonredeemable preferred stock + Redeemable preferred stock + Retained earnings + Treasury Stock - Total Dollar Amount (reduces Stockholder's Equity).	Compustat via WRDS
Total Assets (FDIC); asset	The sum of all assets owned by the institution including cash, loans, securities, bank premises and other assets. This total does not include off-balance-sheet accounts.	FDIC
Total Assets (OCIF); totalasset	Reports on the sum of total current assets, securities, fixed assets, other real estate owned, mortgage servicing rights, personal property (for lease) and all other assets.	OCIF (RCPR1419)
Total Current Operating Revenue (Compustat); TCOR	This item includes the sum of current operating revenue + loan and investment income.	Compustat via WRDS
Total Deposits (FDIC); dep	The sum of all deposits including demand deposits, money market deposits, other savings deposits, time deposits and deposits in foreign offices.	FDIC
Total Deposits (OCIF)	To guarantee loans and leases.	OCIF (RCPR1435)

| Variable	Definition	Source
Total Income (FDIC)	Is defined as the sum of Total Interest Income (intinc), sum of income on loans and leases, plus investment income, interest on interest bearing bank balances, interest on federal funds sold and interest on trading account assets earned by the institution and Total Noninterest Income (nonii), Income from fiduciary activities, plus service charges on deposit accounts in domestic offices, plus trading gains (losses) and fees from foreign exchange transactions, plus other foreign transaction gains (losses), plus other gains (losses) and fees from trading assets and liabilities.	FDIC
Total Income (OCIF)	Reports sum of total interest income (RIPR0406) and total non-interest income (RIPR4079).	OCIF
Total Liabilities (FDIC); liab	Deposits and other borrowings, subordinated notes and debentures, limited-life preferred stock and related surplus, trading account liabilities and mortgage indebtedness.	FDIC
Total Liabilities (OCIF)	Reports on the sum of account payables and accrued liabilities, loans payable, total deposits, mortgage payable (current) and other accounts payable.	OCIF (RCPR1426)

Figure 2: Sector Trends for Aggregated Total Assets and Aggregated Total Deposits – Puerto Rico's Depository Institutions 1983-2019.
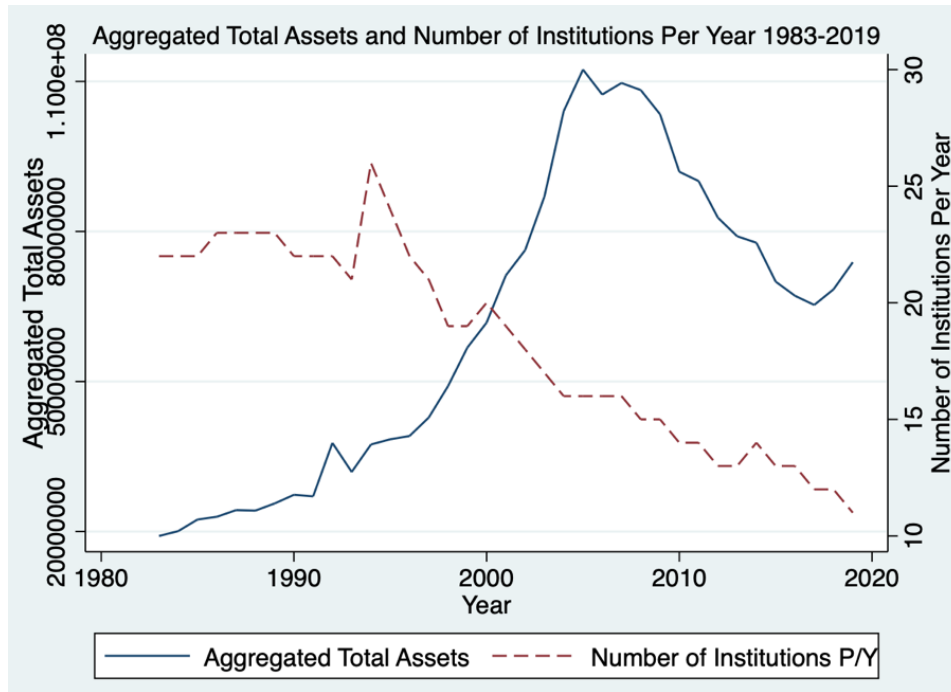
This figure shows yearly aggregated time series data highlighting depository institutions sector trends for institutions per year, assets, deposits, and Herfindahl-Hirschman Index (HHI). Data provided by the Office of the Commissioner of Financial Institutions of the Puerto Rico Government (OCIF).

Panel A illustrates HHI for assets of depository institutions for the years 1983-2019. Panel B shows the total assets for depository institutions aggregated per year and the number of depository institutions per year. Panel C depicts both the aggregate for total assets and total deposits for depository institutions per year. Panel D shows the median and mean of the total assets of depository institutions. Panel E compares the median and mean of total deposits of depository institutions.
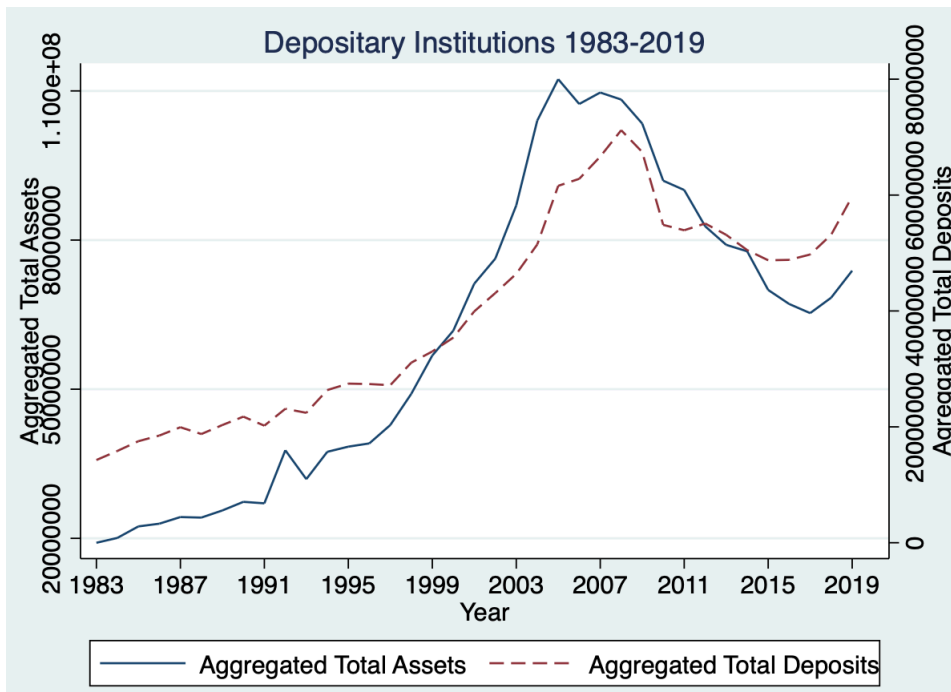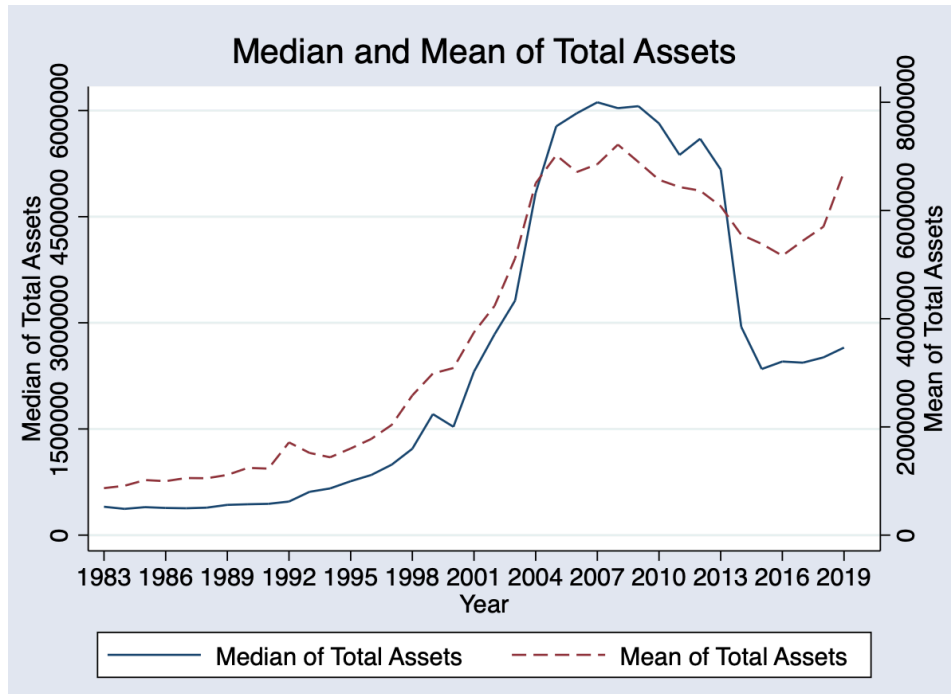
Panel A: Asset-Based HHI.
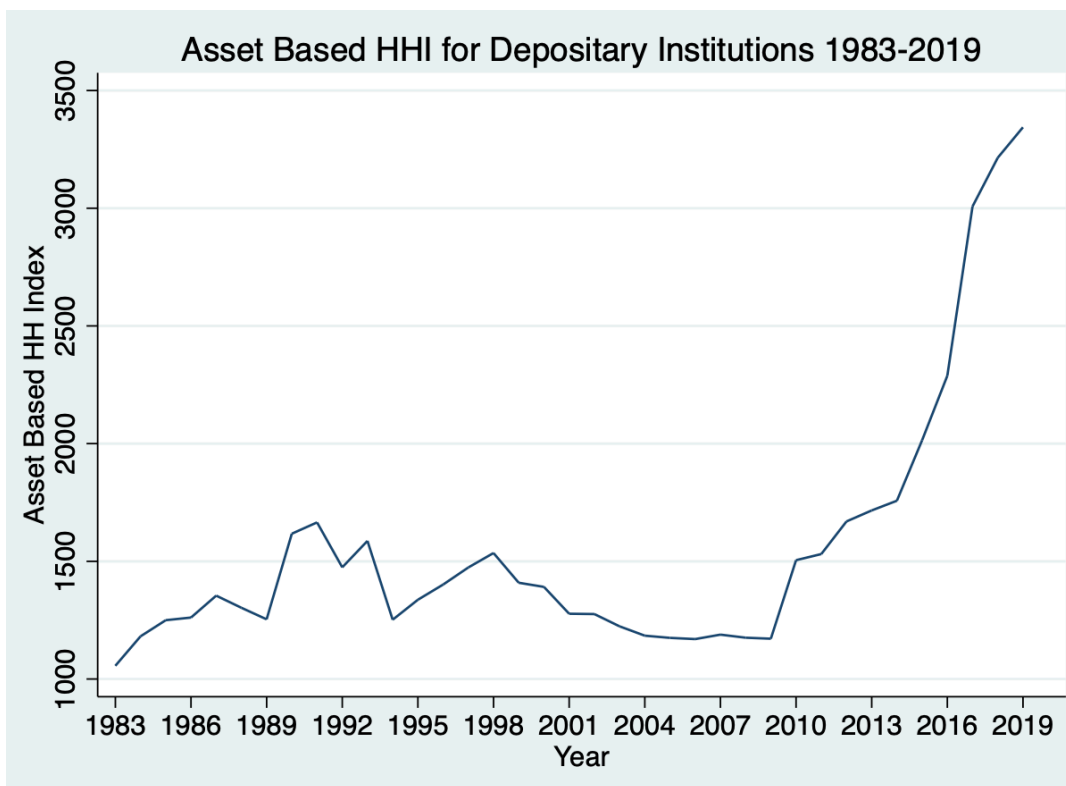
Panel B: Aggregated Total Assets and Number of Institutions Per Year.

Panel C: Aggregated Total Assets and Total Deposits.

Panel D: Median and Mean of Total Assets.

Median and Mean of Total Assets

Panel E: Median and Mean of Total Deposits.
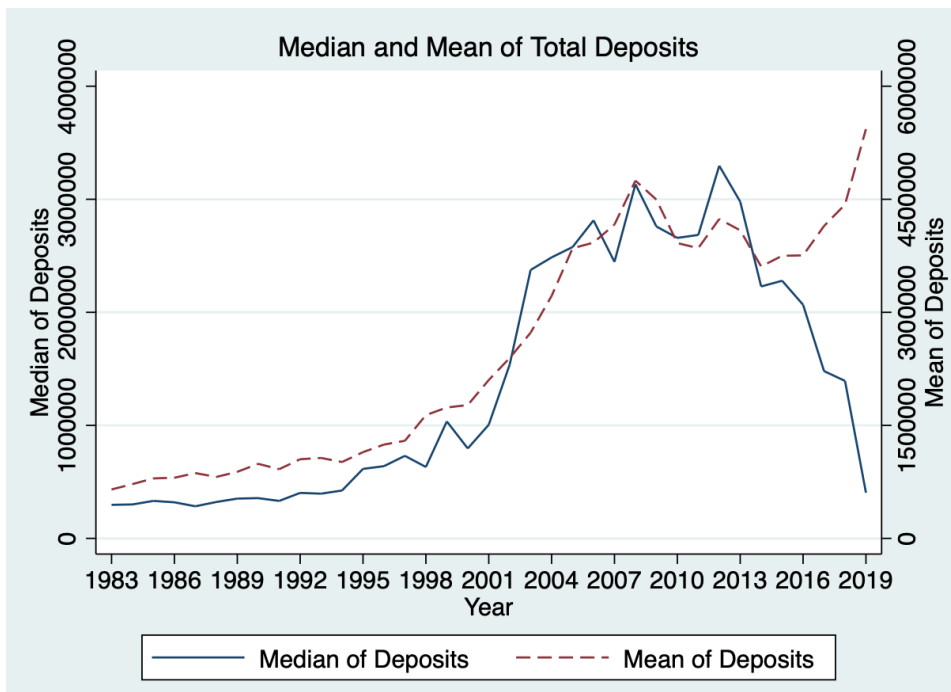

Median and Mean of Total Deposits

Figure 3: Puerto Rico's Financial Industry Trends for Aggregated Variables: 2004-2019.

This figure shows yearly aggregated time series data highlighting industry trends for institution count per year, total assets, market share, total deposits, Herfindahl-Hirschman Index (HHI) of income, assets, and deposits, total income, expense distribution, net income before income tax, net interest income, return on assets, and return on equity. The Puerto Rico financial industry comprises primarily depositary, non-depositary, and cooperative banking institutions. Data was provided by the Office of the Commissioner of Financial Institutions of the Puerto Rico Government (OCIF) and by the Public Corporation for Supervision and Assurance for Cooperatives in Puerto Rico (COSSEC).

Panel A highlights Puerto Rico's institution count per sector per year. Panel B presents the industry institution count and sector market share. Panel C illustrates H.H. Index for industry and sectors per year. Panel D shows aggregated industry figures for both total assets and deposits. Panel E highlights aggregated industry figures for total income and expense distribution. Expense distribution comprises interest expenses, salaries and employee benefits, and expenses for loan and loss provisions. Panel F depicts aggregated industry figures for net interest income and net income before taxes (NIBT). Panel G shows industry and sector figures for the aggregate return on assets. Panel H highlights industry and sector figures for the aggregate of the Lerner index. Panel I showcase industry and sector figures for asset utilization. Panel J presents industry and sector figures for the loan-to-asset ratio. Panel K exhibits industry and sector figures for equity to total asset ratio.

Panel A: Industry Figures Institution Count Per Year.
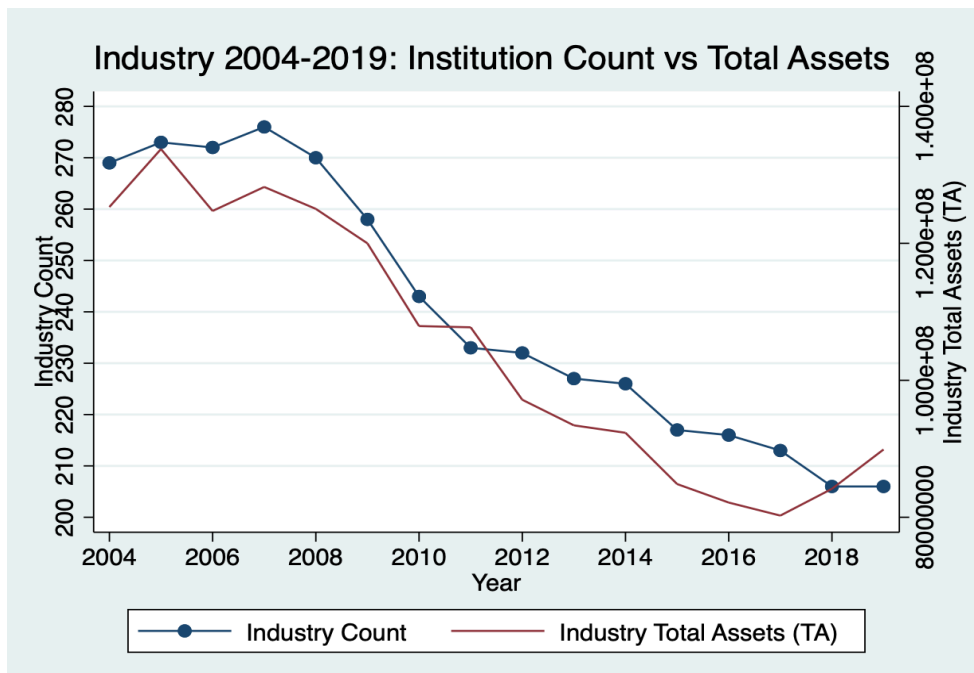
Panel B: Sector Market Share and Industry Institution Count Per Year.
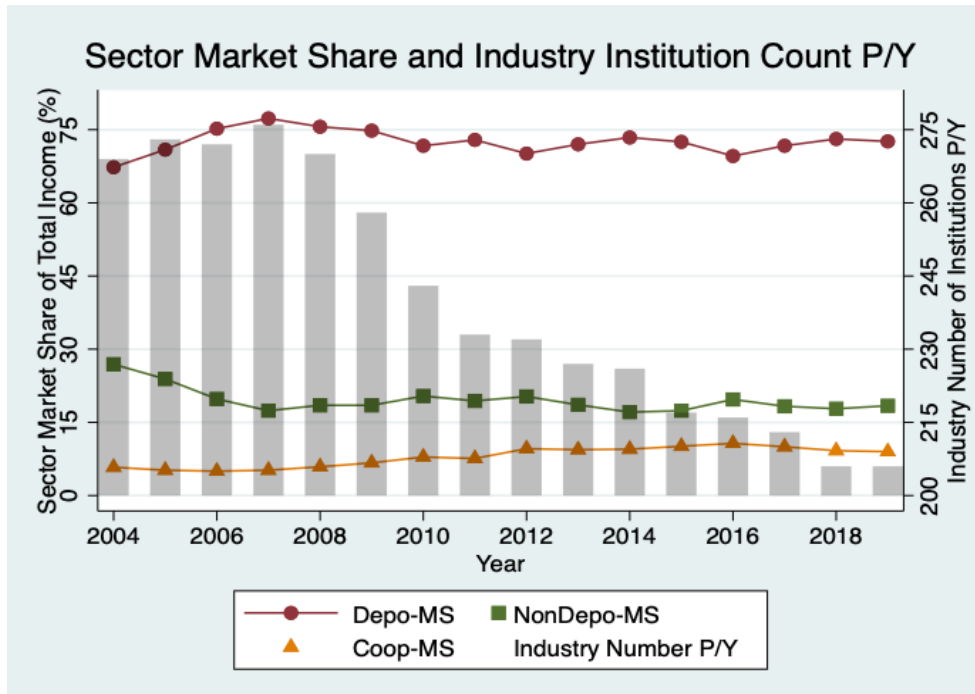
Panel C: Industry Figures for Aggregated Total Assets & Deposits.
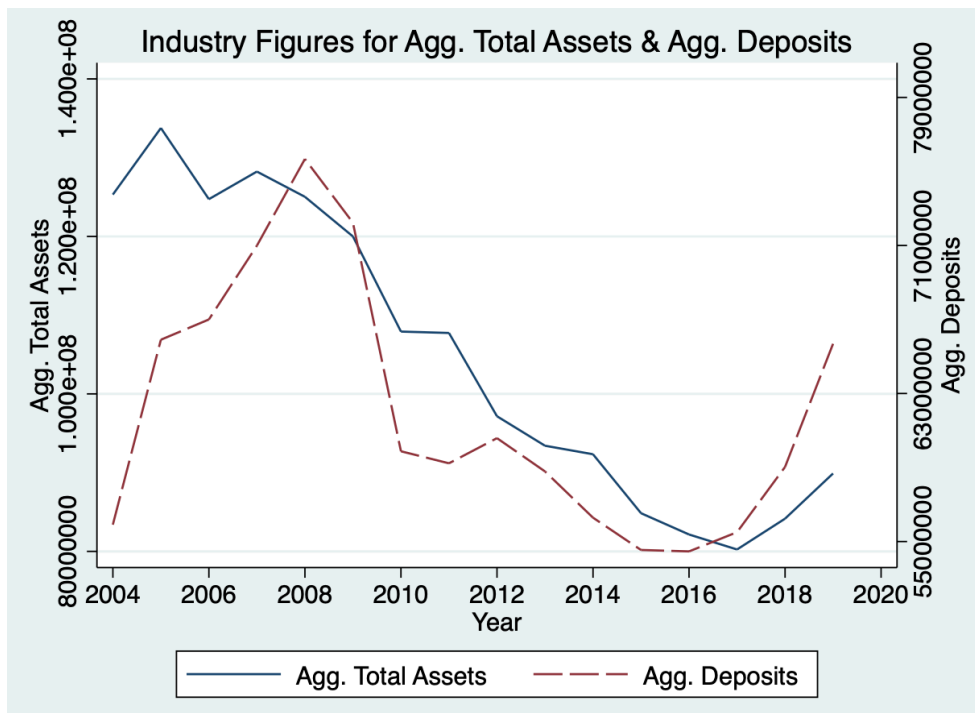
Panel D: Industry Figures for HHI on Total Income and Total Assets.
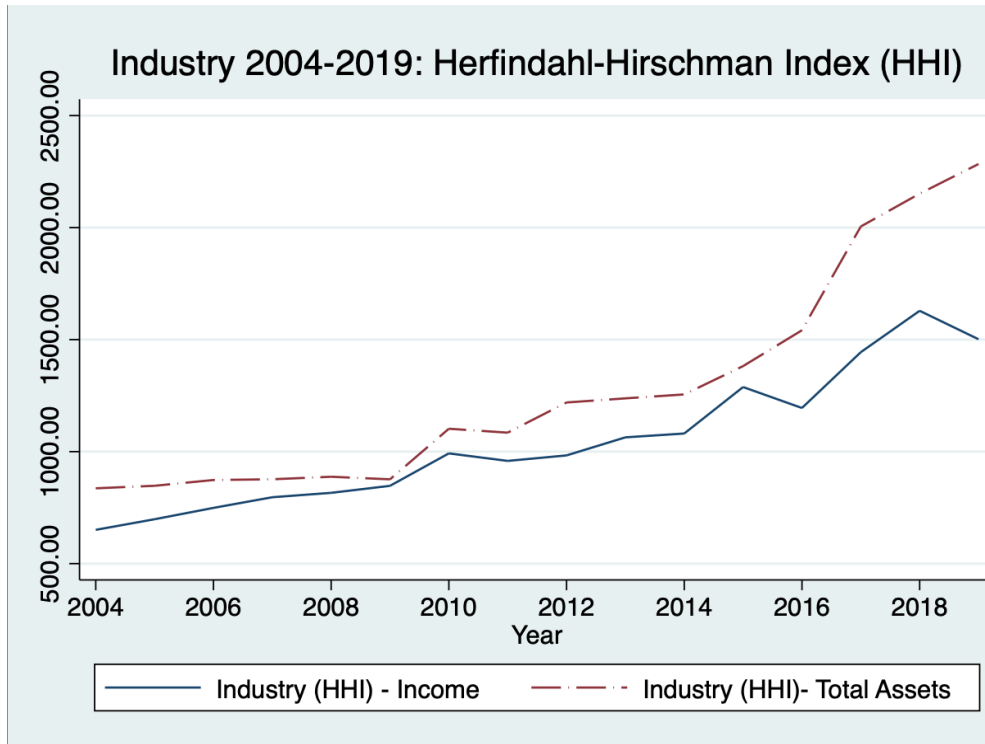
Panel E: Industry Figures for HHI of Total Assets vs Industry Total Assets.
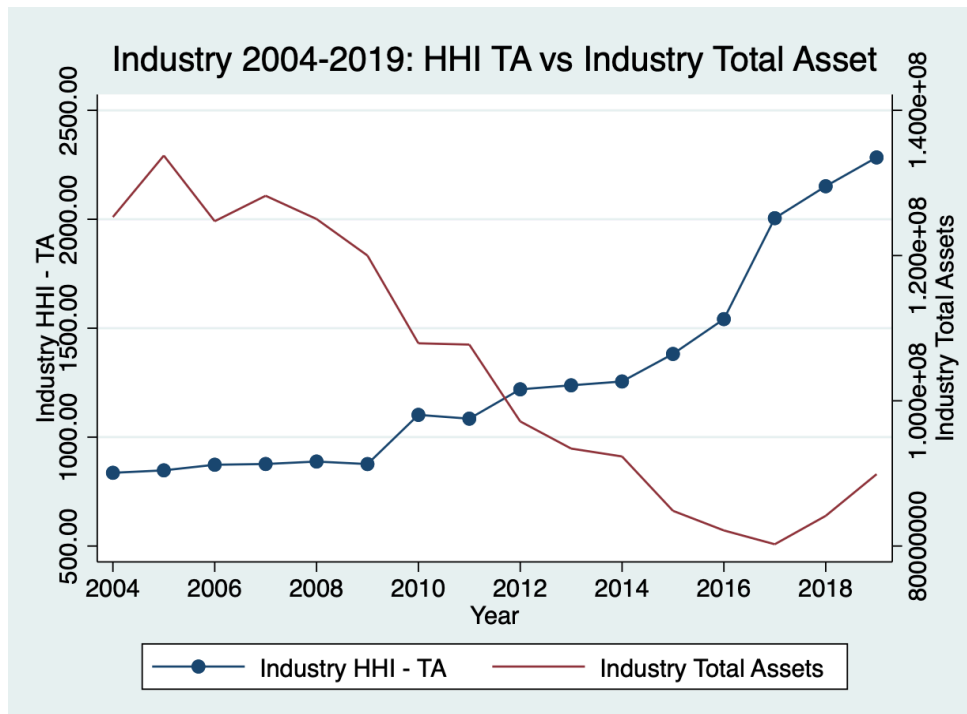
Panel F: Industry Figures for HHI of Deposits vs Total Deposits.

Industry 2004-2019: HHI Deposits vs. Total Deposits
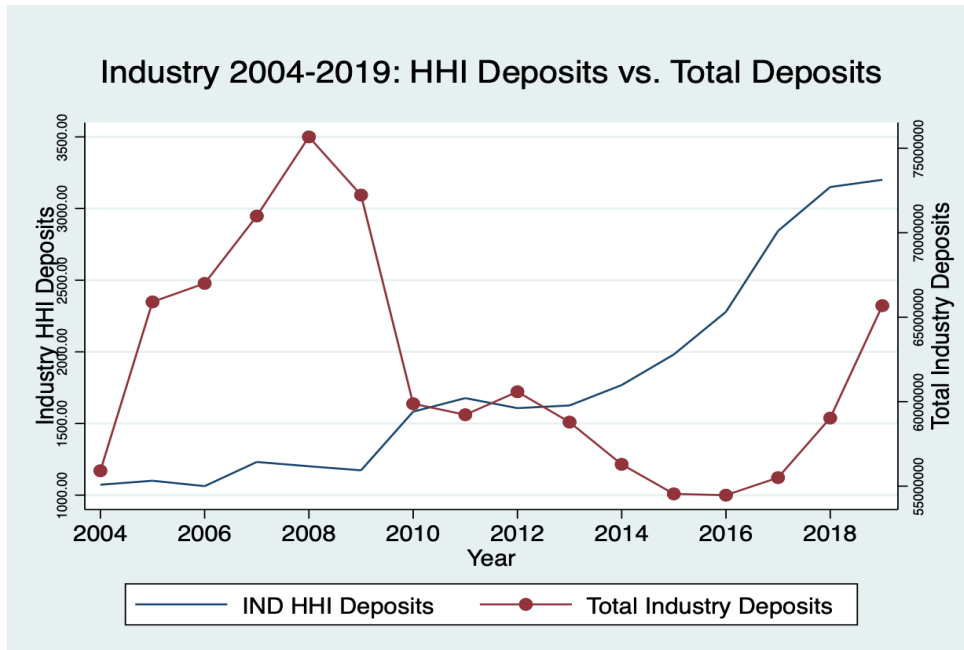
Panel G: Industry Figures for HHI of Deposits for Depositary and Cooperative Institutions.

Industry 2004-2019: Deposits HHI Depositary vs Cooperative Inst.
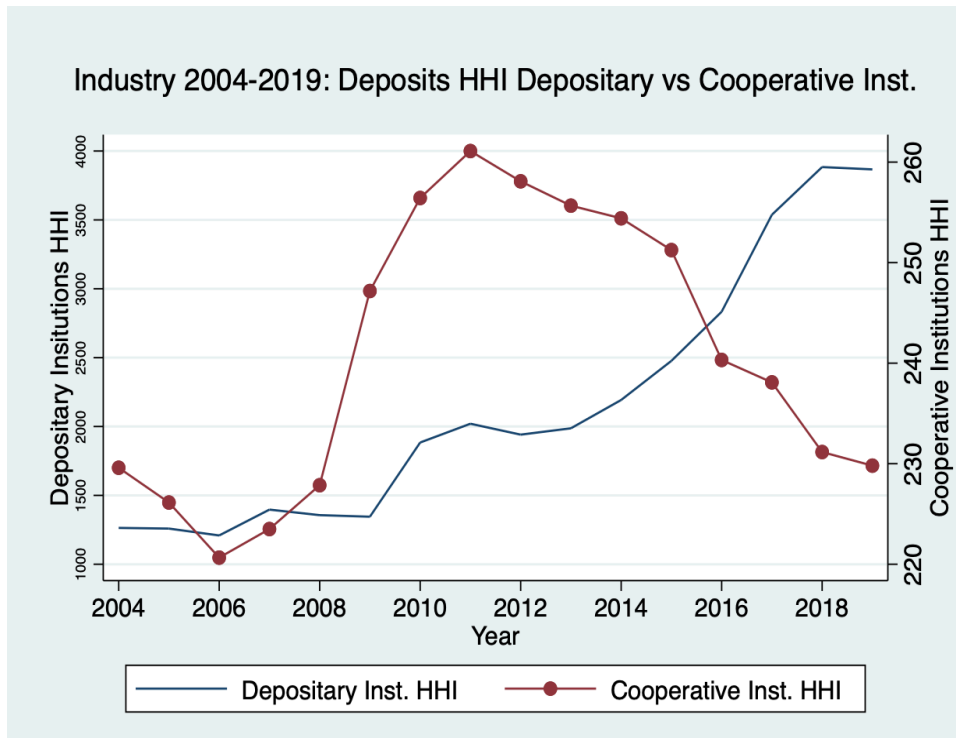
Panel H: Industry Figures for Total Income & Expense Distribution.
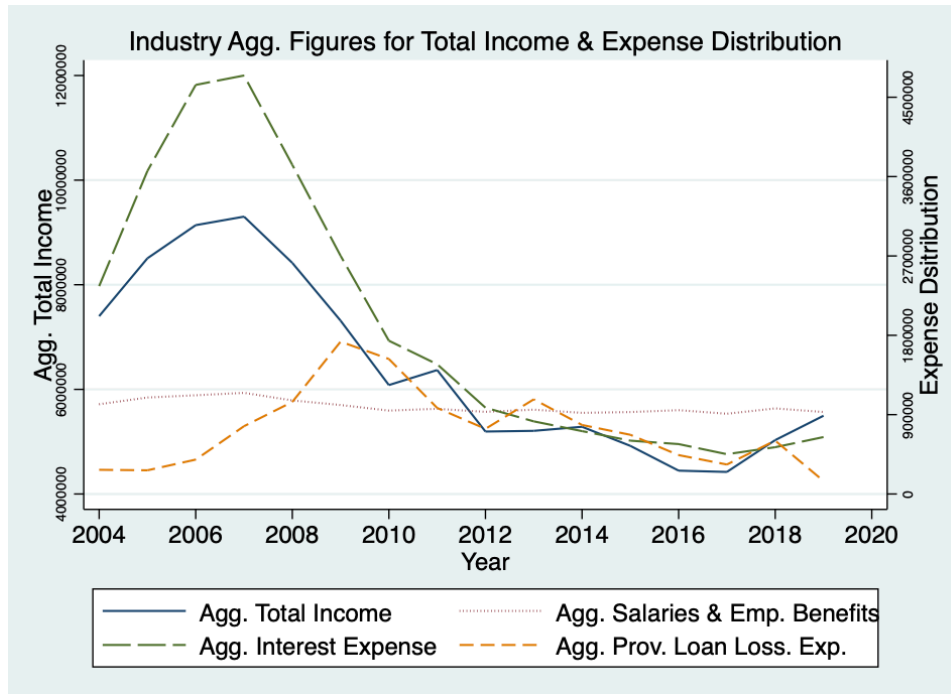
Panel I: Industry Figures for Agg. Net Interest Income & Net Income Before Tax (NIBT).
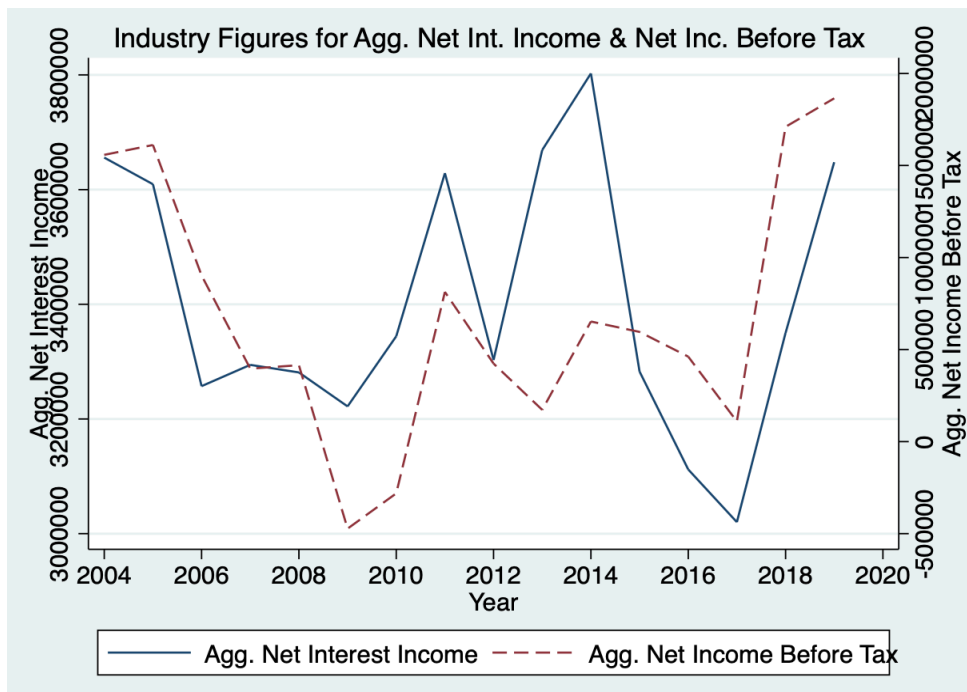
Panel J: Industry Figures Net Income Before Tax vs. Fed Funds Rates.
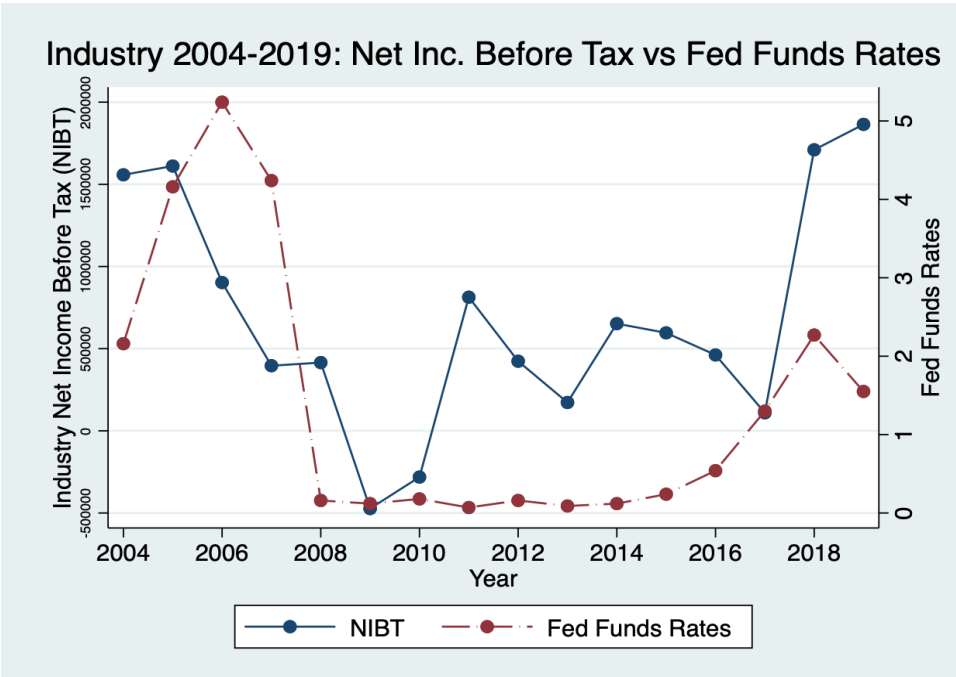
Panel K: Industry Figures for Return on Assets (ROA) vs. Fed Funds Rates.
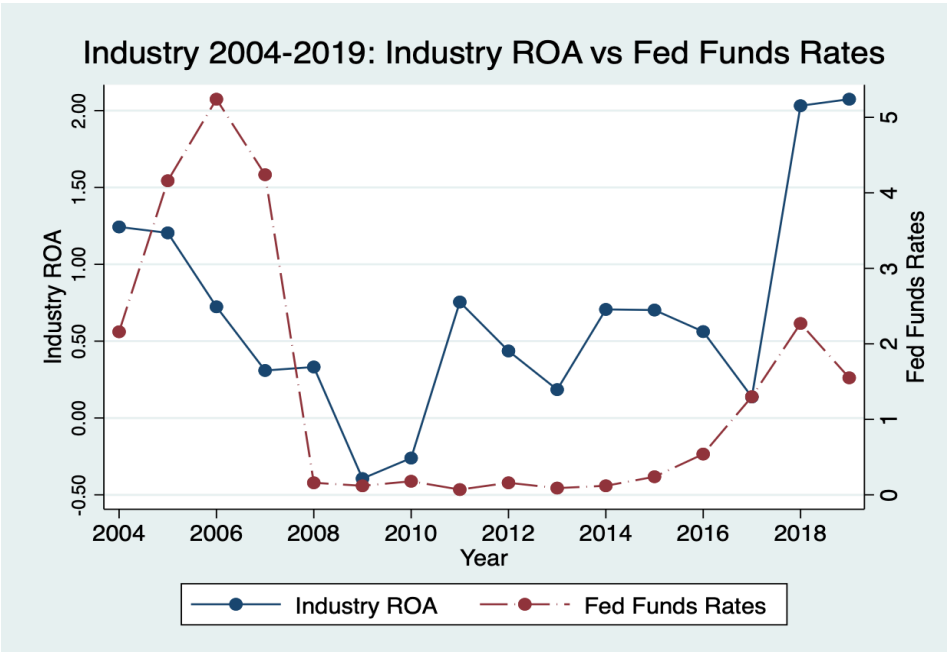
Panel L: Industry Figures for Lerner Index vs Asset Utilization.

Industry 2004-2019: Lerner Index vs Asset Utilization
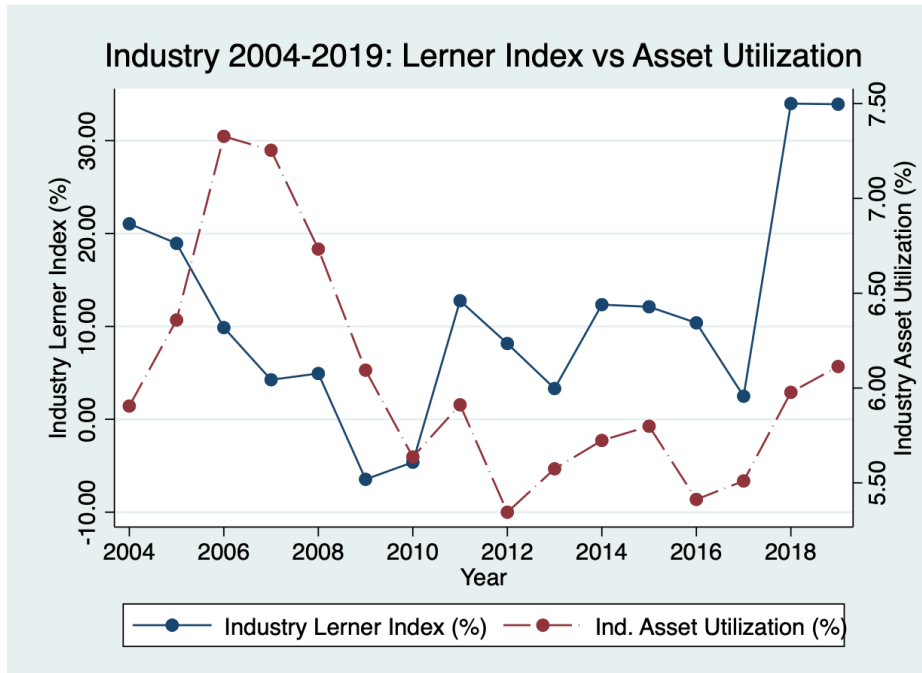
Panel M: Industry and Sector Figures for Loan to Asset Ratio.

Loan to Asset Ratio (L2A) Industry and Sectors
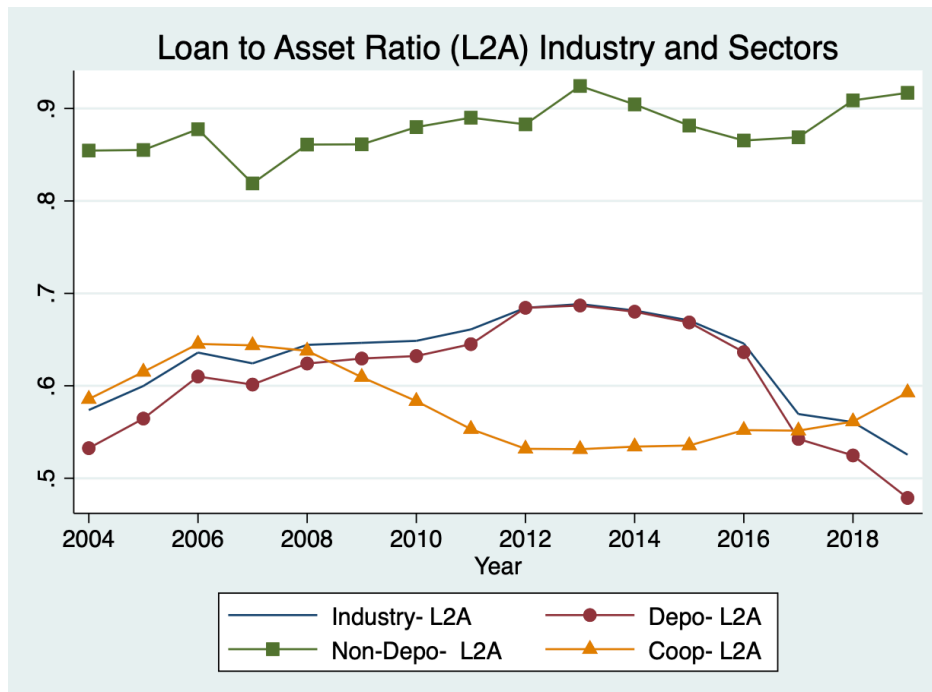
Figure 4: Sector Trends for Aggregated Variables for Depository Institutions 2004-2019: Comparison Between OCIF and FDIC Data – Puerto Rico's Depository Institutions.

This figure shows a comparison of data from OCIF and FDIC. It highlights yearly aggregated time series data for depository institutions sector trends for; institution count, Herfindahl-Hirschman Index (HHI) for total income, total assets and total deposits, total income, total assets, total deposits, and net income before income tax. Data was provided by the Office of the Commissioner of Financial Institutions of the Puerto Rico Government (OCIF) and obtained from the Federal Deposit Insurance Corporation (FDIC) data bank.

Panel A illustrates Puerto Rico's number of institutions per year according to OCIF and FDIC data. Panels B, C, and D highlight HHI for income, total assets, and total deposits of depository institutions for 2004-2019. Panel E shows aggregated total income for the depository sector. Panel F depicts sector figures for aggregated total assets. Panel G shows sector figures for aggregated total deposits. Finally, panel H displays sector figures for aggregated net income before tax.

Panel A: Puerto Rico's Depository Institution Count Per Year: OCIF vs. FDIC data.
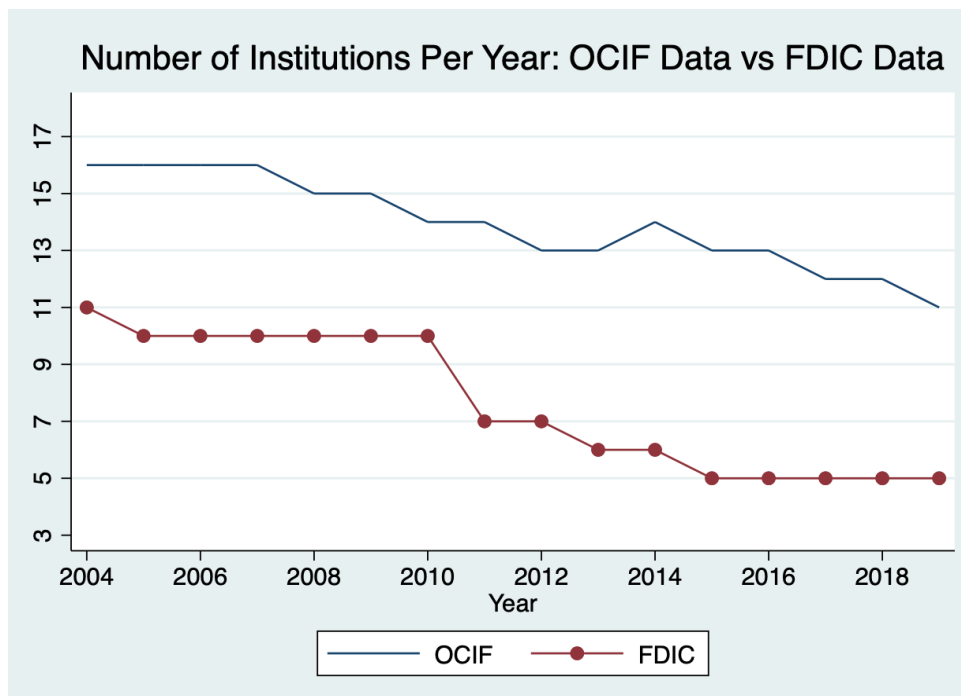
Panel B: Sector Figures for Herfindahl-Hirschman Index (HHI) of Total Income: OCIF vs FDIC data.
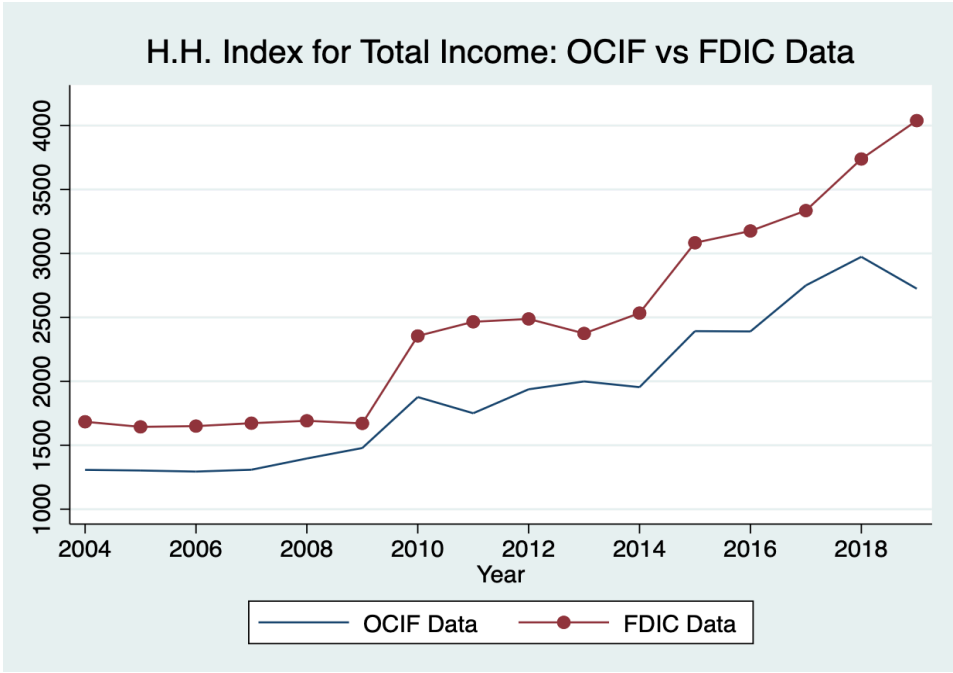
H.H. Index for Total Income: OCIF vs FDIC Data

Panel C: Sector Figures for Herfindahl-Hirschman Index (HHI) of Total Assets: OCIF vs FDIC data.

H.H. Index of Total Assets: OCIF vs FDIC Data
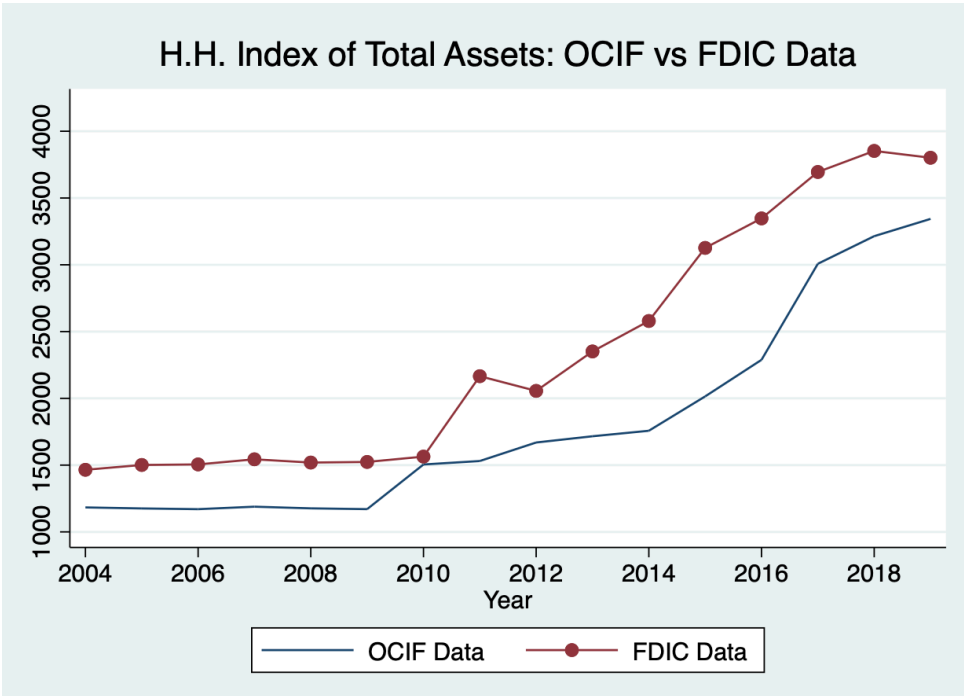
Panel D: Sector Figures for Herfindahl-Hirschman Index (HHI) of Total Deposits: OCIF vs. FDIC data.

H.H. Index of Total Deposits: OCIF vs FDIC Data

Panel E: Sector Figures for Aggregated Total Income: OCIF vs. FDIC data.
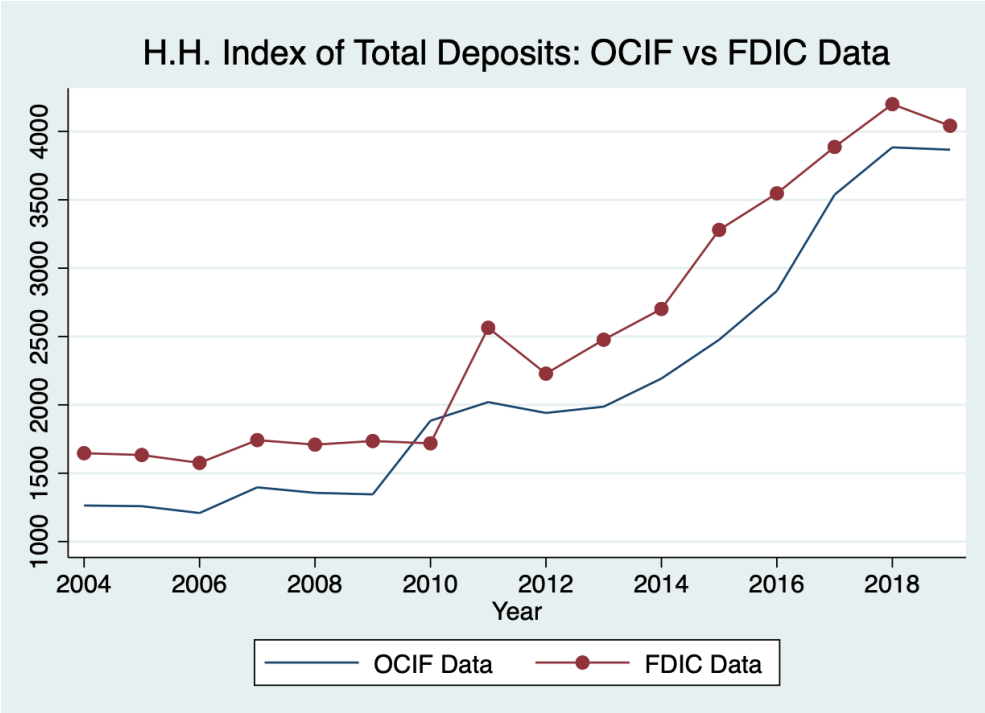
Aggregate of Total Income: OCIF vs FDIC Data

Panel F: Sector Figures for Aggregated Total Assets: OCIF vs FDIC data.
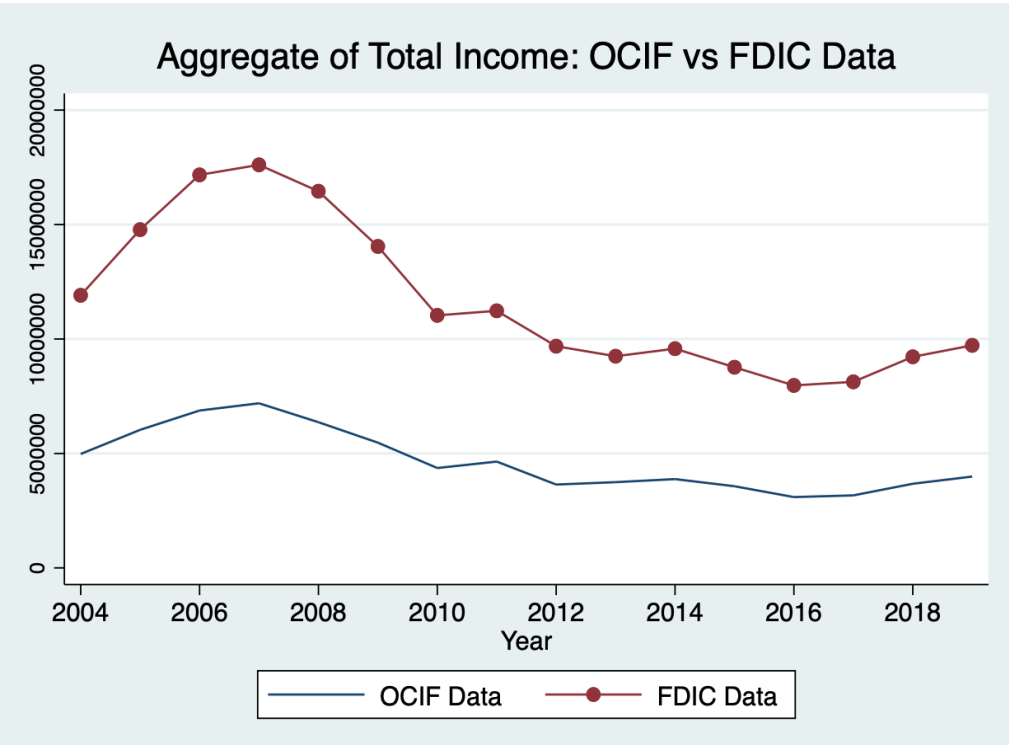
Aggregate of Total Assets: OCIF vs FDIC Data

Panel G: Sector Figures for Aggregated Total Deposits: OCIF vs FDIC data.
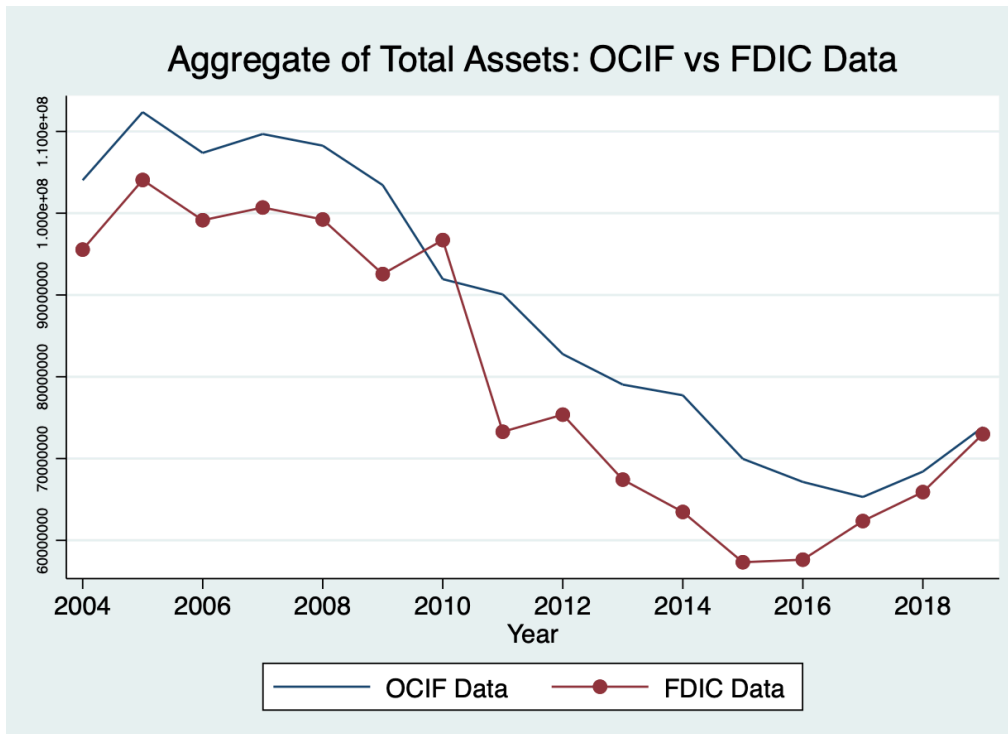
Aggregate of Deposits: OCIF vs FDIC Data

Panel H: Sector Figures for Aggregated Net Income Before Tax: OCIF vs. FDIC data.
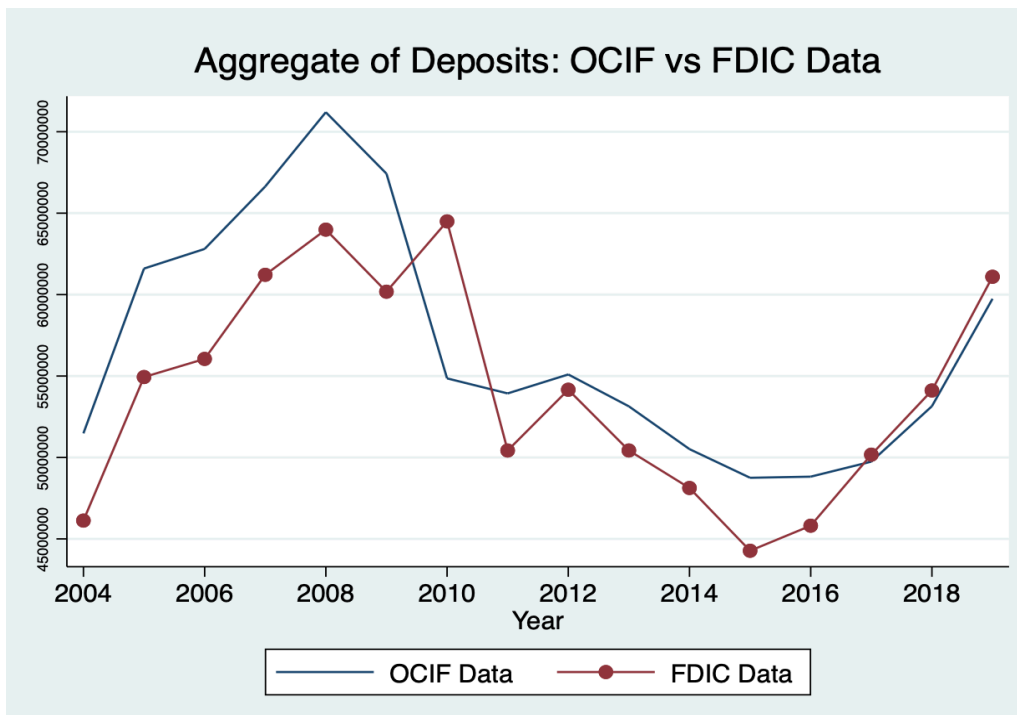
Aggregate of Net Income Before Tax: OCIF vs FDIC Data
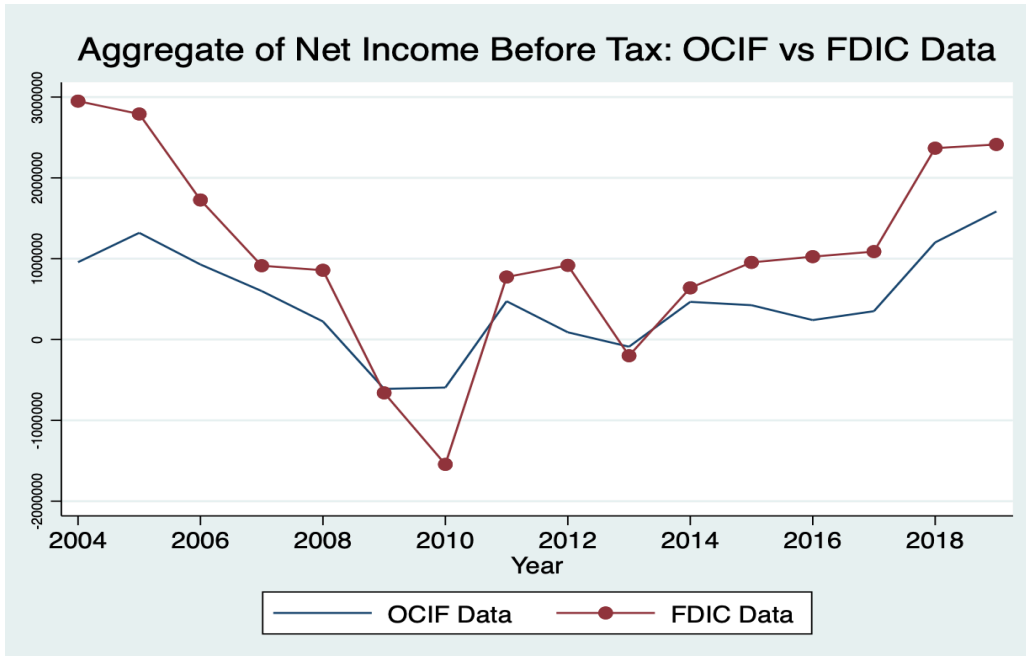
Figure 5: Sector Trends for Aggregated Variables – Puerto Rico's Depositary, Non-Depositary, and Cooperative Banking Institutions for 2004-2019.

This figure shows yearly aggregated time series data highlighting depositary, non-depositary, and cooperative banking institutions sector trends for institution count, Herfindahl-Hirschman Index (HHI) for income and total assets, loans to total assets, return on assets, Lerner Index, asset utilization, interest expense to total deposits and market share of total assets, net income before tax and total deposits. Data provided by the Office of the Commissioner of Financial Institutions of the Puerto Rico Government (OCIF) ranges from 2004-2019. The data provided by the Public Corporation for Supervision and Assurance for Cooperatives in Puerto Rico (COSSEC) ranges from 2004-2019.

Panel A depicts the number of institutions for each sector per year. Panel B illustrates the Herfindahl-Hirschman Index (HHI) of annual income per sector. Panel C represents the Herfindahl-Hirschman Index (HHI) of total assets per sector per year. Panel D shows sector figures for loans to total assets per year. Panel E yearly aggregated return on assets (ROA) for each sector; ROA is defined as net income before income tax scaled by total assets. Panel F compares yearly aggregated values for Lerner Index for each sector; Lerner Index is defined as net income before income tax scaled by total income. Panel G compares the yearly aggregate values for asset utilization; asset utilization is defined as total income scaled by total assets. Panel H presents sector figures for interest expense to deposits spread.   Panel I offers sector figures for the interest expense ratio to total yearly deposits. Panel J highlights sector figures for a market share of total assets per year. Panel K provides sector figures for the market share of net income before taxes. Finally, panel L emphasizes sector figures for the market share of deposits.

Panel A: Number of Institutions Per Sector Per Year.
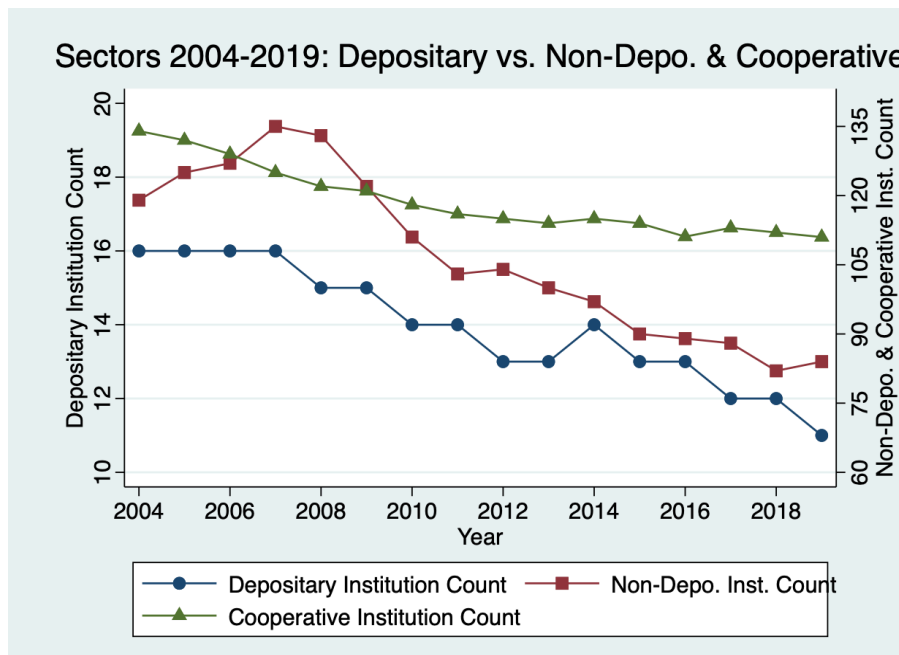
Panel B: Sector Figures for Hirschman Index (HHI) of Income Per Year.
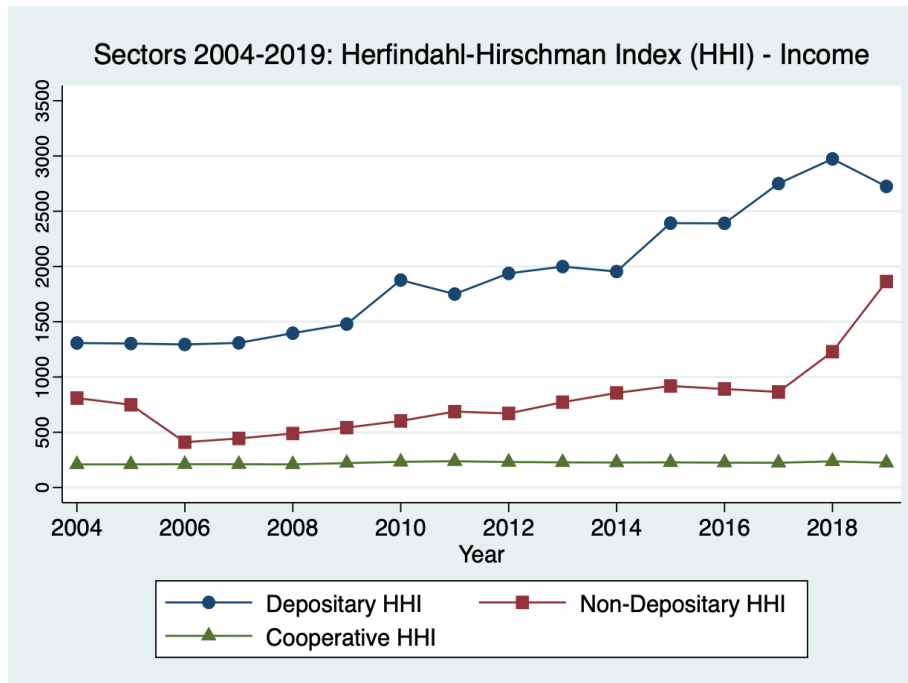
Sectors 2004-2019: Herfindahl-Hirschman Index (HHI) - Income

Panel C: Sector Figures for Hirschman Index (HHI) of Total Assets Per Year.

Sectors 2004-2019: Herfindahl-Hirschman index (HHI) - Total Assets

Panel D: Sector Figures for Loans to Total Assets Per Year.
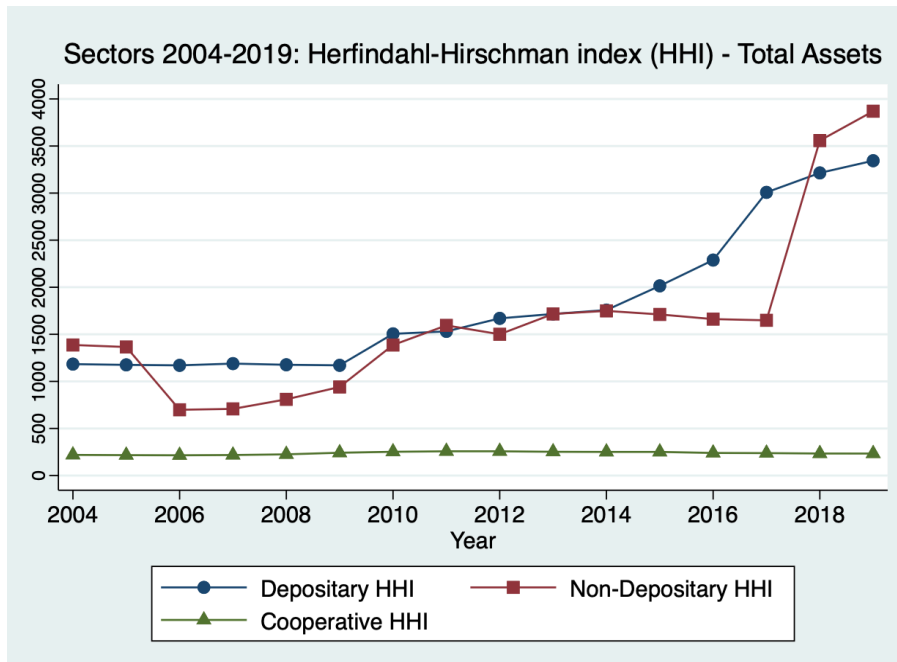
Sectors 2004-2019: Loans-to-Total Assets (%)
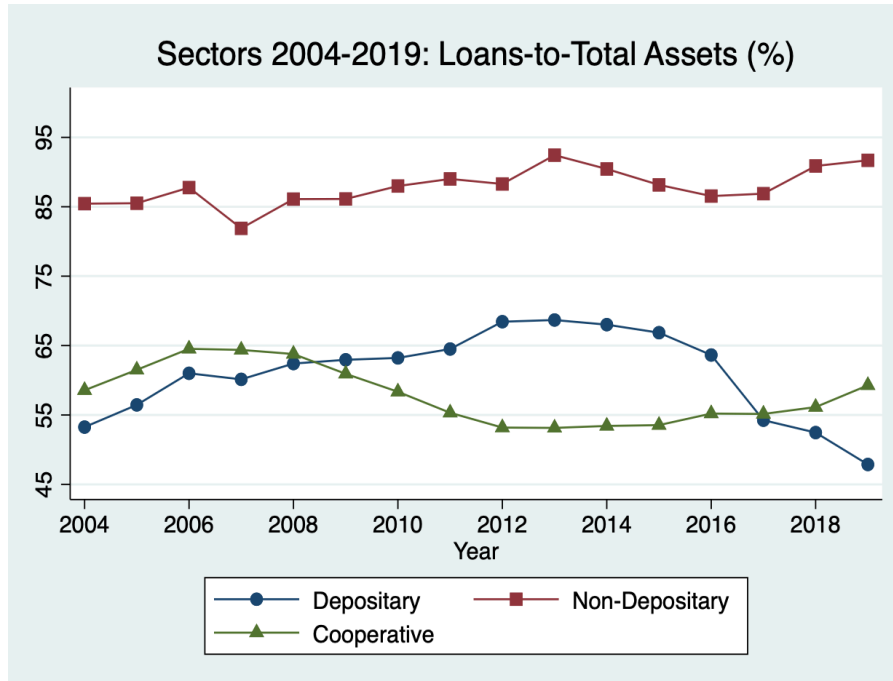
Panel E: Sector Figures for Return on Assets (ROA) Per Year.

Sectors 2004-2019: Return on Assets (ROA%)
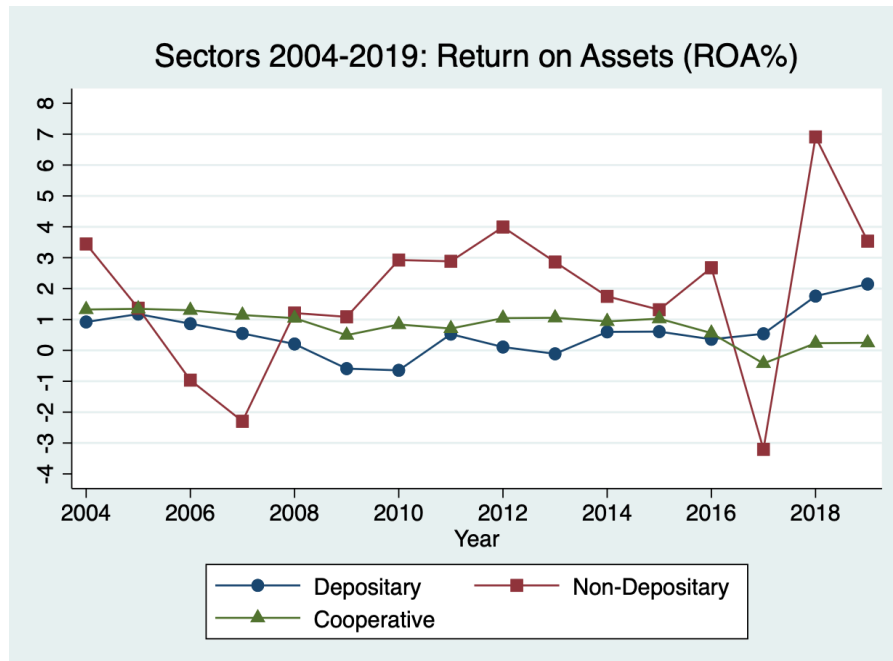
Panel F: Sector Figures for Lerner Index Per Year.

Sectors 2004-2019: Lerner Index (%)
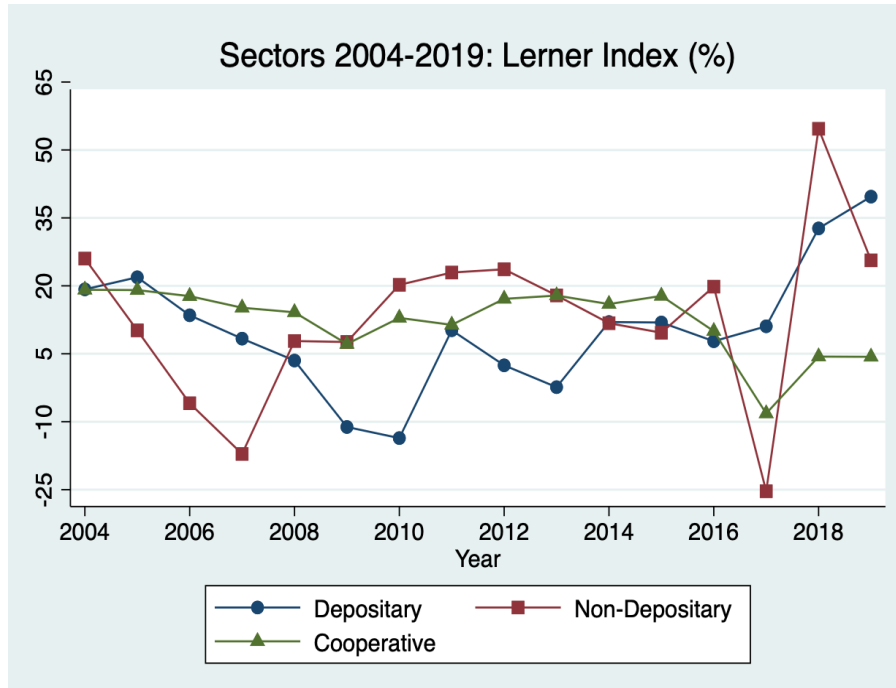
Panel G: Sector Figures for Asset Utilization Per Year.
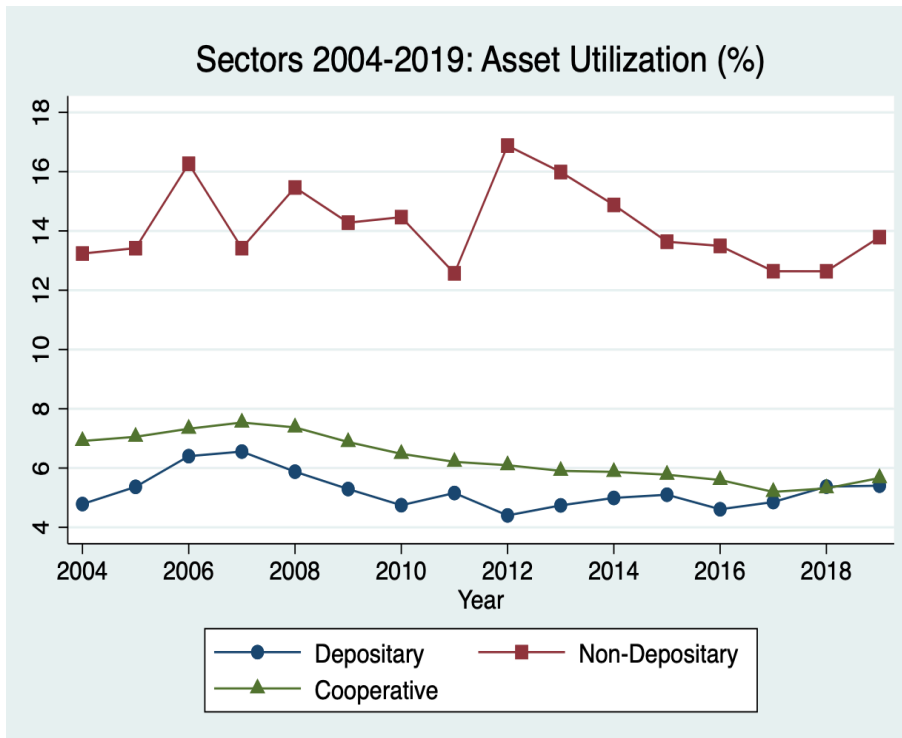
Sectors 2004-2019: Asset Utilization (%)

Panel H: Sector Figures for Interest Expense to Deposits Spread: Depositary vs. Cooperative Institutions Per Year.

Interest Expense-to-Deposits Spread: Depositary vs. Coop. Institutions
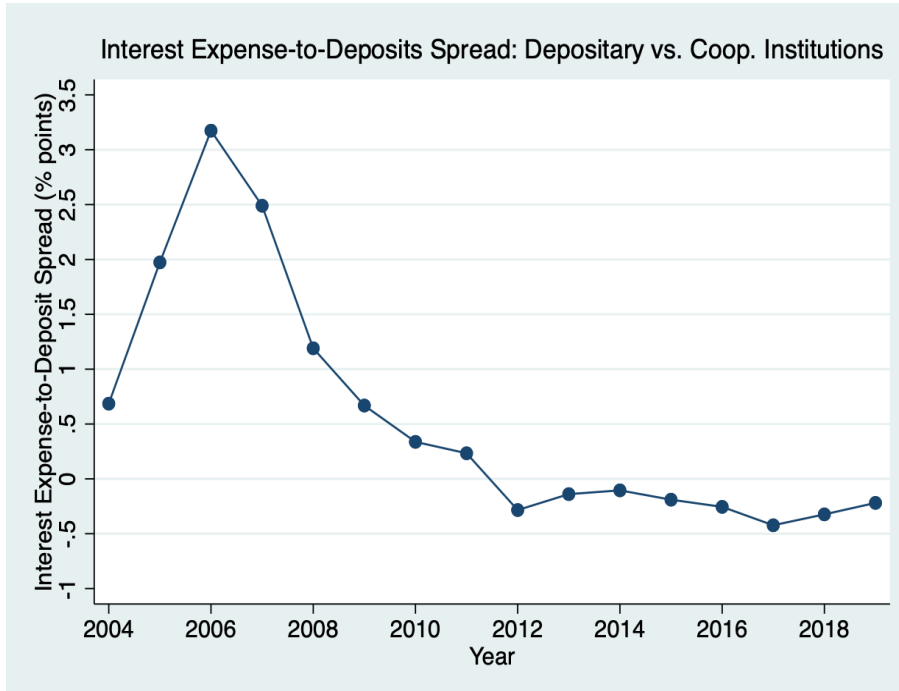
Panel I: Sector Figures for Interest Expense to Total Deposits.

Sectors 2004-2019: Interest Expense-to-Total Deposits (%)
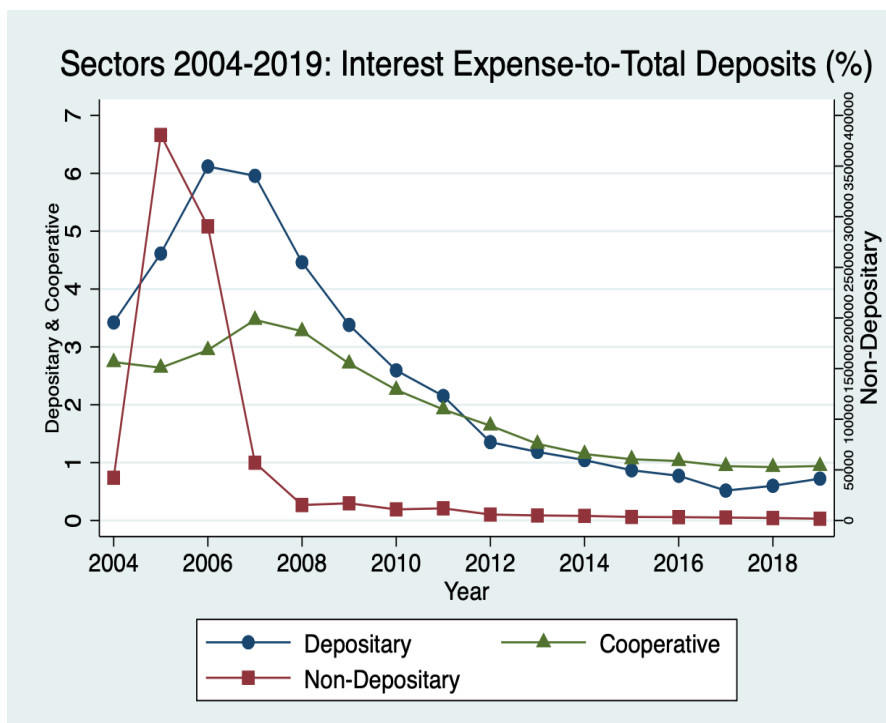
Panel J: Sector Figures for Market Share of Total Assets.

Sectors 2004-2019: Market Share of Total Assets
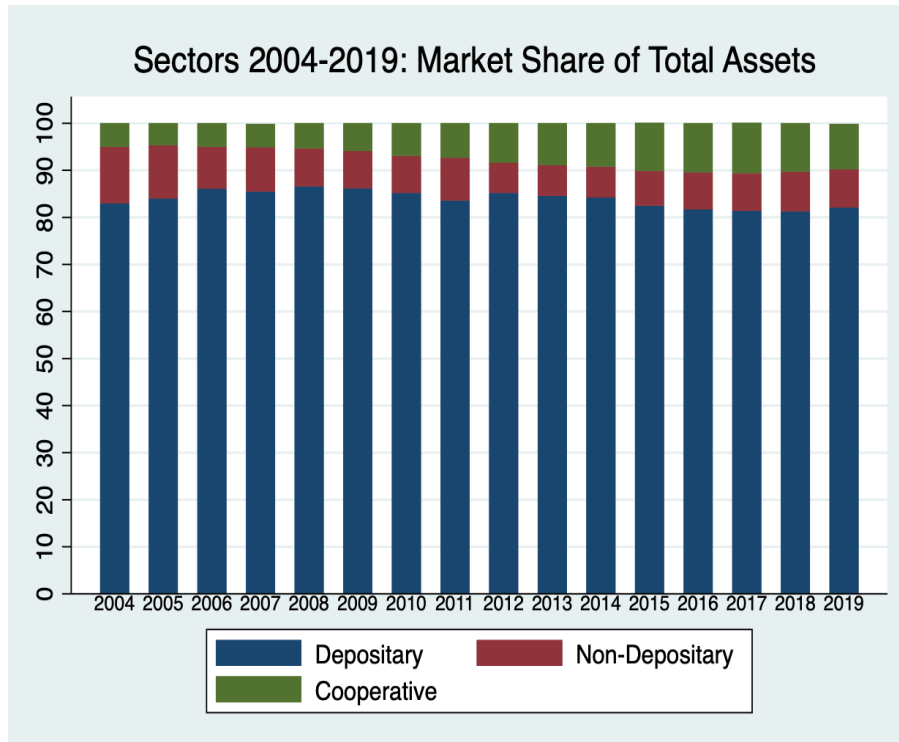
Panel K: Sector Figures for Market Share of Net Income Before Taxes.

Sectors 2004-2019: Market Share of Net Income Before Tax (NIBT)
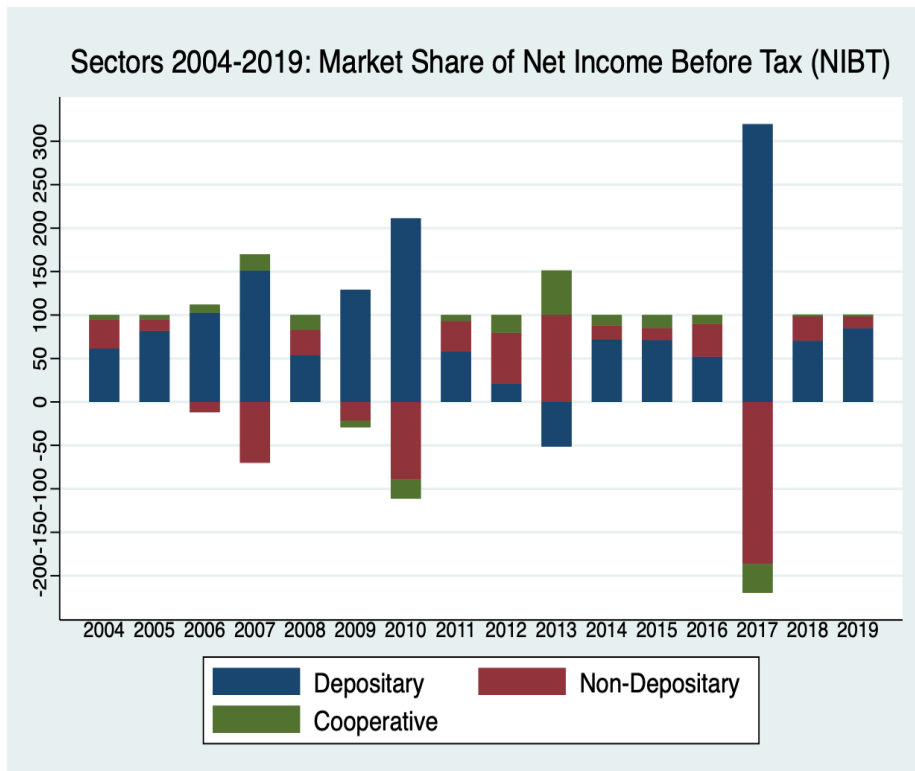
Panel L: Sector Figures for Market Share of Deposits.
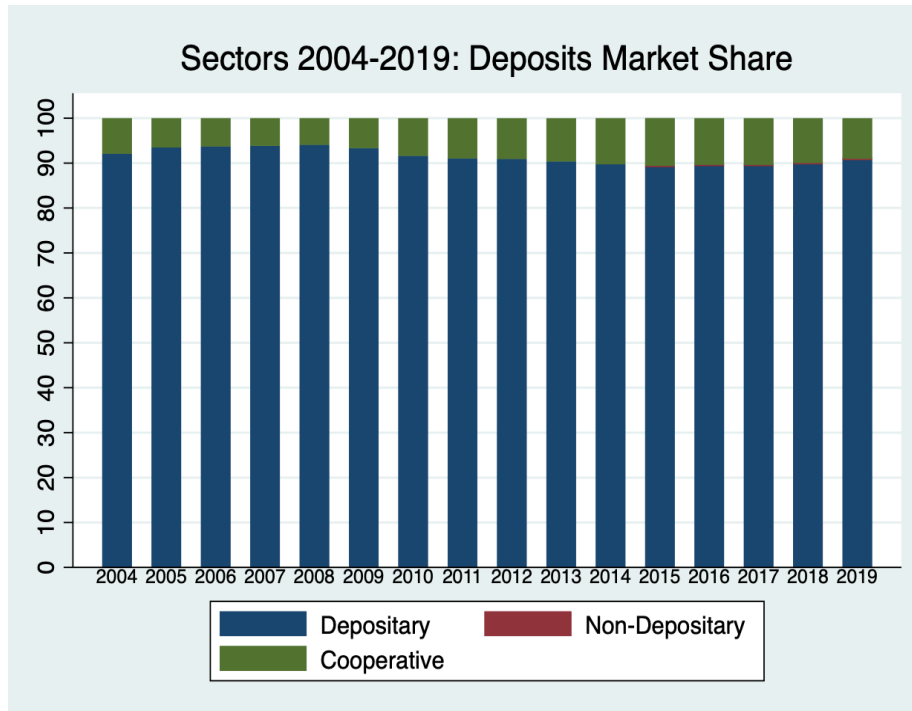
Table 1: Descriptive Statistics for Puerto Rico's financial industry: 2004-2019

Variable	Obs.	Mean	Std. Dev.	Min	Max
Cash	3837	29,634.05	168,786.74	-13,511.00	5,334,000.00
Net Loans & Leases Receiv.	3837	274,857.30	1,403,501.70	-4,114.00	17,769,000.00
Total Assets	3837	437,053.31	2,288,362.20	1.00	39,719,000.00
Total Liabilities	3837	383,865.61	2,075,432.00	-144,888.00	36,555,000.00
Deposits	3837	258,462.18	1,650,084.40	0.00	35,097,000.00
Allowances for Loan Losses	3837	7,266.51	55,663.64	-1,202.00	2,504,721.00
Total Equity Capital	3837	51,310.96	253,991.49	-823,265.00	3,164,000.00
Total Interest Income	3837	22,113.59	105,722.33	-74.00	1,482,000.00
Total Non-Interest Income	3837	4,608.93	26,294.57	-100,385.00	588,000.00
Net Interest Income	3837	14,198.59	72,652.72	-16,203.00	1,257,000.00
Total Income	3837	26,722.52	127,560.05	-1,468.13	1,853,000.00
Salaries & Emp. Benefits	3837	4,134.44	20,274.32	-124.00	359,000.00
Interest Expense	3837	7,915.00	44,803.24	-4,350.00	787,966.00
Other Non-Interest Expen.	3837	7,897.88	39,771.36	-13,173.00	690,000.00
Provisions Loan Losses (Exp.)	3837	3,069.84	27,336.85	-339,995.00	577,000.00
Net Income Before Tax	3837	2,849.54	30,106.64	-414,487.00	577,000.00

Table 2: Descriptive Statistics for Puerto Rico's Depositary and Cooperative Sectors: 2004-2019.

Variable	Obs.	Mean	Std. Dev.	Min	Max
Cash	2128	49,901.16	222,983.11	10.45	5,334,000.00
Net Loans & Leases Receiv.	2128	436,819.32	1,849,471.00	0.00	17,769,000.00
Total Assets	2128	720,702.68	3,028,895.60	164.02	39,719,000.00
Total Liabilities	2128	628,339.27	2,746,750.20	0.00	36,555,000.00
Deposits	2128	466,012.17	2,194,017.60	0.00	35,097,000.00
Allowances for Loan Losses	2128	11,404.56	73,851.19	-1.00	2,504,721.00
Total Equity Capital	2128	92,363.42	335,497.27	-823,265.00	3,164,000.00
Total Interest Income	2128	33,052.63	138,831.88	2.64	1,482,000.00
Total Non-Interest Income	2128	5,630.49	34,028.09	-56,071.00	588,000.00
Net Interest Income	2128	20,983.04	95,654.43	-12,422.00	1,257,000.00
Total Income	2128	38,683.12	167,924.16	-1,468.14	1,853,000.00
Salaries & Emp. Benefits	2128	5,814.83	26,818.34	0.00	359,000.00
Interest Expense	2128	12,069.59	58,707.45	0.00	787,966.00
Other Non-Interest Expen.	2128	11,191.63	52,488.44	2.36	690,000.00
Provisions Loan Losses (Exp.)	2128	5,598.77	35,101.66	-35,784.00	577,000.00
Net Income Before Tax	2128	3,997.18	37,223.60	-414,487.00	577,000.00

Table 3: Descriptive Statistics for Puerto Rico's FDIC Registered Depositary Institutions: 2004-2019.

Variable	Obs.	Mean	Std. Dev.	Min	Max
PY	122	8.32	2.25	5.00	11.00
Total Income	122	1,529,165.50	1,337,107.20	9,213.00	5,736,000.00
Total Interest Income	122	1,330,022.90	1,086,568.90	8,540.00	4,628,000.00
Total Interest Expense	122	474,926.11	475,698.01	4,235.00	2,136,449.00
Net Interest Income	122	855,096.75	859,626.92	4,305.00	4,082,000.00
Provs. for Credit Losses	122	254,147.72	345,220.06	-6,361.00	1,863,000.00
Total Non-Interest Income	122	199,142.68	294,558.84	-124,031.00	1,291,000.00
Additional Non-Int. Inc.	122	115,535.22	171,700.71	-159,000.00	880,000.00
Total Non-Interest Exp.	122	650,814.40	658,767.44	3,826.00	2,978,000.00
Salaries & Employee Ben.	122	232,719.33	224,823.02	1,481.00	992,000.00
Additional Non-Int. Exp.	122	335,028.84	374,110.32	1,517.00	1,668,000.00
Pre-Tax Net Op. Income	122	149,277.30	411,346.01	-1,214,226.00	1,891,000.00
Income Before Extra Items	122	139,442.05	348,114.86	-1,079,635.00	1,519,000.00
Net Income	122	139,616.20	348,231.77	-1,079,635.00	1,519,000.00
Net Operating Income	122	121,995.64	354,427.51	-1,341,399.00	1,519,000.00
Total Assets	122	10,522,345.00	8,371,199.80	550,624.00	41,627,000.00
Loan and Leases (L&L)	122	6,530,726.00	4,988,975.70	359,348.00	19,527,000.00
L&L Loss Allowances	122	172,037.87	160,012.46	6,628.00	656,000.00
Total Liabilities	122	9,505,249.20	7,600,828.40	523,325.00	37,400,000.00
Total Deposits	122	7,095,197.00	6,777,822.10	417,800.00	36,475,000.00
Total Equity Capital	122	1,017,095.70	875,930.57	27,299.00	4,227,000.00

Table 4: Percent of Cash, Loans & Leases and Deposits to Total Assets: Puerto Rico Industry 2004-2019.

Year	Cash % of TA	L&L % of TA	Total Assets (TA)	Deps. % TA
2004	5.22%	57.38%	125,300,000.0	44.62%
2005	4.52%	59.98%	133,800,000.0	49.26%
2006	4.47%	63.60%	124,700,000.0	53.73%
2007	5.19%	62.43%	128,200,000.0	55.37%
2008	4.12%	64.43%	125,000,000.0	60.54%
2009	5.32%	64.65%	120,000,000.0	60.19%
2010	5.40%	64.87%	107,900,000.0	55.49%
2011	7.07%	66.11%	107,700,000.0	54.99%
2012	7.68%	68.44%	97,166,178.0	62.36%
2013	7.43%	68.85%	93,423,467.0	62.93%
2014	8.40%	68.15%	92,337,221.0	60.96%
2015	8.30%	67.08%	84,851,948.0	64.28%
2016	9.55%	64.57%	82,150,344.0	66.30%
2017	13.81%	56.95%	80,245,329.0	69.17%
2018	10.52%	56.07%	84,157,331.0	70.14%
2019	7.71%	52.55%	89,897,795.0	73.07%
Mean 04-19	**6.8%**	**62.7%**	**103,207,348.5**	**59.7%**
Median 04-19	**7.2%**	**66.6%**	**102,433,089.0**	**58.1%**

Table 5: Herfindahl-Hirschman Index of Total Income: Year-to-Year Percent Change for Industry and Individual Sectors.

Year Range	Industry	Depositary	Non-Depositary	Cooperative
2004-2009	30.20%	13.09%	-33.01%	5.76%
2010-2015	29.84%	27.47%	53.71%	-2.11%
2016-2019	25.69%	13.98%	109.03%	-1.31%
2004-2019	**130.75%**	**108.37%**	**130.34%**	**6.23%**

Table 6: Comparative Table: Industry and Individual Sector Count Per Year.

Year	Industry	Depositary	Non-Depositary	Cooperative
2004	269.00	16.0	119.0	134.0
2005	273.00	16.0	125.0	132.0
2006	272.00	16.0	127.0	129.0
2007	276.00	16.0	135.0	125.0
2008	270.00	15.0	133.0	122.0
2009	258.00	15.0	122.0	121.0
2010	243.00	14.0	111.0	118.0
2011	233.00	14.0	103.0	116.0
2012	232.00	13.0	104.0	115.0
2013	227.00	13.0	100.0	114.0
2014	226.00	14.0	97.0	115.0
2015	217.00	13.0	90.0	114.0
2016	213.11	13.0	89.0	111.1
2017	213.00	12.0	88.0	113.0
2018	206.00	12.0	82.0	112.0
2019	206.00	11.0	84.0	111.0
Mean	**239.63**	**13.94**	**106.81**	**118.88**
Median	**232.50**	**14.00**	**103.50**	**115.50**

Table 7: Comparative Table: Herfindahl-Hirschman Index of Total Income: Industry and Sector Figures Per Year.

Year	Industry	Depositary	Non-Depositary	Cooperative
2004	650.82	1,307.51	809.24	209.20
2005	698.28	1,302.60	748.88	209.42
2006	748.92	1,294.33	410.16	210.70
2007	796.41	1,308.61	443.81	210.77
2008	816.03	1,396.57	488.65	209.35
2009	847.35	1,478.63	542.07	221.24
2010	992.23	1,876.88	602.64	232.30
2011	958.63	1,750.39	687.00	237.58
2012	983.03	1,937.76	670.50	230.61
2013	1,063.70	1,999.12	771.76	227.53
2014	1,080.80	1,954.29	855.66	226.12
2015	1,288.31	2,392.43	918.49	227.40
2016	1,194.82	2,390.20	891.72	225.17
2017	1,443.98	2,750.15	864.61	223.89
2018	1,628.63	2,973.53	1,229.01	236.84
2019	1,501.77	2,724.43	1,863.97	223.64
Mean	**1,043.36**	**1,927.34**	**799.89**	**222.61**
Median	**987.63**	**1,907.32**	**760.32**	**224.53**

Table 8: Comparative Table: Herfindahl-Hirschman Index of Total Assets: Industry and Sector Figures Per Year.

Year	Industry	Depositary	Non-Depositary	Cooperative
2004	836.26	1,183.43	1,386.67	219.18
2005	847.50	1,175.65	1,365.22	216.59
2006	873.25	1,170.17	698.44	215.13
2007	876.62	1,188.92	707.75	217.75
2008	887.83	1,176.33	809.41	225.24
2009	876.37	1,170.48	940.87	241.87
2010	1,102.16	1,504.89	1,386.51	252.30
2011	1,084.70	1,530.89	1,594.63	257.73
2012	1,219.43	1,669.51	1,500.49	257.65
2013	1,237.78	1,716.22	1,716.10	252.27
2014	1,255.43	1,757.45	1,748.86	250.98
2015	1,381.75	2,014.59	1,711.19	250.74
2016	1,541.75	2,288.58	1,661.46	239.93
2017	2,005.06	3,007.82	1,648.60	238.15
2018	2,151.58	3,214.40	3,557.97	233.77
2019	2,283.73	3,343.87	3,869.59	233.54
Mean	**1,278.82**	**1,819.58**	**1,643.99**	**237.68**
Median	**1,160.80**	**1,600.20**	**1,547.56**	**239.04**

Table 9: Comparative Table: Herfindahl-Hirschman Index of Total Deposits: Industry and Sector Figures Per Year.

Year	Industry	Depositary	Non-Depositary	Cooperative
2004	1072.96	1263.9	5107.4	229.6
2005	1100.78	1259.0	4961.9	226.1
2006	1063.10	1209.0	3612.9	220.7
2007	1231.66	1396.9	5419.6	223.5
2008	1201.72	1356.6	3862.0	227.9
2009	1173.42	1345.3	6918.5	247.2
2010	1583.06	1883.9	8046.3	256.4
2011	1677.40	2020.4	7097.4	261.1
2012	1607.35	1941.0	8881.6	258.1
2013	1625.88	1987.0	9281.1	255.7
2014	1768.42	2192.7	9049.8	254.4
2015	1981.71	2476.7	6865.3	251.3
2016	2279.31	2833.4	5490.7	240.3
2017	2843.91	3537.4	5017.6	238.1
2018	3150.43	3883.9	4896.9	231.2
2019	3200.78	3866.8	4966.9	229.8
Mean	**1785.12**	**2153.36**	**6217.24**	**240.70**
Median	**1616.61**	**1963.98**	**5455.14**	**239.21**

Table 10: Industry Regression Results for 2004-2019.

This table and the following panels present regression results for dependent variables ROA, Lerner, and Asset Utilization. ROA is the ratio of net income before taxes and total assets. Lerner is defined by net income before taxes divided by total income. Total income divided by total assets defines Asset Utilization. Tables report on coefficients from regressions. Standard errors are reported in parentheses. Significance in p-values is identified by ***, **, * for 1%, 5%, and 10%, respectively.

Panel A: Dependent Variable Return on Assets Entire Sample: 2004-2019. Panel A highlights coefficient results for the dependent variable ROA for the Industry from 2004-2019.

ROA_w	(1)	(2)
logTA	.002	.005
	(.01)	(.01)
logHHI	-.085	-.030
	(.055)	(.061)
logPY		.056**
		(.027)
inter1	.008	.005
	(.017)	(.017)
inter2	-.008	-.012
	(.011)	(.011)
inter3	.108*	.075
	(.061)	(.063)
inter4	.096*	.061
	(.056)	(.058)
_cons	.206	-.279
	(.138)	(.268)
Observations	3830	3830
R-squared	.003	.005
Industry Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes

Standard errors are in parentheses
*** p<.01, ** p<.05, * p<.10

Panel B: Dependent Variable Return on Assets with time range. Panel B compares coefficient results for dependent variable ROA for two specific time ranges, 2004-2011 and 2012-2019.

ROA_w	(1) Complete Sample	(2) 2004-2011 1st Range	(3) 2012-2019 2nd Range
logTA	.005 (.01)	.014 (.024)	.018 (.025)
logHHI	-.030 (.061)	-.288** (.113)	-.460** (.228)
logPY	.056** (.027)	.019 (.098)	.347*** (.085)
inter1	.005 (.017)	-.005 (.039)	-.041 (.032)
inter2	-.012 (.011)	-.027 (.025)	-.007 (.026)
inter3	.075 (.063)	.200* (.119)	.626*** (.237)
inter4	.061 (.058)	.341*** (.122)	.516** (.233)
2004bn.Year			
2005.Year		-.007 (.008)	
2006.Year		-.002 (.011)	
2007.Year		-.005 (.01)	
2008.Year		-.001 (.01)	
2009.Year		.002 (.013)	
2010.Year		.015 (.018)	

Cont.

	(1) Complete Sample	(2) 2004-2011 Range	(3) 2012-2019 Range
2011.Year		.027 (.022)	
2012bn.Year			
2013.Year			-.016** (.008)
2014.Year			-.041*** (.008)
2015.Year			-.030*** (.009)
2016.Year			-.034*** (.01)
2017.Year			-.025** (.01)
2018.Year			-.002 (.012)
2019.Year			-.015 (.012)
_cons	-.279 (.268)	.519 (.489)	-.585 (.735)
Observations	3830	2090	1740
R-squared	.005	.025	.049
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes

Standard errors are in parentheses
*** p<.01, ** p<.05, * p<.10

Panel C: Dependent Variable Lerner Index Entire Sample: 2004-2019. Panel C highlights coefficient results for the dependent variable Lerner Index for the Industry from 2004-2019.

Lerner_w	(1)	(2)
logTA	.071	.041
	(.044)	(.044)
logHHI	-.525**	-1.025***
	(.261)	(.237)
logPY	.520***	
	(.115)	
inter1	.445***	.475***
	(.072)	(.071)
inter2	-.037	-.002
	(.046)	(.045)
inter3	.543**	.845***
	(.269)	(.262)
inter4	.742***	1.065***
	(.249)	(.239)
_cons	-2.527**	1.944***
	(1.153)	(.595)
Observations	3830	3830
R-squared	.038	.032
Industry Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes

Standard errors are in parentheses

*** p<.01, ** p<.05, * p<.10

Panel D: Dependent Variable Lerner Index with a time range. Panel D depicts a comparison of coefficient results for the dependent variable Lerner Index for two specific time ranges, 2004-2011 and 2012-2019.

Lerner_w	(1) Complete Sample	(2) 2004-2011 Range	(3) 2012-2019 Range
logTA	.071 (.044)	.168 (.103)	.420*** (.114)
logHHI	-.525** (.261)	-1.412*** (.483)	-1.639 (1.053)
logPY	.520*** (.115)	.698* (.416)	.070 (.391)
inter1	.445*** (.072)	.009 (.165)	.428*** (.149)
inter2	-.037 (.046)	-.128 (.105)	-.301** (.118)
inter3	.543** (.269)	.806 (.507)	2.61** (1.096)
inter4	.742*** (.249)	1.678*** (.52)	1.846* (1.076)
2004bn.Year			
2005.Year		-.042 (.034)	
2006.Year		-.011 (.048)	
2007.Year		-.032 (.043)	
2008.Year		-.012 (.043)	
2009.Year		-.015 (.056)	
2010.Year		.052 (.079)	

Cont.

	(1) Complete Sample	(2) 2004-2011 Range	(3) 2012-2019 Range
2011.Year		.114 (.092)	
2012.Year			
2013.Year			-.059 (.038)
2014.Year			-.114*** (.039)
2015.Year			-.133*** (.042)
2016.Year			-.175*** (.044)
2017.Year			-.211*** (.048)
2018.Year			-.144*** (.054)
2019.Year			-.214*** (.057)
_cons	-2.527** (1.153)	-1.258 (2.083)	.060 (3.392)
Observations	3830	2090	1740
R-squared	.038	.024	.087
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes

Standard errors are in parentheses
*** p<.01, ** p<.05, * p<.10

Panel E: Dependent Variable Assets Utilization Entire Sample: 2004-2019. Panel E highlights coefficient results for the dependent variable Asset Utilization for the Industry from 2004-2019.

AsstUtil_w	(1)	(2)
logTA	-.019	-.009
	(.029)	(.029)
logHHI	-.279	-.106
	(.172)	(.156)
logPY	-.180**	
	(.076)	
inter1	-.080*	-.091*
	(.047)	(.047)
inter2	-.237***	-.249***
	(.030)	(.030)
inter3	.278	.173
	(.177)	(.172)
inter4	.282*	.171
	(.164)	(.157)
_cons	3.046***	1.501***
	(.757)	(.390)
Observations	3830	3830
R-squared	.230	.229
Industry Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes

Standard errors are in parentheses

*** p<.01, ** p<.05, * p<.10

Panel F: Dependent Variable Asset Utilization with a time range. Panel F highlights coefficient results for the dependent variable Asset Utilization Index for the Industry from 2004-2019.

AsstUtil_w	(1) Complete Sample	(2) 2004-2011 Range	(3) 2012-2019 Range
logTA	-.019	0	-.012
	(.029)	(.072)	(.056)
logHHI	-.279	-.112	-.198
	(.172)	(.335)	(.521)
logPY	-.180**	-.277	-.312
	(.076)	(.288)	(.193)
inter1	-.080*	-.005	-.243***
	(.047)	(.114)	(.074)
inter2	-.237***	-.348***	-.254***
	(.03)	(.073)	(.058)
inter3	.278	.057	.221
	(.177)	(.351)	(.542)
inter4	.282*	.008	.223
	(.164)	(.361)	(.532)
2004bn.Year			
2005.Year		.022	
		(.024)	
2006.Year		.007	
		(.033)	
2007.Year		.016	
		(.03)	
2008.Year		-.015	
		(.03)	
2009.Year		-.025	
		(.039)	
2010.Year		-.023	
		(.055)	
2011.Year		-.007	
		(.064)	

Cont.

	(1) Complete Sample	(2) 2004-2011 Range	(3) 2012-2019 Range
2012.Year			
2013.Year			-.035*
			(.019)
2014.Year			-.062***
			(.019)
2015.Year			-.062***
			(.021)
2016.Year			-.046**
			(.022)
2017.Year			-.037
			(.024)
2018.Year			-.035
			(.027)
2019.Year			-.025
			(.028)
_cons	3.046***	3.665**	3.459**
	(.757)	(1.444)	(1.678)
Observations	3830	2090	1740
R-squared	.23	.325	.208
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes

Standard errors are in parentheses
*** p<.01, ** p<.05, * p<.10*