

# A Study on the Impact of Technological Advancement on Community Bank Performance

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A STUDY ON THE IMPACT OF TECHNOLOGICAL ADVANCEMENT  
ON COMMUNITY BANK PERFORMANCE

By

ANDRE ONG

A thesis submitted in partial fulfillment of the requirements  
for the Honors in the Major Program in Finance  
in the College of Business Administration  
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## **Abstract**

This study investigates the impact of technological advancement in community bank lending, more specifically, how online financial product and service offerings affect community banks' performance. Community banks, institutions with assets under \$1 billion are praised as relationship banking specialists, are important source of credit to individuals and businesses. Their productive performance is highly beneficial for the economic development of the communities and customers that they serve, yet community banks' competitive power against large banks has become increasingly more challenging. Technological advancements radically shift all production and service based industries, including the banking industry and its institutions' offerings. The increasing use of online products and services provides convenience for bank customers, and eventually creates more demand, and boosts up the industry competition. Regarding the impact of technological advancements in the banking industry and the specific position that community banks carries, the question arises of "How does a changing technological landscape affect community banks' performance?". This study aims to contribute to the understanding of how these institutions can better utilize their limited resources to improve their performances.

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## **1. Introduction**

The increasingly common use of technology in banking has resulted in the development of online financial products and services that cater to clients of all categories from personal to commercial. Online financial products/services are convenient and allow customers greater flexibility without having to resort to the traditional method of going to a physical location. By eliminating the need of a physical presence, traditional methods of obtaining financial products/services such as relationship lending have been examined as to their usefulness. Relationship lending, a practice that requires sustained, multiple interactions between the client and bank (Bodenhorn, 2001) may not be necessary when the same financial product/service can be obtained online.

The objective of this study is to investigate the relationship between two major concepts: technological advancement and community bank performance. Technological advancement is measured through the number of online financial products/services that each institution offered through their website. These online financial products/services were grouped between four categories: personal, business, commercial, and total. Community bank performance is measured through performance ratios and values obtained from the Federal Deposit Insurance Corporation (FDIC). These performance ratios and values included are Net Interest Margin, Loan and Lease Loss Provision to Assets, Return on Assets, Return on Equity, Net Charge Offs to Loans, and Loss Allowance to Loans. By analyzing the potential relationship between these two groups of

variables, this study would like to better understand the effectiveness of online product/service offerings. That information could then lead to these institutions' better utilization of their resources to maximize performance in the form of risk and return. By doing so, the study may provide some additional insight on how the use of technology has affected community bank performance and how online offerings may support or diminish relationship banking practice.

To answer the question of "How does technological advancement affect community bank performance?", annual data was collected for the year of 2017. Community banks were filtered from all financial institutions in the state of Florida and data was collected from banks' respective websites along with the FDIC. I then used Descriptive statistics and correlation tables to see the correlation between the number of online financial product/service offerings on bank performance. The study found a positive relationship (increasing) between the number of online financial product/service offerings and the performance of the institution. These findings contribute to the literature by providing initial empirical evidence that as institutions invest into online products and service offerings by creating more convenience to their clients (and also collecting more information due to usage), they can improve their performance in regards to both risk and return.

The study begins with a literature review on relationship lending, its advantages and disadvantages, and its importance to community banks. In chapter 3, the actual data decision and collection process is discussed. Following this, chapter 4 discusses the hypothesis that was formed from preliminary information. Chapter 5 details the variables that were defined to organize the information that reveals the relationship between technological advancement and community bank

performance. Chapter 6 discusses the limitations of the study while chapter 7 finishes with concluding remarks.



## **2. Literature Review**

### **2.1. What is Relationship Lending?**

In this section, I establish what exactly I define as relationship lending and under what context and constraints I will apply to that definition. Relationship lending can be conducted by any lender such as a commercial bank, finance company, or small community bank to a third party. Besides offering lending services such as loans, letters of credit (L/C), and equipment financing, the business of relationship lending may also involve the sale of other products or services such as treasury management. The practice of relationship lending, the transferring of complicated ‘soft’ information between individuals, is and always has been, an integral part of the U.S. economy. As an important source of credit to small businesses, new changes in technological advancement have both increased efficiency and the complexity of bank-consumer exchanges. In an area of banking where opaque information is vital but difficult to value, the question arises as to how a changing technological landscape will affect this long-performed practice.

The necessity of relationship lending is created because of the unusual problem that individuals and businesses have when seeking out avenues to fund their enterprises. Potentially too small and obscure to be able to issue stock or participate in the bond market and yet too large to require the services of retail banks or rely upon individual loans, businesses struggle to acquire credit to fund growth. Unlike large companies and corporations with obligations to show financial statements and have access to public bond markets, smaller, untraded firms are more reliant on a bank-borrower relationship (Berger, 1995). Relationship lending tackles the issue of asymmetric

information and informational opacity from the borrower by developing a borrower-lender relationship, relationship lending. Lenders, such as commercial banks are valuable to both parties because by participating in the relationship the bank is able to have a greater depth of knowledge into a borrower's details. By having insider information, the bank can adjust the terms of a contract to be specifically designed for the client such as the amount of interest that they will pay on a loan or the collateral that the bank will require from them (Berger, 1995). The bank can design such a specific product because of the information obtained through the course of the relationship and the credit arrangement that was designed, but also by other services that the customer may have with the bank such as deposit accounts. (Berger, 1995). However, removing the barrier of information asymmetry is not only performed through the bank-borrower relationship. Lenders are able to design a contract that is tailored to the customer's needs based on the risk that the lender perceives of the customer. Therefore, it is in the best interest of the lender to understand their borrower to the greatest extent possible.

When deciding the type of credit to make available to the borrower, the lender will obtain information anywhere from the borrower's deposit accounts to the history of the firm, character of its owners and management team, their involvement and standing with the community, and the borrower's own suppliers and customers (Berger, 2002). Obtaining information from every source is critical to the relationship because in many cases, the information is not easily verifiable. For a small business, these examples of 'soft' information are not easily translatable into numbers and specific measurements but can make the difference in the pricing and credit availability in a contract (Berger, 2002). The 'relationship' in 'relationship lending' is as a result of the exchange

of opaque information between the bank and borrower but also the continual exchange of this information over repeated interactions.

However, it must be noted that a long or even exclusive relationship does not necessarily imply a good one (Bodenhorn, 2001). Borrowers that maintain a long relationship but only purchase the use of a letter of credit to be used on an as needed basis is still a weak relationship. Infrequent interaction such as this does not build up informational advantage that is valued for relationship lending. Lenders require a long relationship with multiple interactions in order to create a strong picture of the client and to refine the contract terms that best identifies their risk. By doing so, it helps remove the informational opacity that makes small businesses so reliant upon bank financing (Bodenhorn, 2001).

Relationship lending also emphasizes the comparative advantage that this interaction between bank and borrower to remove the issue of asymmetric information has over *de novo* lenders that are unfamiliar with the business (Boot, 1999). As to what specifically relationship banking entails, “I define relationship banking as the provision of financial services by a financial intermediary that:

- i. invests in obtaining customer-specific information, often proprietary in nature; and
- ii. evaluates the profitability of these investments through multiple interactions with the same customer over time and/or across products.” (Boot, 1999)

And as to the nature of relationship lending:

“i. Relationship lending leaves room for flexibility and discretion in contracts that permits the utilization of subtle, noncontractable information, thereby facilitating *implicit* long term contracting.

ii. Relationship lending may include extensive covenants that allow for a better control of potential conflicts of interest.

iii. Relationship lending may involve collateral (e.g., as in asset-based lending) that needs to be monitored. In fact, the need for such lending and monitoring may make the proximity of a relationship financier essential; otherwise, lending might not occur at all.

iv. Relationship lending could permit the funding of loans that are not profitable for the bank from a short-term perspective but may be profitable if the relationship with the borrower lasts long enough. As I shall see, the reason for this is that long relationships make possible value-enhancing intertemporal transfers in loan pricing.” (Boot, 1999)

## 2.2. Advantages of Relationship Lending

### 2.2.1. Borrower’s Perspective

I will explore the benefits that borrowers obtain from participating in relationship lending. Among the most valued benefits to the borrower in a bank-borrower relationship is the evidence of lower interest rates and being less likely to pledge collateral than other small firms that don’t participate in relationship lending. Essentially, borrowers find it easier to negotiate loan terms if

they have a relationship with the bank (Berger, 1995). As the issue of asymmetric information declines, there is an increase in 'trust'. The borrower obtains a reputation of being low-risk and therefore is allowed greater amounts of responsibility which translates to lower interest rates and a decline in likelihood of providing collateral requirements. This is done in the expectation that with their history and with the information obtained about their business, they will be able to fulfill their financial obligations and repay any borrowed credit.

Strong relationships also lead to several other benefits besides lower interest rates and less likely having to pledge collateral such as a lower dependence on the need for trade debt, greater protection against the interest rate cycles and fluctuations, and an increase in credit availability both for normal business operations and during a crisis (Berger, 2002). Another reason as to why the bank is able to offer these benefits to the borrower as a result of a stronger relationship is as a result of cost savings.

Borrowers prove themselves as responsible risks through their reputation which simultaneously causes the bank's moral hazard to decline (Blackwell, 1997). With a borrower's strong reputation, banks are less inclined to constantly monitor and protect themselves against the risk of the borrower being unable to pay the loan. With less monitoring, these cost savings are passed down to the borrower in the form of lower interest rates on average (Blackwell, 1997). The bank is incentivized to offer these lower interest rates from their cost savings due to external competition with other banks. If a borrower were to concentrate their borrowing into one lender, this would allow that sole lender to have a greater depth of insider information and understanding of the borrower's risk (Blackwell, 1997).

The informational advantages as a result of repeated borrowing is where the value of relationship lending is emphasized by lower interest rates, lower guarantees, and a greater likelihood of still having access to credit by having a relationship even during adverse environmental financial panics and downturns (Bodenhorn, 2001).

The value of the benefits that relationship lending can offer to borrowers is in the discretion that the contracts terms can be renegotiated. Flexibility and discretion is the value (Boot, 1999). Having discretion, especially with the issue of asymmetric ‘soft’ information is especially valuable in the bank-borrower relationship and is the reason why lenders will occasionally take a short-term loss in the recognition that they will recoup this later in the relationship, known as an intertemporal smoothing of contract terms. (Boot, 1999). Flexibility is beneficial to both the borrower for being able to obtain credit even during a short-term loss but also to the lender for being able to benefit in the long-term relationship. To the borrower, relationship lending allows them an opportunity to receive credit that other institutions would not offer them. Especially *de novo* lenders, who would realize that these small businesses pose very serious adverse selection and moral hazard problems and would likely not take the risk to lend to them (Boot 1999). Having a reliable relationship gives borrowers an avenue that understands that short-term losses are not long-term failures.

### 2.2.2. Lender’s Perspective

I took a reciprocal view of the bank-borrower relationship by examining the benefits that relationship lending gives the lender. In terms of the issue of informational opacity and asymmetry,

bank's benefit from their relationship with borrowers by being able to obtain increasing amounts of private information that allow them to better gauge the risk they are undertaking when making a contract (Berger, 1995). Having insider information better insulates the bank from risk by allowing them to identify the likelihood of the borrower repaying their loan and making good with their financial obligations.

Protecting themselves from risk is their main concern and relationship lending has a greater significant value than pure numbers from financial statements, collateral, and credit score (Berger, 2002). These numbers reflect management decision making, but this is much better understood with the insider information obtained from relationship lending and allows them to position themselves better for issues in relation to informational opacity (Berger, 2002). Apart from simply knowing more than a transactional lender, relationship lending, and the nature and ease of being able to tailor contracts to best suit the needs of the stakeholders also benefit the lender by allowing them certain strategies to better insulate themselves from risk.

This lies in contract covenants that allow the lender to mitigate agency costs if suboptimal information is received from the business (Bodenhorn, 2001). The ease of renegotiation allows the lender to safely protect itself by imposing stricter standards or requirements if necessary.

Besides reducing agency costs, extensive covenants are able to guide the bank-borrower relationship and mitigate conflicts of interest between the two parties (Boot, 1999). Other than using its informational advantage to protect itself, relationship lending also allows the bank to enter as an overall package of selling products and services to the small business.

Relationship lending may not even be the main service that is offered to the customer but can be used as a foot in the door to cross-sell more lucrative products and services such as payments, savings, and advisory services (de la Torre, 2010). Lenders may cross-sell more lucrative products both to maximize their capital but also to deepen the relationship and engagement that they have with the borrower. By doing so, the lender increases the likelihood that they will be the borrower's principal bank and may potentially increase the chances of attracting clients associated with the borrower such as their employees, owners, and families (de la Torre, 2010). These 'sticky' products also make a borrower less likely to leave the relationship as they are heavily invested into it with a large portion of their business reliant upon the strength of the relationship. Lenders such as commercial banks also receive several benefits in relationship lending as a result of their size. An example of this is that they can take advantage of economies of scale when it comes to processes such as credit scoring models that need a large number of customers and financial products or when using their large resource of service platforms, technical expertise, and IT and back-office to accommodate non-lending services. Additionally, large commercial banks are also better able to use more complex and sophisticated business models and risk management systems which not only becomes a more accurate gauge of the customers is, but also decreases their exposure to risk (de la Torre, 2010). The lender's benefit in relationship lending in their access to sensitive information of small businesses but also in their wide power of available products services that they can sell and the economies of scale that they can use,



### 2.2.3. Regulator's Perspective

Separate from both parties in a bank-borrower relationship, I analyze the perspective of government regulators in the advantages of relationship lending. Relationship lending may help impede the “decline of banking” where “securitization and nonbank competition are reducing the share of loans held by banks” (Berger, 1995). The value of relationship lending prevents the decline of loans because of the benefits that borrowers receive from a bank-borrower relationship. Individuals and finance companies can offer loans to borrowers, but few can provide the advantages that relationship lending with a bank can offer. From a regulator's perspective, the strength of relationship lending is important as a reliable source of funding to a growing entrepreneurial class that relies on banks to obtain credit. Simultaneously speaking, competition between other banks may also increase the importance of relationship lending. Relationship lending differentiates one bank from another and increases the value that customers see between banks.

Banks therefore may focus more effort to become more client-driven in the expectation that it will separate them from other banks (Boot, 1999). This is valuable as a means of banks continuously competing against one another to provide the best service to the borrower and customer. Even with the numerous advantages that large commercial banks seemingly have over other lenders, relationship lending is also an advantage to small community banks. The specific characteristic of the uniqueness of the relationship can help prevent the complete penetration of small-business lending by large banks. The small bank advantage is in the fact that it is a small

bank which means that there may be a greater depth of the local relationship between the bank and the borrower. There may be greater personal contact between the bank and the opaque business which would not be affected as much by changing technologies. Similarly, the contract and loan terms that the business maintains would potentially be the same as in previous decades and they want to have a bank that understands they don't want to change.

Small banks may also have an organizational advantage of decision makers when it comes to authority and bureaucracy. Small banks are also likely not to be commoditized and can compete with others by being innovative (Elyasiani, 2004). Essentially, relationship lending is extremely competitive and involves multiple lenders with a unique advantage over their specific borrower due to that relationship. Due to this, there will never likely be one sole lender that will control a large portion of market share because of the competitive nature of relationships and informational asymmetry.

## 2.3. Disadvantages of Relationship Lending

### 2.3.1. Borrower's Perspective

I begin to view the borrower's perspective on the disadvantages of relationship lending and how it may be harmful to the business. For small businesses, there is a large informational issue between those who own the firm and those that the firm relies upon for credit. The informational asymmetry makes it difficult for them to obtain external financing. This is most emphasized when outsiders are not willing to lend credit to a small business because they cannot identify if the firm

has a quality project (adverse selection problem) that will recoup the return of the initial investment, or even ensure that the credit will be used to fund another project (moral hazard problem) (Berger, 2002). With such informational opacity, small businesses are heavily reliant and vulnerable to large commercial banks.

Since they are so reliant and because they are so difficult to understand, borrowers face a high equilibrium interest rate when they initially seek credit (Blackwell 1997). This problem is even worse because not only do they face high interest rates during equilibrium, but if there is disequilibrium they are even more at risk of either paying higher interest rates or not having access to credit at all. Their reliance on commercial banks also highlights another issue with relationship lending. The firm's informational opacity is a struggle to understand and creates a high barrier of entry to obtain credit from a lender. But once a relationship is developed, the bank has the opportunity to exploit the informational advantage.

The issue is exacerbated when banks are located in concentrated markets that have a large degree of market power (Bodenhorn, 2001). Essentially, this means that to obtain credit from a lender, borrowers must not only sacrifice at high interest rates to have access, but they are also unable to escape the relationship due to the fact that they may have to pay switching costs and may not have any other options to obtain financing. The fear that the commercial bank will cause the borrower to be locked into paying a high interest rate causes some borrowers to avoid borrowing from the bank which will be a loss of potential investment opportunities, known as the hold-up problem. If the borrower decides to maintain multiple bank relationships then they will decrease

the likelihood of becoming informationally captured but they also decrease their availability of credit because of a reduction in the value of acquiring the business's information (Boot, 1999).

Having multiple lenders increases the price of access to credit while simultaneously reducing its availability (Elyasiani, 2004). If multiple lenders are aware of insider information, then there is no competition to provide better products or services. Small businesses have to pay the initially high interest rates because of a lack of reputable history that certifies them as good credit risks but also because taking on a loan is a form of certification that the borrower is safe. Since bank loans are the lowest in priority during repayment in the case of the business becoming bankrupt, willingness to loan to the borrower indicates to the rest of the market that all higher claims are safe from risk (Elyasiani, 2004).

### 2.3.2. Lender's Perspective

Although the lender, usually a bank, has many incentives to participate in relationship lending there are also several risks and dangers by extending credit to borrowers. Chief among the issues that banks face as a result of relationship lending is the agency problem that arises between the relationship manager/loan officer and the bank that they work for. The issue results from the opaque nature of small businesses and the importance of 'soft' information when making decisions of extending credit. Since the exchange of information most directly happens between the borrower and the loan officer as opposed to the borrower and the bank, it makes sense that more authority be given to the loan officer who has access to this information. However, this increase

in authority is what creates the agency problem (Berger, 2002). The problem lies in differing incentives especially on the part of the loan officer. The loan officer is driven by profit and may therefore decide to focus on generating new loans from new customers as opposed to monitoring their current relationships due to either a short horizon or incentive-based pay based on portfolio growth. Likewise, the loan officer may also be motivated by personal gain to hide negative information about a borrower's credit quality due to "a personal friendship with the owner, the prospect of a future job offers from the firm, an undisclosed financial interest in the firm, or illegal kickbacks" (Berger, 2002). Not only do banks face the agency problem when delegating more authority to loan officers, but they also need to pay higher monitoring costs to review loan officer actions to prevent these issues. These risks are most prevalent due to the fact of differing incentives, but a large organizational structure also increases the likelihood of the agency problem arising as opposed to "a small, closely-held organization with few managerial layers" (Berger, 2002). The large organizational structure combined with the difficulty in transferring 'soft' information between individuals would likely increase the magnitude of the contracting problem (Berger, 2002). 'Soft' information that is shared between borrowers and their loan officers is difficult to translate from loan officers to the bank as a whole. Since the 'soft' information is vital to decision making, commercial banks may attempt to simplify the data through "standardized credit policies based on easily observable, verifiable, and transmittable data" (Berger, 2002). Using this tactic may backfire by adopting the very characteristics that separates relationship lending from transactional lending. Another issue of relationship lending that commercial banks face is simply the distance between their place of operations and their customers. The large physical

distance makes it more difficult to exchange the “soft, locally- based relationship information to senior bank management” (Berger, 2002) which can escalate any issues already present in the relationship. Additionally, besides internal risks, commercial banks also face issues relating to extending credit to borrowers. One of these issues is the soft budget constraint problem. Basically, borrowers understand that the most important obligation that the commercial bank has is to itself and to the loan. Therefore, a distressed firm may take advantage of this obligation by seeking credit when they become distressed to postpone bankruptcy or defaulting on the loan (Bodenhorn, 2001). The commercial bank then needs to decide of whether there is a greater value in allowing the borrower to default on the loan and to liquidate and collateral or assets that would make up the value or to extend further amounts of credit to the distressed firm in the expectation that they will be able to regain profitability to repay the loan.

But herein lies one of the issues of relationship lending to the lender, the advantage of the ease of loan renegotiation can also be a disadvantage from borrowers that may exert insufficient effort to repay the loan and hostage the commercial bank from preventing a bad outcome (Boot, 1999). To a borrower, they have a hold on the lender due to fear of having a loan default and then rely on liquefying collateral or the fear of lending more money which can result in a greater loss.

### 2.3.3. Regulator's Perspective

From a regulator's point of view, relationship lending is inherently risky to both consumers and to the economy as a whole because of its ingrained nature of capturing information. The relationship that is developed between a customer and lender is more valuable than the book value of assets that is written into a contract (Berger, 1995). Value is created, immeasurably, by the information that is exchanged between the two parties. That information, is the value. A bank failure can lead to more than a paper loss. Aside from causing greater than can be measured monetarily, the practice of relationship lending also increases the risk to small businesses if the bank were to fail. The relationship that has been established fails and the small business is forced into a credit crunch where they may have to accept terms and conditions from another lender without the benefit of 'soft' information (Berger, 1995).

Regulators may also view the risk of relationship lending and the nature of 'soft' information by the organizational structure of the lending institution. Relationship lending may not only increase the risk of an agency problem between the loan officer and the bank that they represent, but it also may increase complexity and inefficiency. Essentially, there lies a contracting problem as a bank increases in size in complexity. Small lenders are able to resolve their issues quickly by eliminating several managerial layers and bureaucratic processes that result in organizational diseconomies (Berger 2002). Regulators may highlight this importance of organizational in relation to its effect on relationship lending during mergers and acquisitions. Consolidation may increase contracting problems and the behaviors of lending institutions (Berger

2002). Berger also finds that aside from complexity, regulators may find that banks that consolidate are not in the interest of small businesses. As the banks increase in complexity they are less likely to make relationship loans.

The risk of relationship lending not only lies between the bank-consumer exchange but also is influenced by external competition. Increased competition, more players in the market, results in less relationship lending and less benefit to consumers. With more options for consumers to choose from they would be less likely to remain loyal to one institution for their banking needs. In anticipation of shorter relationships, banks are less inclined to offer relationship-specific deals and advantages. The information advantage is no longer as important since many competitors may have it and because the bank that may have it at the current moment won't be able to reuse the information over a long period of time (Boot, 1999).

#### 2.4. Prior Literature: Technological Advancement in Relationship Lending

As technological innovation grows, banks and relationship lending may have serious changes as they adopt new practices. Technological advancements have allowed an increase of competition that has begun to threaten the survivability of small community banks. Not only that, but it also has left community banks with an exploitable position for larger banks looking to consolidate. (Elyasiani 2004). This change is likely due to the strength of community banks in their local knowledge and personal relationships with consumers that have eroded with more efficient ways of communication. "The reasons for the erosion include relaxation of the branching



and product mix regulations which gives large banks a freer hand to compete against small banks, new technologies rendering small scale operations inefficient in many areas of bank production, revolution in payment technology that renders distance unimportant, proliferation of investment options that make consumers less dependent on banks, deeper and broader financial markets that largely facilitate direct financing, and commoditization of financial assets. These changes have resulted in an increase in the share of the 10 largest banks from 28% of total banking assets in 1986 to 76% in 2001 and a commensurate reduction in the share of the smaller community banks (DHU, 2004).” (Elyasiani 2004). Therefore, it seems that small community banks are losing a great deal of their market share as their competitive advantages have declined with technological advancements. New technology has made previous strengths obsolete and may create a divide between within the banking industry by size where large banks concentrate on “hard information” while small banks use “soft” information (Elyasiani 2004). However, with increasingly competitive environments, small banks are losing their niche advantage.

Technological advancement, notably credit scoring models, is one of the most important methods by which large banks have been able to encroach into small business lending formerly dominated by community banks (Ely 2001). Using credit scoring models has allowed banks to create a better overall picture of a borrower’s riskiness. “Larger banks (those with assets greater than \$15 billion) were more likely to use credit scoring models than smaller banks (Federal Reserve Board 1997). To the extent that credit scoring reduces large banks’ costs of extending small business loans, it would be expected to narrow the gap between large and small banks’ emphasis on small business lending.” (Ely 2001). Large banks have an advantage by employing

technological advancements not only to decrease the cost of gauging risk but also increasing its accuracy by. Smaller banks in comparison are less likely to use these credit scoring models which increases their exposure to risk and the likelihood that they will lose on a loan to a borrower.

Relationship lending has been so costly due to the time necessary to acquire the information from small firms in order to develop those relationships (Petersen 2000). This difficulty in obtaining opaque information is what has been declining with newer methods of communicating information. Technological advancement allows greater access to information and “the evidence is consistent with greater information availability being responsible for the increasing distance between lender and borrower” (Petersen 2000). This further supports the idea that technological advancement has eroded the necessity of face-to-face relationships that were previously used to obtain ‘soft’ information. With increasing distances, community banks with local knowledge lose their competitive advantage and value.

Computers and information technology has allowed data transmission much cheaper by reducing transaction costs. The reduction in price has allowed a greater number of transactions by allowing products that were once too expensive, to now be offered to customers. (Mishkin 1999). Having easily transmittable information not only reduces the cost for all parties involved but it also makes itself reusable for multiple products. Having a greater amount of information has allowed lenders to better gauge good and bad credit risks through monitoring (Mishkin 1999). Information can now be used in credit scoring models and in part to determine a borrower’s overall risk when taking into consideration the other aspects of their lives. While allowing banks to have

a stronger picture of their borrowers, many banks continue to incorporate the loan officer's judgment in conjunction with the 'hard' information to determine and sometimes override the advice of a credit scoring model (Mishkin 1999).

### **3. Data**

#### 3.1. Data Gathering

For this study, data will be extracted from the Federal Deposit Insurance Corporation (FDIC) website for institutions within the state of Florida. Using the FDIC industry analysis and directory allowed a credible and standardized source of information. A custom report was generated that contained the dependent variable of ‘Community Bank Performance’ through performance ratios and values including Net Interest Margin, Loan and Lease Loss Provision to Assets, Return on Assets, Return on Equity, Net charge offs to loans, and Loss Allowance to Loans. The data from these variables were gathered from the annual numbers of December 31, 2017. With the initial data set, there were 133 institutions after filtering by State. After filtering further for institutions with less than \$1 billion in assets, there were a total of 111 institutions. These institutions were then further separated into five categories based on the size of their assets to group the institutions into classes: \$0-\$200,000 (Small), \$200,001-\$400,000 (Small-Medium), \$400,001-\$600,000 (Medium), \$600,001-\$800,000 (Medium-Large), and \$800,001-\$1,000,000 (Large).

The independent variable, technological advancement, as measured by the number of online financial products/services offered on the institutions website was found by utilizing the web addresses of each respective institution from the FDIC reports. Upon viewing the websites of financial institutions, I determined three classes of clients that banks would service to: personal (individual) banking, business banking (small and mid-size businesses?), and corporate banking.

To obtain the number of online financial products/services based on the class of client, I went through each individual website, searching for those products/services to see if it was offered online. If the institution offered the product/service, then it would be denoted as a '1' while a lack of the product/service was shown as a '0'. These numbers were then tallied to show the number of personal financial products/services, business financial products/services, commercial financial products/services, and finally the total number of financial products/services among categories. For personal banking these financial products included items such as: online statements, mobile app for personal banking, checking accounts, savings accounts, money market accounts, certificates of deposit, mortgage payments, commercial real estate loans, credit/debit cards, deposits, and transfers. For business banking, these financial products included: online statements, business bill pay, mobile app for business banking, business checking accounts, business savings accounts, business money market accounts, business certificate of deposits, business (remote) deposit services, business treasury management products, small business loans, business credit cards, and business transfers. For corporate (commercial) banking these financial products included: corporate deposit services, corporate treasury management, corporate lending, and commercial real estate loans.

### 3.2. Data Calculations

After gathering all the financial data from the FDIC and all the qualitative data from the individual institution websites for their internet (online) products and services I began to determine

the calculations needed to find patterns and reason with the information. I decided that to organize and explain the data I would use a correlation table and table of descriptive statistics. The correlation table would identify patterns among variables that could affect one another, descriptive statistics would be used to analyze the data as an aggregate.

### 3.3. Average Data

Upon gathering all the data as an aggregate, I could identify some patterns from the raw information prior to fully calculating and organizing it. After going through each institution's website, I tallied the number of financial products that their website had shown to be available by keeping a running list composed with '1' if the product had been shown to be available and a '0' if it was not shown. At the end I summed the total number of financial products per institution.

Regardless of the institutions size, location, or financial performance, they appeared to have a great spread in terms of number of online financial products and the type of products they offered. For example, there were only a handful of intuitions that even offered any sort of corporate or commercial financial products or services. On the other hand, nearly all observations are at the minimum offered products to consumers in the form of online payments. The definition of community banks as institutions under \$1 billion in assets may explain their concentration towards personal and business banking as opposed to the more complex and capital-intensive servicing required for corporate and commercial clients.

## 4. Hypothesis

Based upon the data that was available and the objective of answering the research question of “What is the impact of technological advancement on community bank performance?”, I was able to form a hypothesis.

Hypothesis: If there is a higher amount of alternative distribution channels then community bank lending performance will increase.

As technological advancement increases there will be more products and services offered to cater to clients in all economic positions that will attempt to increase convenience and ease of use for services such as mobile application banking. Allowing clients to have the power to bank the way they choose to by giving them options not only benefits them but reciprocally increases the strength of commitment the client maintains with their respective institution. These sticky products create a symbiotic relationship where the client becomes dependent on the institution for their financial needs as the institution benefits through sustainable performance.

## **5. Methodology**

### 5.1. Definition of Variables

#### 5.1.1. Independent Variables

Independent variables grouped into four categories of services and products: personal, business, and corporate (commercial), and total. In total, there were 27 financial products or services that were each measured separately per institution to determine whether it was available or not. The number of personal financial products/services, number of business financial products/services, number of commercial financial products/services, and total number of personal financial products/services were treated as separate variables when measured against the dependent variables.

An independent variable was needed to measure ‘Technological Advancement’. Several variables could have been used to measure how an independent variable could affect ‘Community Bank Performance’ such as measuring the money invested as a value or ratio towards network infrastructure or online platform maintenance. Similarly, an independent variable of measuring non-interest expenses could also have been used.

However, many financial measures or ratios needed to determine a reliable way to measure ‘Technological Advancement’ proved to be unreliable because of a lack of access to internal reports that would reveal the information stated above. Therefore, a proxy variable in the form of the number of financial products and services made available based off the institutions website was created to determine ‘Technological Advancement’. The basis being that an institution would



like to increase its online presence and consumer access by creating more products and services online to reach them.

### 5.1.2. Dependent Variables

The dependent variables to measure 'Community Bank Performance' are performance ratios and values including Net Interest Margin, Loan and Lease Loss Provision to Assets, Return on Assets, Return on Equity, Net charge offs to loans, and Loss Allowance to Loans. Using these variables allowed a comprehensive view of performance by seeing metrics for both the risk and the return of each institution over a quarterly basis. Risk was measured through Loan Loss Allowance, Loan and Lease Loss Provision to Assets, Net charge offs to loans, and Loss Allowance to Loans. A decrease in any or all, of these variables would indicate a simultaneous decrease in the risk of the institution's portfolio. Return was measured by Net Interest Margin, Return on Equity, and Return on Assets. An increase in any or all, of these variables would indicate a simultaneous increase in the return of the institution's portfolio.

### 5.1.3. Control Variables

There were two main controlled variables: the size of the institutions separated by assets and the separation of the types of online financial products/services offered by each institution. Both variables were controlled in order prevent overarching conclusions that an increase/decrease

in all independent variables would lead to an increase/decrease in all dependent variables. The size of the institutions even in the same ‘community bank’ category over under \$1 billion in assets can be affected very differently and simultaneously not all their financial products/services will be affected equally. The reason that there was a separation in both the types of online financial products/services and the size of the assets of the institution was because these both variables may be catered to specific customers. For example, small or small/medium sized institutions may specifically be targeting the consumer demographic for personal online financial products/services, their lack of size and capital could even be a factor on their ability to participate in more complex commercial/corporate banking. On the other hand, medium/large and large institutions may have personal, business, and commercial online financial products/services but may specifically be targeting the commercial/corporate demographic because of their ability to handle the more complex and lucrative deals.

The size of the institutions was controlled by separating them into five different categories: \$0-\$200,000 (Small), \$200,001-\$400,000 (Small-Medium), \$400,001-\$600,000 (Medium), \$600,001-\$800,000 (Medium-Large), and \$800,001-\$1,000,000 (Large). By doing so, changes are reflected by each category and not as ‘community banks’ which may lead to over generalizations.

The types of financial products/services offered by each institution were also controlled by separating them into four categories: the number of personal financial products/services, number of business financial products/services, number of commercial financial products/services, and finally the total number of financial products/services among categories. By doing so, using these

independent variables only affects the institutions within these categories without referring to ‘community banks’ as a whole.

## 5.2. Empirical Methods and Results

### 5.2.1. Descriptive Statistics

The table of descriptive statistics was used to summarize major categories of the data set for each size of institution class (SM-Table 4.1, SM-MD Table 4.2, MD Table 4.3, MD-LG Table 4.4, and LG Table 4.5) on a quarterly basis. Starting with the SM class of institutions in Table 4.1, the most apparent trend are the decreases in mean from Q1 to Q4 in Loss Allowance to Loans. Simultaneously, these results are paired with an increase in Net Interest Margin, higher ROA, and higher ROE. Observing these results indicates a reduction in risk as indicated by the lowering of the Loan Loss Allowance combined with a higher performance in the financial ratios.

For institutions in the SM-MD class in Table 4.2, the most unique trends were observed in the decrease of Loan and Lease Loss Provision to Assets, decrease in Net Charge Offs to Loans, and decrease to Loss Allowance to Loans. These variables all indicate reductions in risk by reducing the amount of funds directed at problem loans and the expected losses from credit risk.

Quarterly progression from Q1 to Q4 also revealed favorable increases in ROA and ROE along with decreases in Loan Loss Allowance and Loss Allowance to Loans for institutions in the MD (Middle) size class of banks in Table 4.3. Like their counterparts, institutions in the MD-LG class of institutions, Table 4.4, experienced increasing amounts of net interest margin regardless

of the class of financial product, increasing ROA, increasing ROE, and a decline in their Loss Allowance to Loans. Finally, the largest size of bank classes, Table 4.5, performed well in return measures such as increasing net interest margin, ROA, and ROE. However, experienced simultaneous average performance measures in categories such as Loan and Lease Loss Provision to Assets and Net Charge Offs to Loans.

### 5.2.2. Correlation Table

Correlation tables were created to observe all performance metrics in risk and return for the variables: Loan Loss Allowance, Net interest margin, Loan and Lease Loss Provision to Assets, Return on Assets (ROA), Return on Equity (ROE), net charge-offs to loans, loss allowance to loans, number of personal financial products/services, business products/services, and total number of financial products/services. The correlation tables allowed an understanding of the interrelatedness between the independent and dependent variables. Each correlation table was created per quarter of the year to identify any differences in results. Unfortunately, going through each quarter, correlations among variables were relatively low. In Q1, Table 2.4, the highest correlations were between the number of business financial products/services and loan loss allowance at -0.14. Q2. Table 2.3, also had few major correlations. Q3 (Table 2.2) and Q4 (Table 2.1) however, displayed positive correlations between net all products, personal, business, and total to net interest margin ranging from 0.130 to 0.168.

## 6. Discussion

Despite the attempt to separate variables and to identify answers to the question of “What impact does technological advancement have on community bank lending?” there are several limitations to the study. Firstly, there’s no method to track when each institution enabled or placed a specific online financial product or service on their website over time. For example, if an institution recently engaged in the development of a mobile banking application there is no way to track as an aggregate when that service became available on the institution’s website. Having this limitation means that data can only be tracked when the product is already there and not how it has affected the dependent variable, community bank lending, over time.

Secondly, perhaps a better gauge of understanding how technological advancement can be used to affect community bank lending is to measure directly how much the institution invests into their technology. How much do they invest, how high are their non-interest expenses, how often and at what cost do they upgrade infrastructure or server? The study is limited from that proprietary information within the institution’s own income statements and balance sheets that are not public record and therefore the study has had to rely on other metrics to determine the answer.

Finally, the financial data used at the time of the study is not the most current because it is reliant upon quarterly reports from the FDIC. Therefore, real-world situations based on the data may be different than what the study is using.

## 7. Conclusion

In conclusion, the study seeks to investigate “How does technological advancement affect community bank lending?”. The original purpose of the study was to identify a correlation between the availability of online financial products/services to several consumer groups and how that would be reflected in the performance of community banks. Through descriptive statistics and correlation tables, the study has isolated independent and dependent variables to measure their relatedness. Considering all the tests from the data that was gathered, I have concluded that there is a direct relationship between technological advancement and community bank lending. I have identified that as the number of financial products/services increases, performance measures to determine risk and return also tend to increase in unison. The most obvious and simplest way of identifying this trend is in the observation of the correlation tables between the variables such as Table 3. Depending on the size of the institution and specifically what kind of class of products that they offer, in a significant amount of cases, performance tends to improve as the number of products increases. This essentially shows that the research has achieved the research goal by not only finding a correlation between technological advancement and community bank performance, but has also shown a positive correlation. The relationship between the two can possibly be explained by consumers having greater access to more flexible options. Convenience along with clarity may be possible explanations as to why having more products tends to increase the performance of community banks.

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## 9. Appendix

**Table 1**

<b>Variable Name</b>	<b>Description</b>
nimy	<i>Net interest margin</i>
ELNATRY	<i>Loan and lease loss provision to assets</i>
roa	<i>Return on assets (ROA)</i>
roe	<i>Return on Equity (ROE)</i>
ntlslr	<i>Net charge-offs to loans</i>
lnatresr	<i>Loss allowance to loans</i>
SM	<i>\$0-\$200,000 (million in assets)</i>
SM-MD	<i>\$200,001-\$400,000 (million in assets)</i>
MD	<i>\$400,001-\$600,000 (million in assets)</i>
MD-LG	<i>\$600,001-\$800,000 (million in assets)</i>
LG	<i>\$800,001-\$1,000,000 (million in assets)</i>

**Table 2.1 - 12.31.17 – Correlation Table**

ts/Services	<i>lnatresr 12.31</i>	<i>nimy 12.31</i>	<i>elnatry 12.31</i>	<i>roa 12.31</i>	<i>roe 12.31</i>	<i>ntlslr 12.31</i>	<i>lnatresr 12.31</i>	<i>Personal # of Financial Products/Services</i>	<i>Business # of Financial Products/Services</i>	<i>Total # of Financial Products/Services</i>
<i>lnatresr 12.31</i>	1.000									
<i>nimy 12.31</i>	-0.155	1.000								
<i>elnatry 12.31</i>	0.045	0.453	1.000							
<i>roa 12.31</i>	0.107	0.082	0.006	1.000						
<i>roe 12.31</i>	0.157	0.111	0.009	0.777	1.000					
<i>ntlslr 12.31</i>	0.017	0.428	0.734	-0.122	-0.189	1.000				
<i>lnatresr 12.31</i>	-0.131	0.153	0.159	0.049	0.015	0.040	1.000			
<i>Personal # of Financial Products/Services</i>	-0.049	0.137	-0.033	0.090	0.107	0.079	-0.104	1.000		
<i>Business # of Financial Products/Services</i>	-0.063	0.130	-0.003	-0.077	0.064	0.063	-0.033	0.572	1.000	
<i>Total # of Financial Products/Services</i>	-0.070	0.148	-0.011	-0.016	0.093	0.103	-0.073	0.802	0.932	1.000



**Table 2.2 - 09.30.17 – Correlation Table**

ts/Services	Inatres 09.30	nimy 09.30	elnatry 09.30	roa 09.30	roe 09.30	ntlslr 09.30	Inatresr 09.30	Personal # of Financial Products/Services	Business # of Financial Products/Services	Total # of Financial Products/Services
Inatres 09.30	1.000									
nimy 09.30	-0.161	1.000								
elnatry 09.30	0.069	0.435	1.000							
roa 09.30	0.044	0.152	-0.017	1.000						
roe 09.30	0.090	0.155	-0.001	0.707	1.000					
ntlslr 09.30	0.031	0.375	0.718	-0.126	-0.152	1.000				
Inatresr 09.30	-0.127	0.129	0.159	0.064	0.022	0.047	1.000			
Personal # of Financial Products/Services	-0.047	0.159	-0.032	0.124	0.109	0.058	-0.106	1.000		
Business # of Financial Products/Services	-0.061	0.144	-0.005	-0.027	0.107	0.054	-0.026	0.572	1.000	
Total # of Financial Products/Services	-0.068	0.168	-0.012	0.028	0.118	0.094	-0.070	0.802	0.932	1.000

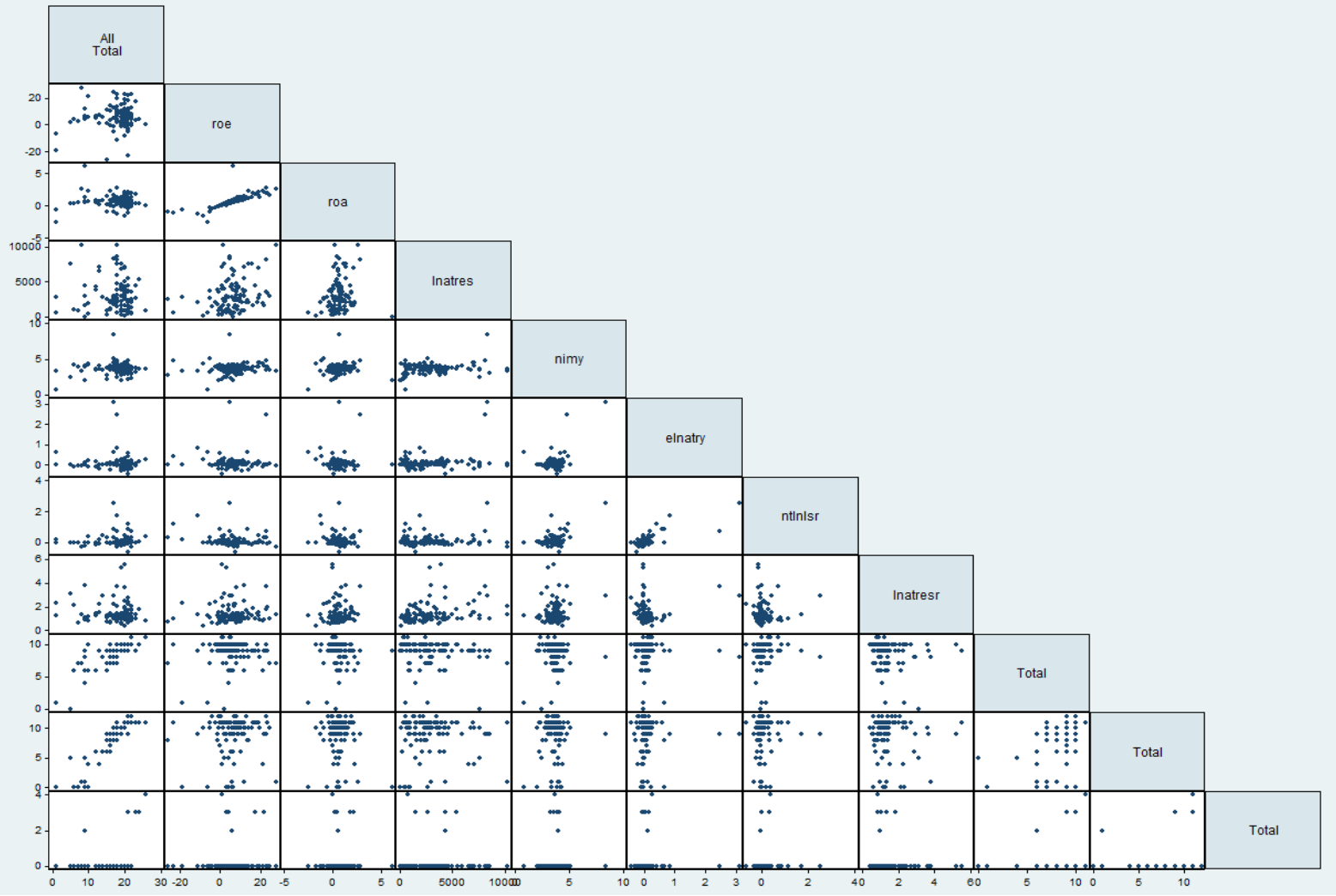
**Table 2.3 - 06.30.17 – Correlation Table**

ts/Services	Inatres 06.30	nimy 06.30	elnatry 06.30	roa 06.30	roe 06.30	ntlslr 06.30	Inatresr 06.30	Personal # of Financial Products/Services	Business # of Financial Products/Services	Total # of Financial Products/Services
Inatres 06.30	1.000									
nimy 06.30	-0.189	1.000								
elnatry 06.30	0.065	0.465	1.000							
roa 06.30	0.025	0.025	0.092	1.000						
roe 06.30	0.066	0.089	0.059	0.705	1.000					
ntlslr 06.30	0.048	0.356	0.599	-0.019	-0.048	1.000				
Inatresr 06.30	-0.129	0.140	0.167	0.097	0.079	0.034	1.000			
Personal # of Financial Products/Services	-0.067	0.029	-0.012	-0.041	0.027	0.038	-0.106	1.000		
Business # of Financial Products/Services	-0.064	0.065	-0.002	-0.127	0.069	0.038	-0.025	0.536	1.000	
Total # of Financial Products/Services	-0.079	0.066	-0.002	-0.109	0.061	0.090	-0.069	0.777	0.930	1

**Table 2.4 - 03.31.17 – Correlation Table**

ts/Services	Inatres 03.31	nimy 03.31	elnatry 03.31	roa 03.31	roe 03.31	ntlslr 03.31	Inatresr 03.31	Personal # of Financial Products/Services	Business # of Financial Products/Services	Total # of Financial Products/Services
Inatres 03.31	1.000									
nimy 03.31	-0.084	1.000								
elnatry 03.31	0.041	0.544	1.000							
roa 03.31	0.062	-0.030	0.062	1.000						
roe 03.31	0.065	-0.007	0.018	0.594	1.000					
ntlslr 03.31	0.079	0.255	0.465	-0.076	-0.081	1.000				
Inatresr 03.31	-0.105	0.129	0.126	0.166	0.287	-0.007	1.000			
Personal # of Financial Products/Services	-0.086	-0.046	-0.028	-0.016	0.074	0.041	-0.006	1.000		
Business # of Financial Products/Services	-0.040	0.036	0.006	-0.135	0.050	0.035	-0.002	0.536	1.000	
Total # of Financial Products/Services	-0.067	0.015	-0.005	-0.113	0.058	0.099	-0.014	0.777	0.930	1.000

**Table 3 – Correlation Table Graph**



**Descriptive Statistics – SM Table 4.1**

	Mean	Standard Error	Median	Mode	Standard Deviation	Sample Variance	Kurtosis	Skewness	Range	Minimum	Maximum	Sum	Count
<i>Inatres 12.31</i>	1142.872	144.425	862.000	400.000	901.934	813484.273	1.643	1.379	3991.000	0.000	3991.000	44572.000	39
<i>Inatres 09.30</i>	1137.103	143.236	874.000	#N/A	894.507	800142.147	1.565	1.377	3904.000	0.000	3904.000	44347.000	39
<i>Inatres 06.30</i>	1149.692	142.327	964.000	#N/A	888.833	790024.166	1.620	1.376	3895.000	0.000	3895.000	44838.000	39
<i>Inatres 03.31</i>	1164.744	146.062	963.000	#N/A	912.158	832031.564	1.519	1.379	3915.000	0.000	3915.000	45425.000	39
<i>nimy 12.31</i>	3.622	0.122	3.920	#N/A	0.761	0.579	-0.203	-0.695	3.048	2.002	5.050	141.246	39
<i>nimy 09.30</i>	3.599	0.124	3.870	#N/A	0.775	0.600	-0.130	-0.608	3.217	1.962	5.180	140.352	39
<i>nimy 06.30</i>	3.577	0.126	3.906	#N/A	0.785	0.617	-0.170	-0.549	3.243	1.964	5.207	139.501	39
<i>nimy 03.31</i>	3.548	0.130	3.764	#N/A	0.814	0.662	0.005	-0.253	3.396	1.931	5.327	138.370	39
<i>elnatry 12.31</i>	0.027	0.027	0.000	0.000	0.168	0.028	2.865	1.171	0.883	-0.295	0.588	1.048	39
<i>elnatry 09.30</i>	0.022	0.029	0.000	0.000	0.183	0.034	3.619	0.926	1.064	-0.404	0.660	0.841	39
<i>elnatry 06.30</i>	-0.011	0.033	0.000	0.000	0.204	0.042	3.376	-0.962	1.119	-0.621	0.498	-0.418	39
<i>elnatry 03.31</i>	-0.016	0.045	0.000	0.000	0.282	0.080	10.832	-1.276	2.113	-1.200	0.912	-0.622	39
<i>roa 12.31</i>	0.532	0.187	0.396	#N/A	1.171	1.371	13.694	2.804	7.790	-1.648	6.142	20.748	39
<i>roa 09.30</i>	0.658	0.196	0.501	#N/A	1.223	1.495	17.638	3.292	8.625	-1.785	6.840	25.667	39
<i>roa 06.30</i>	0.656	0.186	0.480	#N/A	1.161	1.347	15.695	2.870	8.254	-1.901	6.353	25.568	39
<i>roa 03.31</i>	0.701	0.193	0.451	#N/A	1.206	1.454	14.033	2.825	8.187	-1.689	6.498	27.326	39
<i>roe 12.31</i>	3.032	1.213	3.942	#N/A	7.576	57.391	4.162	-1.599	39.404	-23.217	16.186	118.244	39
<i>roe 09.30</i>	4.064	1.147	5.492	#N/A	7.164	51.327	7.696	-2.164	41.730	-25.807	15.923	158.509	39
<i>roe 06.30</i>	4.319	1.475	5.586	#N/A	9.212	84.861	15.834	-3.150	62.871	-41.230	21.641	168.456	39
<i>roe 03.31</i>	6.275	2.704	4.620	#N/A	16.885	285.115	20.444	3.367	131.322	-37.560	93.762	244.733	39
<i>ntlslr 12.31</i>	0.073	0.053	0.000	0.000	0.324	0.105	3.649	1.439	1.793	-0.624	1.169	2.765	38
<i>ntlslr 09.30</i>	0.071	0.053	0.013	0.000	0.324	0.105	4.186	1.118	1.959	-0.739	1.220	2.685	38
<i>ntlslr 06.30</i>	0.011	0.046	0.004	0.000	0.286	0.082	2.669	-0.731	1.472	-0.831	0.641	0.435	38
<i>ntlslr 03.31</i>	-0.044	0.057	-0.001	0.000	0.351	0.123	8.190	-2.209	2.103	-1.429	0.674	-1.686	38
<i>Inatresr 12.31</i>	1.616	0.179	1.225	#N/A	1.100	1.211	6.232	2.421	5.106	0.420	5.527	61.414	38
<i>Inatresr 09.30</i>	1.641	0.174	1.277	#N/A	1.072	1.149	5.172	2.147	5.044	0.296	5.341	62.348	38
<i>Inatresr 06.30</i>	1.674	0.170	1.305	#N/A	1.046	1.095	5.098	2.109	5.029	0.296	5.325	63.616	38
<i>Inatresr 03.31</i>	1.712	0.162	1.322	#N/A	0.997	0.994	3.655	1.750	4.749	0.179	4.928	65.053	38

**Descriptive Statistics – SM-MD Table 4.2**

	Mean	Standard Error	Median	Mode	Standard Deviation	Sample Variance	Kurtosis	Skewness	Range	Minimum	Maximum	Sum	Count
<i>Inatres 12.31</i>	2914.971	277.934	2453.500	#N/A	1620.621	2626411.726	5.728	2.275	7278.000	1111.000	8389.000	99109.000	34
<i>Inatres 09.30</i>	2917.676	250.880	2502.500	#N/A	1462.869	2139985.074	4.977	2.043	6706.000	1098.000	7804.000	99201.000	34
<i>Inatres 06.30</i>	2861.235	237.701	2573.000	2134.000	1386.026	1921067.094	4.518	1.884	6597.000	1077.000	7674.000	97282.000	34
<i>Inatres 03.31</i>	2766.912	202.030	2478.500	#N/A	1178.028	1387750.143	2.981	1.429	5737.000	968.000	6705.000	94075.000	34
<i>nimy 12.31</i>	3.919	0.151	3.815	#N/A	0.878	0.771	21.175	4.149	5.447	2.936	8.383	133.235	34
<i>nimy 09.30</i>	3.899	0.150	3.760	#N/A	0.875	0.765	20.971	4.132	5.413	2.924	8.336	132.560	34
<i>nimy 06.30</i>	3.865	0.152	3.701	#N/A	0.884	0.781	21.214	4.144	5.520	2.839	8.359	131.413	34
<i>nimy 03.31</i>	3.824	0.150	3.654	#N/A	0.875	0.766	20.747	4.090	5.481	2.772	8.253	130.025	34
<i>elnatry 12.31</i>	0.228	0.117	0.054	0.000	0.685	0.469	11.921	3.417	3.509	-0.422	3.088	7.760	34
<i>elnatry 09.30</i>	0.253	0.130	0.056	0.000	0.760	0.577	11.537	3.375	3.946	-0.562	3.384	8.596	34
<i>elnatry 06.30</i>	0.238	0.144	0.000	0.000	0.842	0.709	12.843	3.563	4.571	-0.845	3.725	8.097	34
<i>elnatry 03.31</i>	0.215	0.142	0.000	0.000	0.826	0.682	11.760	2.943	5.235	-1.537	3.697	7.314	34
<i>roa 12.31</i>	0.883	0.149	0.805	#N/A	0.867	0.752	0.422	0.236	4.124	-1.262	2.862	30.019	34
<i>roa 09.30</i>	0.946	0.143	0.780	#N/A	0.833	0.694	1.510	0.159	4.425	-1.419	3.006	32.178	34
<i>roa 06.30</i>	0.952	0.126	0.743	#N/A	0.734	0.539	0.766	1.008	3.338	-0.284	3.054	32.371	34
<i>roa 03.31</i>	0.906	0.127	0.661	#N/A	0.739	0.546	2.647	1.486	3.641	-0.250	3.391	30.788	34
<i>roe 12.31</i>	8.729	1.415	8.074	#N/A	8.252	68.091	-0.010	0.103	34.778	-11.415	23.363	296.780	34
<i>roe 09.30</i>	9.328	1.334	8.243	#N/A	7.777	60.474	0.809	-0.031	36.889	-12.511	24.378	317.141	34
<i>roe 06.30</i>	9.424	1.203	8.328	#N/A	7.015	49.207	-0.142	0.748	28.397	-2.425	25.972	320.411	34
<i>roe 03.31</i>	9.052	1.262	7.440	#N/A	7.359	54.152	1.868	1.352	34.270	-2.114	32.155	307.770	34
<i>ntlslr 12.31</i>	0.208	0.093	0.000	0.000	0.542	0.294	11.059	3.223	2.654	-0.140	2.514	7.072	34
<i>ntlslr 09.30</i>	0.208	0.109	-0.001	0.000	0.634	0.402	10.942	3.314	2.945	-0.188	2.757	7.064	34
<i>ntlslr 06.30</i>	0.172	0.097	-0.005	0.000	0.568	0.323	12.408	3.296	3.040	-0.313	2.727	5.862	34
<i>ntlslr 03.31</i>	0.222	0.109	-0.001	0.000	0.635	0.403	8.500	2.824	3.227	-0.411	2.816	7.559	34
<i>Inatresr 12.31</i>	1.427	0.120	1.308	#N/A	0.700	0.489	3.030	1.762	3.067	0.631	3.698	48.527	34
<i>Inatresr 09.30</i>	1.489	0.122	1.321	#N/A	0.712	0.507	3.436	1.805	3.229	0.668	3.897	50.626	34
<i>Inatresr 06.30</i>	1.492	0.123	1.275	#N/A	0.719	0.516	3.220	1.792	3.125	0.698	3.823	50.742	34
<i>Inatresr 03.31</i>	1.496	0.115	1.350	#N/A	0.672	0.452	3.108	1.709	2.985	0.672	3.657	50.851	34

**Descriptive Statistics – MD Table 4.3**

	Mean	Standard Error	Median	Mode	Standard Deviation	Sample Variance	Kurtosis	Skewness	Range	Minimum	Maximum	Sum	Count
<i>Inatres 12.31</i>	4024.130	287.464	3836.000	3502.000	1378.627	1900612.573	0.599	0.946	4881.000	2175.000	7056.000	92555.000	23
<i>Inatres 09.30</i>	3987.826	289.883	3670.000	#N/A	1390.232	1932745.514	0.807	1.065	5231.000	2019.000	7250.000	91720.000	23
<i>Inatres 06.30</i>	3961.261	303.682	3743.000	#N/A	1456.410	2121129.565	1.974	1.367	6219.000	1783.000	8002.000	91109.000	23
<i>Inatres 03.31</i>	3897.870	322.906	3672.000	#N/A	1548.605	2398177.664	2.027	1.340	6801.000	1458.000	8259.000	89651.000	23
<i>nimy 12.31</i>	3.622	0.088	3.650	#N/A	0.423	0.179	0.232	0.325	1.687	2.809	4.496	83.302	23
<i>nimy 09.30</i>	3.604	0.092	3.579	#N/A	0.443	0.197	0.520	0.471	1.828	2.737	4.565	82.887	23
<i>nimy 06.30</i>	3.566	0.097	3.544	#N/A	0.463	0.214	0.525	0.440	1.884	2.705	4.590	82.015	23
<i>nimy 03.31</i>	3.535	0.095	3.509	#N/A	0.457	0.209	1.111	0.242	1.967	2.598	4.566	81.312	23
<i>elnatry 12.31</i>	0.057	0.027	0.042	0.000	0.129	0.017	0.338	-0.429	0.539	-0.236	0.303	1.314	23
<i>elnatry 09.30</i>	0.034	0.026	0.015	0.000	0.127	0.016	0.177	-0.519	0.499	-0.264	0.236	0.791	23
<i>elnatry 06.30</i>	0.047	0.025	0.014	0.000	0.119	0.014	1.270	-0.282	0.536	-0.238	0.298	1.071	23
<i>elnatry 03.31</i>	0.033	0.023	0.007	0.000	0.111	0.012	6.116	-1.534	0.555	-0.351	0.204	0.763	23
<i>roa 12.31</i>	0.687	0.131	0.774	#N/A	0.630	0.397	0.452	-0.433	2.706	-0.855	1.851	15.791	23
<i>roa 09.30</i>	0.713	0.118	0.771	#N/A	0.565	0.319	3.290	-1.361	2.650	-1.044	1.606	16.398	23
<i>roa 06.30</i>	0.731	0.096	0.757	#N/A	0.459	0.211	1.062	-0.534	2.055	-0.471	1.585	16.812	23
<i>roa 03.31</i>	0.646	0.103	0.646	#N/A	0.493	0.243	2.738	-0.929	2.377	-0.814	1.563	14.847	23
<i>roe 12.31</i>	6.607	2.015	7.569	#N/A	9.666	93.431	5.266	-1.480	50.162	-25.812	24.350	151.960	23
<i>roe 09.30</i>	6.829	2.064	7.405	#N/A	9.901	98.028	9.490	-2.370	54.214	-30.594	23.620	157.069	23
<i>roe 06.30</i>	7.588	1.429	7.229	#N/A	6.852	46.953	3.902	-0.610	36.556	-13.271	23.285	174.524	23
<i>roe 03.31</i>	6.368	1.735	6.415	#N/A	8.318	69.197	6.906	-1.588	45.979	-22.755	23.224	146.465	23
<i>ntlslr 12.31</i>	0.042	0.031	0.040	#N/A	0.148	0.022	1.441	0.913	0.596	-0.164	0.432	0.964	23
<i>ntlslr 09.30</i>	0.012	0.024	0.017	#N/A	0.114	0.013	-0.628	-0.428	0.366	-0.194	0.171	0.279	23
<i>ntlslr 06.30</i>	0.028	0.024	0.014	0.000	0.115	0.013	1.822	0.770	0.520	-0.170	0.350	0.645	23
<i>ntlslr 03.31</i>	0.061	0.025	0.013	0.000	0.118	0.014	0.671	1.145	0.433	-0.088	0.346	1.411	23
<i>Inatresr 12.31</i>	1.260	0.142	1.031	#N/A	0.682	0.465	6.535	2.451	3.011	0.638	3.650	28.983	23
<i>Inatresr 09.30</i>	1.297	0.153	1.038	#N/A	0.733	0.538	7.152	2.517	3.335	0.585	3.921	29.830	23
<i>Inatresr 06.30</i>	1.305	0.143	1.031	#N/A	0.687	0.472	5.010	2.145	3.063	0.534	3.597	30.014	23
<i>Inatresr 03.31</i>	1.319	0.143	1.083	#N/A	0.687	0.472	4.537	2.013	3.110	0.456	3.566	30.342	23

### Descriptive Statistics – MD-LG Table 4.4

	Mean	Standard Error	Median	Mode	Standard Deviation	Sample Variance	Kurtosis	Skewness	Range	Minimum	Maximum	Sum	Count
<i>Inatres 12.31</i>	6447.250	693.384	6329.000	#N/A	1961.187	3846253.357	1.199	0.939	6058.000	4227.000	10285.000	51578.000	8
<i>Inatres 09.30</i>	6516.000	756.638	6022.500	#N/A	2140.096	4580012.571	-0.573	0.590	6054.000	4115.000	10169.000	52128.000	8
<i>Inatres 06.30</i>	6453.875	765.550	5928.500	#N/A	2165.303	4688537.554	-0.461	0.574	6299.000	3887.000	10186.000	51631.000	8
<i>Inatres 03.31</i>	6074.143	860.135	5467.000	#N/A	2275.704	5178830.810	0.046	0.997	6346.000	3670.000	10016.000	42519.000	7
<i>nimy 12.31</i>	3.642	0.220	3.792	#N/A	0.622	0.387	1.406	-1.029	2.034	2.420	4.454	29.133	8
<i>nimy 09.30</i>	3.616	0.223	3.776	#N/A	0.632	0.400	1.336	-0.971	2.076	2.384	4.460	28.932	8
<i>nimy 06.30</i>	3.601	0.226	3.782	#N/A	0.641	0.410	1.362	-0.980	2.103	2.347	4.449	28.804	8
<i>nimy 03.31</i>	3.795	0.171	3.918	#N/A	0.452	0.204	0.004	-0.226	1.377	3.091	4.468	26.568	7
<i>elnatry 12.31</i>	0.109	0.031	0.121	0.000	0.088	0.008	-0.755	0.119	0.250	0.000	0.250	0.874	8
<i>elnatry 09.30</i>	0.112	0.032	0.128	0.000	0.089	0.008	-1.207	-0.027	0.244	0.000	0.244	0.894	8
<i>elnatry 06.30</i>	0.130	0.043	0.121	0.000	0.121	0.015	2.011	1.157	0.377	0.000	0.377	1.039	8
<i>elnatry 03.31</i>	0.146	0.036	0.158	#N/A	0.095	0.009	-0.729	-0.503	0.268	0.000	0.268	1.024	7
<i>roa 12.31</i>	0.832	0.224	0.647	#N/A	0.634	0.402	1.949	1.469	1.937	0.200	2.137	6.654	8
<i>roa 09.30</i>	0.949	0.210	0.713	#N/A	0.594	0.353	3.914	2.006	1.776	0.501	2.277	7.594	8
<i>roa 06.30</i>	0.940	0.222	0.731	#N/A	0.627	0.394	3.027	1.760	1.894	0.403	2.298	7.523	8
<i>roa 03.31</i>	0.890	0.262	0.577	#N/A	0.693	0.480	3.606	1.885	2.002	0.328	2.330	6.232	7
<i>roe 12.31</i>	7.737	2.000	6.319	#N/A	5.657	32.002	1.470	1.144	17.362	1.664	19.026	61.892	8
<i>roe 09.30</i>	8.692	1.871	6.751	#N/A	5.293	28.016	2.989	1.654	16.239	3.865	20.104	69.534	8
<i>roe 06.30</i>	8.540	2.005	6.142	#N/A	5.670	32.150	3.090	1.739	17.481	3.360	20.841	68.323	8
<i>roe 03.31</i>	8.487	2.376	5.821	#N/A	6.287	39.520	3.808	1.844	18.848	2.735	21.582	59.410	7
<i>ntlslr 12.31</i>	0.074	0.061	-0.013	#N/A	0.172	0.030	2.969	1.839	0.495	-0.047	0.447	0.595	8
<i>ntlslr 09.30</i>	0.033	0.036	-0.005	#N/A	0.102	0.010	5.540	2.284	0.307	-0.035	0.272	0.260	8
<i>ntlslr 06.30</i>	0.025	0.045	-0.017	#N/A	0.126	0.016	6.520	2.495	0.383	-0.056	0.328	0.203	8
<i>ntlslr 03.31</i>	0.057	0.085	0.001	#N/A	0.226	0.051	4.400	1.910	0.700	-0.166	0.535	0.399	7
<i>Inatresr 12.31</i>	1.557	0.257	1.383	#N/A	0.726	0.527	3.024	1.714	2.166	0.962	3.128	12.459	8
<i>Inatresr 09.30</i>	1.605	0.272	1.391	#N/A	0.769	0.592	2.097	1.438	2.286	0.922	3.208	12.838	8
<i>Inatresr 06.30</i>	1.625	0.278	1.403	#N/A	0.786	0.618	2.746	1.596	2.371	0.936	3.307	12.996	8
<i>Inatresr 03.31</i>	1.391	0.157	1.248	#N/A	0.416	0.173	-0.631	0.696	1.167	0.905	2.071	9.734	7

**Descriptive Statistics – LG Table 4.5**

	Mean	Standard Error	Median	Mode	Standard Deviation	Sample Variance	Kurtosis	Skewness	Range	Minimum	Maximum	Sum	Count
<i>Inatres 12.31</i>	6926.833	1064.366	7584.500	#N/A	2607.154	6797253.767	-1.472	-0.357	6448.000	3752.000	10200.000	41561.000	6
<i>Inatres 09.30</i>	6865.333	1040.428	7764.500	#N/A	2548.517	6494940.267	-1.683	-0.556	6099.000	3698.000	9797.000	41192.000	6
<i>Inatres 06.30</i>	6698.500	1017.120	7210.000	#N/A	2491.425	6207197.900	-1.290	-0.197	6336.000	3670.000	10006.000	40191.000	6
<i>Inatres 03.31</i>	6454.667	911.850	7014.000	#N/A	2233.567	4988821.867	-1.851	-0.478	5279.000	3643.000	8922.000	38728.000	6
<i>nimy 12.31</i>	3.380	0.166	3.416	#N/A	0.406	0.164	-0.289	-0.196	1.149	2.786	3.935	20.277	6
<i>nimy 09.30</i>	3.362	0.161	3.409	#N/A	0.394	0.155	-0.627	-0.271	1.093	2.788	3.881	20.169	6
<i>nimy 06.30</i>	3.319	0.153	3.372	#N/A	0.375	0.141	-0.492	-0.351	1.044	2.764	3.807	19.917	6
<i>nimy 03.31</i>	3.247	0.157	3.256	#N/A	0.386	0.149	-0.966	-0.268	1.030	2.686	3.716	19.481	6
<i>elnatry 12.31</i>	0.014	0.029	0.007	#N/A	0.072	0.005	-1.201	0.357	0.185	-0.069	0.117	0.081	6
<i>elnatry 09.30</i>	-0.001	0.039	0.002	#N/A	0.096	0.009	-0.431	-0.082	0.269	-0.137	0.131	-0.007	6
<i>elnatry 06.30</i>	-0.025	0.045	0.004	#N/A	0.109	0.012	-0.371	-0.856	0.287	-0.200	0.088	-0.151	6
<i>elnatry 03.31</i>	0.004	0.010	0.000	0.000	0.024	0.001	2.142	0.370	0.076	-0.032	0.044	0.021	6
<i>roa 12.31</i>	1.034	0.395	0.952	#N/A	0.968	0.938	1.315	0.845	2.836	-0.156	2.680	6.205	6
<i>roa 09.30</i>	0.930	0.130	0.828	#N/A	0.319	0.102	-0.565	0.786	0.852	0.576	1.428	5.579	6
<i>roa 06.30</i>	0.956	0.125	0.848	#N/A	0.307	0.094	0.333	0.972	0.849	0.615	1.464	5.737	6
<i>roa 03.31</i>	0.923	0.105	0.804	#N/A	0.256	0.066	-1.847	0.792	0.573	0.675	1.248	5.538	6
<i>roe 12.31</i>	11.413	4.122	10.989	#N/A	10.097	101.945	0.526	0.610	29.044	-1.236	27.808	68.478	6
<i>roe 09.30</i>	10.044	1.752	8.808	#N/A	4.292	18.420	-1.554	0.664	10.209	5.982	16.190	60.262	6
<i>roe 06.30</i>	10.405	1.714	9.424	#N/A	4.199	17.635	-0.900	0.722	10.449	6.377	16.826	62.432	6
<i>roe 03.31</i>	10.138	1.516	9.111	#N/A	3.713	13.789	-1.817	0.545	8.784	6.140	14.924	60.830	6
<i>ntlslr 12.31</i>	-0.074	0.051	-0.034	#N/A	0.125	0.016	1.365	-1.325	0.327	-0.295	0.032	-0.444	6
<i>ntlslr 09.30</i>	-0.117	0.073	-0.041	#N/A	0.178	0.032	-1.873	-0.779	0.395	-0.358	0.037	-0.704	6
<i>ntlslr 06.30</i>	-0.152	0.095	-0.057	#N/A	0.233	0.054	0.262	-1.137	0.606	-0.545	0.061	-0.911	6
<i>ntlslr 03.31</i>	-0.078	0.041	-0.027	#N/A	0.101	0.010	-1.876	-0.846	0.214	-0.214	0.000	-0.467	6
<i>Inatresr 12.31</i>	0.964	0.134	1.007	#N/A	0.328	0.108	-1.663	-0.322	0.801	0.531	1.333	5.783	6
<i>Inatresr 09.30</i>	0.972	0.141	1.036	#N/A	0.346	0.120	-1.802	-0.422	0.803	0.524	1.327	5.830	6
<i>Inatresr 06.30</i>	0.958	0.139	1.027	#N/A	0.341	0.116	-1.367	-0.293	0.875	0.518	1.393	5.750	6
<i>Inatresr 03.31</i>	0.943	0.129	1.063	#N/A	0.316	0.100	-1.866	-0.745	0.703	0.525	1.227	5.656	6