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# COMMERCIAL BANK BRANCHING, DEPOSIT DEPTH AND STATE ECONOMIC GROWTH

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TITLE: COMMERCIAL BANK BRANCHING, DEPOSIT DEPTH AND STATE ECONOMIC GROWTH

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Using banking and economic data from 2000 to 2010 for all 50 US states, this paper tests the hypothesis that commercial bank branching and commercial bank deposits both positively impact state economic growth. The results support this hypothesis, and suggest that the branching-growth nexus remains persistent even in the face of nationwide recessions and bank failures.

KEYWORDS: Commercial Banking, Bank Branches, Bank Deposits

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## I. Introduction

The gradual deregulation of banking in the United States during the last quarter of the 20th century has enabled measurement of commercial bank deposits as an incubator of state economic growth. The "Great Recession" that occurred in the United States between 2007 and 2010 further allows economists to test the *strength* of the most visible result of banking deregulation – the widespread proliferation of bank branching – in terms of its effect on state GDP.

If the economic effects of commercial bank branching and commercial deposit depth could be isolated and calculated, an array of state-level financial development questions could be answered, such as:

1.) Can we forecast the impact of commercial bank branches on state GDP, relative to the impact of unit banks?
2.) What effect, if any, might bank deposits and/or bank branching have in offsetting the effects of unemployment during a recession?
3.) Does the *convenience* of commercial bank branching provide an intrinsically positive influence on fund supply?
4.) Does the *depth* of bank deposits and/or bank branching positively affect state GDP notwithstanding the economic effect of bank failures?

This study attempts to identify influences of commercial bank deposits and commercial bank branching on state economic indicators in a manner that might address the concerns listed above. This paper will first provide the reader with background information necessary to interpret the findings, followed by a review of selected literature, a description of data, an outline of the methodology, a detailed report of the results, and finally, a conclusion summarizing the overall findings and implications of the study.

## II. Background

Between 1970 and 1996, state and national regulations that restricted bank branching and interstate banking were gradually relaxed, resulting in all 50 states allowing at least some form of freedom in bank branching before the turn of the century (Strahan 2003). Most notable among these deregulations was the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994, which allowed banks to open branches across state lines effective June 1997.[1] Both state and national deregulations activated a trend of banking-industry consolidation, manifest through a constant succession of mergers and acquisitions (Wheelock 2011). The state-level deregulations enabled highly efficient banks to accumulate a larger market presence by expanding their branch networks – often at the expense of smaller and/or less efficient banks (Jayaratne & Strahan 1996). Because efficiency was the presumed driver of a bank's survival in post-deregulation environments, *quality* of banks' loan portfolios improved during this consolidation period, and as a result, the collective performance of banks that survived state deregulation created a positive impact on economic growth (Jayaratne & Strahan 1996).

[1] http://www.federalreservehistory.org/Events/DetailView/50

Interstate banking deregulation further enhanced the durability of banks that expanded their branch networks *across* state lines. Banks able to open new interstate branches benefited from reduced profit-based bank risks – especially where banks established branches within an economically diverse region (Shiers 2002). Thus, the overall result of deregulation was that highly efficient banks were able to increase their size and reduce their risks, making them more likely to outlast smaller, less efficient and less asset-diversified banks.

In conjunction with deregulation, improvements in information and telecommunications technology also contributed to the consolidation of the banking industry. Proliferation of electronic-payment systems, back-office IT systems and credit-scoring technologies during the 1990s greatly increased banking efficiency, and enabled long-distance loans (Berger 2003). In addition, automated teller machines (ATMs) and debit cards enjoyed significant market penetration during the 1990s and the 2000 decade, which elevated the role of banks as a payment system for customers (Gerdes, Walton, Liu & Parke 2005). These technologies usually benefited larger banks *earlier* than smaller banks (presumably due to cost constraints faced by smaller banks), granting yet another tangible advantage to larger, more efficient and more geographically-dispersed banking institutions (Berger 2003).

This banking-consolidation trend continued into the financial crisis of 2007-2010, wherein bank concentration increased *simultaneously* with an increase of bank failures. Of 318 bank failures that occurred between 2007 and 2010, about 94 percent were acquired through "purchase and assumption" (P&A) transactions by another institution – the acquiring institution typically was a larger bank with more branches than the failed banks (Wheelock 2011). Most failed banks during this period were small, but there were large banks that failed as well – the most notable among these was Washington Mutual Bank, which was declared insolvent in 2008, and acquired by JP Morgan Chase (Wheelock 2010). Other large commercial banks, such as Countrywide Bank, Wachovia Bank and National City Bank, were acquired by other banks during the financial crisis, but were never officially declared "failed banks" or closed by regulators (Wheelock 2011). As of 2014, the nation's largest commercial banks controlled trillions of dollars of deposits, and owned thousands of offices across America.[2] The top four banks alone had about $3.58 trillion in deposits in 2014, comprising roughly 21 percent of US GDP that year.

In summary, the recent history of banking, leading up to and beyond the financial crisis, has been a story of constant consolidation, in which the commercial banking industry collectively sought to enhance performance by increasing efficiency, improving technology, increasing merger-and-acquisition activity and expanding branch penetration. As the US banking industry increases its depth and improves its performance, economists theorize that economic factors will improve as well, as shown by the literature review in the upcoming section.

[2] https://www2.fdic.gov/sod/sodSumReport.asp?barItem=3&sInfoAsOf=2014)

## III. Review of Selected Literature

Mainstream economic literature has depicted a perpetual two-way causality between banking and economic growth. Specifically, existing literature describes a pattern in which trade activity increases the depth of financial-market activity, enabling investment in capital-intensive industrial projects, which ultimately results in rapid economic growth. Historical studies establish banking as an essential tool in the initial upward mobility of the world's most developed economies. Joseph Schumpeter (1911) established the concept of banking as the necessary condition for entrepreneurship, stating that virtually every entrepreneur is first a "debtor." Alfred Marshall (1923) wrote that this entrepreneurship condition evolved from a merchant-manufacturer relationship, wherein the manufacturer initially borrowed from a merchant, who hired him to make products, from which the merchant profited upon selling. As the business of manufacturing became more ambitious, manufacturers began borrowing from banks, enabled by pooled deposits from the public (Marshall 1923).

Alexander Gerschenkron (1962) describes banking as a useful device for economies tasked with "catching-up" to the modern world. Gerschenkron depicted banks as the determining factor in the development of French and German economies during the nineteenth century, wherein banks mobilized credit to fund large-scale heavy industry ventures. He further mentions that the absence of a strong banking sector, often due to scarce financial capital, renders a backward economy unable to fund the types of capital-intensive projects necessary for economic modernization. Edward Shaw (1973) proposed that large-scale investment is made possible in the private sector when savings are *pooled* in financial markets. Shaw recognized the streamlining effect that banking efficiency has on the overall efficiency of an economy at large, stating that the integration of capital markets causes the integration of labor, land and product markets – creating more benefits from economies of scale and comparative advantage in production. The dual causality of financial deepening and economic growth was explained by Jeremy Greenwood and Bryan Jovanovic (1990), whose extensive mathematical models showed that economic growth develops financial structure, and consequently, financial structure enables higher growth. The most notable conclusion of their research is that growth is usually slower when exchange is unorganized – suggesting that robust banking systems provide the most efficient investment opportunities within economies that are already robust. Greenwood and Jovanovic specifically cited factors within a strong banking system that directly affect economic growth. These factors include the pooling of risk and the gathering of financial information – the latter allowing resources to flow toward their most effective use, enabling the most profitable results of an investment project.

Hidden within the literature is the constraint of the Modigliani-Miller Theorem, which states, among other things, that a firm's value remains the same regardless of whether its funding structure consists of bank loans or stock sales (Modigliani & Miller 1958). This theorem has prompted economists to distinguish between bank-oriented economies, such as Japan and Germany, where banks play a much more integrated role in economic development, and market-oriented systems, such as the United Kingdom and the United States, in which financial markets (stock sales) play a stronger role (Levine 2002). Colin Mayer (1991) describes the bank-oriented growth model as a "hands-on" endeavor, where banks form long-term committed relationships with entrepreneurs, which reduces moral hazard and time-inconsistency problems. In their comprehensive study of European industrial history, Rondo Cameron and Richard Tilly (1967) reinforce the concept of banking as a catalyst for economic growth (Cameron et. al. 1967). Cameron states that banking made a "positive and significant contribution" to England's Industrial Revolution – often despite poor and inefficient economic decisions made by England's government and central bank. Cameron cites country-banking instruments, such as checks, shop notes and trade bills, as major catalysts of the financial deepening that enabled the rapid and far-reaching proliferation of England's industrial growth. Cameron also credits Scotland's robust banking system as a determining factor in Scotland's success in "catching up" to England's per-capita income levels during the nineteenth century. Tilly reinforces the image of the banking-intensive German economy, stating that private German banks were needed to flow funds into industries where capital was scarce. Tilly stated that German banks formed long-term relationships with entrepreneurial firms, which ultimately converted short-term credit into long-term credit.

An alternative theory of finance and economic development was initiated by Joan Robinson (1952), who introduced the concept of fund supply as a measure of "confidence" on the part of those who own financial wealth. Her now-infamous quote, "where enterprise leads, finance follows," appears to express the belief that enterprise *creates* prospects for financiers to supply funds in expectation of future profit. From the same passage (from chapter 4.II of her 1952 book, *The Generalization of the General Theory*), she expresses the importance of economic confidence as it relates to finance and industry, in which she states, "A high level of prospective profits and a high degree of confidence in these prospects promote enterprise and at the same time ease the supply of finance." This quote is most important, because it eschews the current concept of dual causality between finance and economic activity in favor of a more sequentially-logical model – it is *economic confidence* that causes *both* enterprise activity and finance *simultaneously*. This aspect of Robinson's philosophy, as it relates to some of the models in my research study, will be described in further detail toward the end of this section.

Within American development history, Homer Hoyt (1941) and Douglass North (1956) credit banks and financial institutions with strengthening America's urban economic base, allowing American cities to grow rapidly. Hoyt cited banking and insurance as fundamental sources of workforce employment, and North stated that external investment capital tends to flow into existing export industries, which North believed were essential toward creating local employment that causes cities to grow.

Within the subject of banking and its effect on development, newer literature has revealed specific factors that positively impact economic growth. Levine, Demirguc-Kunt, Feyen and Cihak (2013) created a useful global database using four measures to assess a nation's financial development: 1.) Size/depth; 2.)

Access; 3.) Efficiency and 4.) Stability. They then compared correlations between the four financial-development factors and the economic development levels of various nations. According to Levine et al., financial development describes the extent to which financial factors reduce the effects of imperfect markets, mostly by drafting enforceable contracts, reducing transaction costs and employing information technology. Levine et al. further propose that when financial institutions succeed at mitigating the effects of imperfect markets, they enable allocation of resources toward the most promising ideas and projects, and thereby, yield economic development. Asli Demirguc-Kunt and Leora Klapper (2012) discovered a link between bank-account access and the income levels of nations. They found that bank account penetration is considerably less in low income countries, where a small minority of people (24 percent) have formal bank accounts, compared to a greater majority of people (89 percent) who have bank accounts in high-income countries. With regard to banking deregulation, Zou, Miller and Malamud (2009) discovered that banks enjoyed higher returns on equity and higher returns on assets following the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 (mentioned in the background section), but efficiency gains differed between various income classes of banks. With regard to smaller community banks, Emmons, Gilbert and Yeager (2004) delineated two types of risks faced by small banks: 1.) Risks associated with non-diversified clients (idiosyncratic risk), and 2.) Risks associated with the absence of bank branches (market risk). This implies that bank branching increases an institution's chances of survival. Although this view is generally supported by US banking history, Craig Aubuchon and David Wheelock's 2010 study of the banking industry recession revealed exceptions to this rule – as mentioned in the previous section, several large banking institutions with sizable branch networks still failed during the 2007-2010 recession. Because the 2007-2010 banking recession represents an anomaly, this study generally assumes that larger and more diversified banks enjoy greater security, at least in the face of local economic downturns.

Existing literature measures banking factors using a variety of methods. With regard to banking *intensity*, Raymond Goldsmith (1969) tracked the assets-to-GNP ratio; Franklin Allen and Douglas Gale (1994) tracked the ratio of assets divided by GDP and Ronald McKinnon (1973) measured banking intensity by the ratio of banking liabilities (presumably deposits) divided by GNP. More recently, Levine, Demirguc-Kunt, Feyen and Cihak (2013) used a statistic called "private credit to GDP" ratio, which involves domestic private credit to the "real sector," and excludes credit issued to governments and public enterprises. Levine et al. reported that this statistic is positively correlated with the income levels of nations.

Other economists track banking strength by size. Robert King and Ross Levine (1993) used the size of the financial sector relative to GDP as a measure of financial development. Grabowski, Aly, Pasurka and Rangan (1990) estimated the effect of bank size on technical efficiency, in which they measured a bank's size by total deposits and the number of branches. With respect to other indicators, Michael Klein (1971) believed the *convenience* of banking locations was a strong inducement for depositors, stating "…since demand deposits are used primarily for transactions, the proximity of the depositor to the bank is of prime importance."

In contrast to the existing literature, my study uses a wider assortment of intensity and strength variables to gauge relationships between banking and state GDP. Where King & Levine (1993), and Levine et.al (2013) measure banking strength in terms of assets, my study measures commercial bank deposits in terms of their dual nature. On a balance sheet, deposits represent a proxy for Joan Robinson's measure of economic confidence within a region. Deposits are sourced on two general fronts – they are simultaneously fueled by fund supply on the right-hand side of a bank's balance sheet (deposits as liabilities), and commercial lending generated by the left-hand side, which creates "new private saving" in the form of deposits made by eventual borrowers (Tobin 1963). From a competitive-market standpoint, deposits may be similar to an employment rate – my findings suggest they are the mechanism by which financial-industry expansion and streamlining can be inferred. My study also attempts a specific path with regard to branch banking. Whereas Benston et al. (1982) and Powers (1969) successfully measured the economy-of-scale and/or efficiency capabilities between branches and unit banks, my study tracks the ability of branching weight and banking consolidation to positively impact state GDP while withstanding economic shocks associated with recessions and bank failures. This is feasible because of two important banking events that occurred during the time-interval of my study: 1.) In 2003, electronic payments outnumbered the usage of checks for the first time in American history – indicating the ability of technology (which primarily favors larger banks) to vastly improve the efficiency of the "payment system" function of the finance industry (Gerdes et.al 2005); and 2.) The financial crisis of 2007-2010 caused a massive wave of bank failures – many of which were resolved by acquisitions transactions (Wheelock 2010). For these reasons, I am able to test the effects of consolidation (fueled by deregulation, technology and bank failures) and bank deposits (a partial proxy for Joan Robinson's concept of economic confidence) against the effects of cyclical economic downturns (visible during the financial crisis of 2007-2010).

## IV. Data

This section describes and defines the banking and financial data used in this study, and specifies general trends observed within the data. My study uses financial and sector-industry data within a cross-section of all 50 states in the United States of America (not including the District of Columbia), across a time-interval spanning 2000 to 2010. My goal was to obtain data that would allow calculation of: 1.) Banking factor elasticities of state GDP, 2.) Weights of banking activity, and 3.) Banking factor elasticities of income pertaining to state industries – most notably, construction, trade and financial services. Banking data were obtained from the Federal Deposit Insurance Corporation's (FDIC) Historical Statistics on Banking database.[3] These data include total commercial bank deposits (foreign and domestic), total number of banking institutions, number of banks with branches, number of unit banks (stand-alone banks that

[3] https://www2.fdic.gov/hsob/SelectRpt.asp?EntryTyp=10&Header=1

do not operate branches), total number of branches and total number of bank offices. The "total number of banking institutions" statistic is recorded by the FDIC as the sum of the "*number of unit banks"* statistic plus the "*number of banks with branches"* figure. The "total number of bank offices" statistic is recorded by the FDIC as the sum of the "*total number of banking institutions"* figure plus the "*total number of branches"* statistic. This means unit banks can be weighted both as a percentage of *banking institutions* and as a percentage of *bank offices*, while bank branches only can be weighted as a percentage of *bank offices*. Descriptive statistics of these variables are visible in Table A1.

**Table A1 - Descriptive Statistics**

| Variable | Number of Observations | Mean | Standard Deviation | Min | Max |
|---|---|---|---|---|---|
| State GDP Log | 550 | 25.7188 | 1.0513 | 23.5754 | 28.3214 |
| Manufacturing Log | 550 | 23.5713 | 1.2883 | 20.5405 | 26.2366 |
| Manufacturing Share of GDP | 550 | 0.1309 | 0.0563 | 0.0190 | 0.2983 |
| Transportation Log | 550 | 22.2161 | 1.0450 | 19.7919 | 24.5320 |
| Financial Svcs Log | 550 | 22.9186 | 1.2214 | 20.2596 | 26.0060 |
| Financial Svcs Share of GDP | 550 | 0.0693 | 0.0450 | 0.0192 | 0.3164 |
| Unemployment Rate | 550 | 5.5319 | 1.9834 | 2.3000 | 13.7833 |
| Deposits Log | 550 | 24.5513 | 1.3891 | 21.3241 | 28.0663 |
| Deposits Relative to State GDP | 550 | 0.7254 | 1.8091 | 0.0167 | 23.9535 |
| Banks Log | 550 | 4.4504 | 1.1917 | 1.3863 | 6.5667 |
| Branches Log | 550 | 6.8570 | 0.9985 | 4.7536 | 8.8406 |
| Branches Per 100,000 residents | 550 | 27.1910 | 7.6744 | 12.3982 | 49.5765 |
| Offices Log | 550 | 6.9687 | 0.9899 | 4.8040 | 8.8811 |
| Branches Per Offices | 550 | 0.8976 | 0.0739 | 0.6667 | 0.9747 |
| Unit Banks Per Offices | 550 | 0.0297 | 0.0339 | 0.0000 | 0.1920 |
| Deposits Per Office Log | 550 | 17.5826 | 1.0826 | 15.5190 | 21.4531 |
| Deposits Per Capita Log | 550 | 9.4436 | 1.0901 | 6.7089 | 13.9457 |
| Unit Banks Log | 550 | 2.8999 | 1.3929 | 0.0000 | 5.5013 |
| Unit Banks Per 100,000 Residents | 550 | 1.1205 | 1.5867 | 0.0000 | 9.2775 |
| Banks with Branches | 550 | 109.5964 | 101.8266 | 4.0000 | 470.0000 |
| Banks With Branches Log | 550 | 4.1613 | 1.1777 | 1.3863 | 6.1527 |
| Total Banks | 550 | 149.3109 | 146.8852 | 4.0000 | 711.0000 |
| Population Log | 550 | 15.1077 | 1.0112 | 13.1109 | 17.4333 |
| National Fed Funds Rate | 550 | 2.7036 | 1.9883 | 0.1600 | 6.2400 |
| Failed Banks | 550 | 0.5327 | 2.3161 | 0.0000 | 24.0000 |
| Farm GDP Log | 550 | 20.7673 | 1.3373 | 16.3004 | 23.8052 |
| Oil & Gas Extraction Log | 550 | 14.6104 | 8.0469 | 0.0000 | 25.7589 |
| Mining Log | 550 | 19.7618 | 2.0761 | 0.0000 | 22.7900 |
| Construction Log | 550 | 22.6567 | 1.0293 | 20.5713 | 25.2732 |
| Wholesale Trade Log | 550 | 22.8060 | 1.1556 | 20.3975 | 25.4259 |
| Retail Trade Log | 550 | 23.0047 | 1.0135 | 20.9384 | 25.5413 |
| Total Trade Log | 550 | 23.6107 | 1.0715 | 21.4164 | 26.1627 |

Per Table A1, the logs of the economic sector indicators mostly show substantial but comparable numerical ranges, and the bank statistics show a relatively wide range. The logs of the total number of banking institutions ranged from 1.3863 to 6.5667. When coupled with a mean of 4.4504, this range indicates that the number of overall banking institutions varied greatly across states as well as time. Also remarkable is the range of the "*bank branches per total bank offices"* statistic – it ranged from 0.6667 to 0.9747, with a mean of 0.8976 and a standard deviation of 0.0739. This relatively high mean suggests banks across the United States generally followed a trend of increasing the overall number of bank branches per state per year (presumably to make bank branches "convenient" to attract lenders' deposits, and possibly, to attract customers to purchase loans). The "*unit banking per 100,000 residents*" statistic shows the opposite trend, the range extends from zero (0) to 9.2775, but the mean is low – it's 1.1205, with a small standard deviation of 1.5867 – indicating a national trend toward reducing the population of unit banks per state per year.

Industry data were obtained from the Bureau of Economic Analysis' (BEA) Interactive Data Application website.[4] These data include state GDP, state financial and insurance services GDP and state manufacturing GDP. I also obtained state industry GDP data for farming, transportation, mining, oil & gas extraction, trade (wholesale and retail) and construction from this same database. I obtained state unemployment rates from the Bureau of Labor

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[4] http://www.bea.gov/itable/iTable.cfm?ReqID=70&step=1#reqid=70&step=5&isuri=1&7003=200&7004=naics&7001=1200&7002=1&7090=70

Statistics (BLS) database.[5] Elsewhere, the federal funds rate was obtained from the Federal Reserve Board of Governors website database;[6] ten-year inclusive state population data were garnered from the United States Census 2012 Intercensal Estimates application;[7] and failed banks data were obtained from the "Failures & Assistance" database on the FDIC Historical Statistics on Banking (HSOB) website.[8]

The data are organized in panel regression format – the cross section variable is the state, and the time variable is the year. By and large, the data show steady increases in GDP, with minor downturns in 2009, presumably due to the nationwide recession that began in 2007 and created visible industry-income losses during 2009. Unemployment took an abrupt jump in most states during 2009, and several states saw short decreases in bank deposits circa 2009-2010.

## V. Methodology

The following paragraphs outline the models used in this study, and attempt to describe the purposes and expected outcomes of each model. Existing literature promotes three concepts: 1.) Robust financial systems are associated with GDP growth; 2.) Increased bank branching improves overall banking efficiency, which

[5] http://www.bls.gov/lau/#tables

[6] http://www.federalreserve.gov/releases/h15/data.htm

[7] https://www.census.gov/popest/data/intercensal/state/state2010.html

[8] https://www2.fdic.gov/hsob/SelectRpt.asp?EntryTyp=30&Header=1

increases economic growth; and 3.) Larger banks (presumably those with multiple branches) tend to survive local economic recessions better than unit banks. Existing literature also suggests that failed unit banks tend to merge into larger banks, wherein the larger bank converts the unit bank's subsidiaries into branches, which further hedges banking risks. The goal of the models listed below is to test the impact of bank deposit magnitude on state GDP, and to test the impact upon state GDP of changes in the number of bank branches, unit banks and total bank offices. The dependent variable for the first group of models is the natural logarithm of state GDP (sgdp), measured in state "i" at year "t."

**First Group:**

$$sgdp_{it} = b_0 + b_1 dl_{it} + b_2 offices_{it} + b_3 ff_{it} + b_4 popln_{it} + u_{it} \quad \mathbf{(1)}$$

$$sgdp_{it} = b_0 + b_1 dl_{it} + b_2 br_{it} + b_3 ub_{it} + b_4 ff_{it} + b_5 popln_{it} + u_{it} \quad \mathbf{(2)}$$

$$sgdp_{it} = b_0 + b_1 dpo_{it} + b_2 br_{it} + b_3 ub_{it} + b_4 ff_{it} + b_5 popln_{it} + u_{it} \quad \mathbf{(3)}$$

$$sgdp_{it} = b_0 + b_1 dpcl_{it} + b_2 br_{it} + b_3 ub_{it} + b_4 ff_{it} + b_5 popln_{it} + u_{it} \quad \mathbf{(4)}$$

$$sgdp_{it} = b_0 + b_1 cpd_{it} + b_2 br_{it} + b_3 ub_{it} + b_4 ff_{it} + b_5 popln_{it} + u_{it} \quad \mathbf{(5)}$$

Regarding the independent variables in the first model, the term "$b_0$" is the vertical intercept, "$dl_{it}$" is the natural log of commercial bank deposits, "$offices_{it}$" is the natural log of the number of total bank offices, "$ff_{it}$" is the federal funds rate and "$popln_{it}$" is the natural log of state population. In model (2), I replaced "$offices_{it}$" with two related but mutually-exclusive banking variables: the first, "$br_{it}$," is the natural log of the number of bank branches, and the second, "$ub_{it}$," is the natural log of the number of unit banks. I did this to test if "$br_{it}$," would turn out positive simultaneously with the "$ub_{it}$" variable turning out negative (as one might predict from the existing literature). In model (3) I re-ran a variant of model (2), replacing "$dl_{it}$" with "$dpo_{it}$," which is the natural log of the ratio of commercial bank deposits per bank office. I used "$dpo_{it}$," to determine if the weight of deposits per office (a subtle proxy for deposit concentration) would produce a positive elasticity coefficient. I used a similar approach in model (4), replacing "$dpo_{it}$" with "$dpcl_{it}$," which is the natural log of the ratio of commercial bank deposits per capita. This was intended to determine if positive elasticity would result from changes in the weight of deposits per population – testing the *effect* upon state GDP of deposit growth relative to population. Intuitively, this type of growth would reveal economic confidence, among both depositors *and* investors, toward the economic prospects in a particular state. Model (5) replaces the "$dpcl_{it}$," variable with "$cpd_{it}$," which represents commercial bank deposits as a percentage of state GDP. This variable is meant to test the weight of deposits in context with the state's overall activity. I used this variable because I wanted to determine whether the *deposits to state GDP ratio* could provide a useful benchmark by which a commercial banking sector could be judged. This first group of equations was assembled to test the effects of raw banking size and deposit factors on state GDP growth, and the federal funds rate and state population size were used as control variables. The second group of equations are intended to measure the elasticities and causalities of commercial bank branching weights pertaining to their effect on state GDP, and against the economic effect of bank failures.

**Second Group:**

$$sgdp_{it} = b_0 + b_1 dl_{it} + b_2 bpo_{it} + b_3 ff_{it} + b_4 fb_{it} + b_5 popln_{it} + u_{it} \quad \textbf{(6)}$$

$$sgdp_{it} = b_0 + b_1 dpcl_{it} + b_2 bpo_{it} + b_3 ff_{it} + b_4 fb_{it} + b_5 popln_{it} + u_{it} \quad \textbf{(7)}$$

$$sgdp_{it} = b_0 + b_1 dl_{it} + b_2 brpt_{it} + b_3 ubpt_{it} + b_4 ff_{it} + b_5 popln_{it} + u_{it} \quad \textbf{(8)}$$

The second group of equations tests the relationship between bank branching depth and state GDP. The variable "$bpo_{it}$" represents commercial bank branches as a percentage of total bank offices, "$fb_{it}$" represents the number of failed banks in state "i" during year "t," "$brpt_{it}$" and "$ubpt_{it}$" represent *branches per 100,000 residents* and *unit-banks per 100,000 residents* respectively. These equations are designed test the hypothesis that branch weight yields a persistently positive economic result notwithstanding the negative effect of failed banks.

**Third Group:**

$$sgdp_{it} = b_0 + b_1 dl_{it} + b_2 b_{it} + b_3 ff_{it} + b_4 popln_{it} + u_{it} \quad \textbf{(9)}$$

$$sgdp_{it} = b_0 + b_1 dl_{it} + b_2 bwb_{it} + b_3 ff_{it} + b_4 popln_{it} + u_{it} \quad \textbf{(10)}$$

$$sgdp_{it} = b_0 + b_1 dl_{it} + b_2 bwbshare_{it} + b_3 ff_{it} + b_4 popln_{it} + u_{it} \quad \textbf{(11)}$$

The third group of equations test the effect of deposits on state GDP, against a persistent backdrop of bank consolidations that have caused reductions in the total number of institutions. These models are designed to test whether bank consolidation aids state GDP by streamlining financial services. The expression "$b_{it}$" is the logarithm of the total number of banking institutions in state "i" during year "t," "$bwb_{it}$" represents the logarithm of the number of banks that have branches ("$bwb_{it}$" is therefore a subset of "$b_{it}$"). The expression "$bwbshare_{it}$" represents the weight of this subset relationship – it's the number of *banks with branches* as a percentage of the total number of banking institutions.

**Fourth Group:**

$$sgdp_{it} = b_0 + b_1 dl_{it} + b_2 ff_{it} + b_3 ump_{it} + b_4 popln_{it} + u_{it} \quad \textbf{(12)}$$

$$sgdp_{it} = b_0 + b_1 dpo_{it} + b_2 ff_{it} + b_3 ump_{it} + b_4 popln_{it} + u_{it} \quad \textbf{(13)}$$

$$sgdp_{it} = b_0 + b_1 dpcl_{it} + b_2 ff_{it} + b_3 ump_{it} + b_4 popln_{it} + u_{it} \quad \textbf{(14)}$$

$$sgdp_{it} = b_0 + b_1 bwbshare_{it} + b_2 ff_{it} + b_3 ump_{it} + b_4 popln_{it} + u_{it} \quad \textbf{(15)}$$

The fourth group of models uses the same variables used in the first group, however, the models test the impact of deposit weights on state GDP against a backdrop of unemployment – the expression "$ump_{it}$" refers to the unemployment rate in state "i" during year "t." The last equation of the group (15) specifically tracks the impact upon state GDP of the share of banks with branches, notwithstanding the effect of the unemployment rate.

**Fifth Group:**

$$dl_{it} = b_0 + b_1 offices_{it} + b_2 ff_{it} + b_3 fspgdp_{it} + u_{it} \quad \textbf{(16)}$$

$$dl_{it} = b_0 + b_1 br_{it} + b_2 ff_{it} + b_3 fspgdp_{it} + u_{it} \quad \textbf{(17)}$$

The fifth group of equations tests the source of the deposits. On its face, this might appear to create an endogeneity problem. For this reason, I test the effects of the logarithms of offices and branches on the logarithm of deposits, but set against the weight of financial services sector GDP ("$fspgdp_{it}$"). This pairing was meant to isolate the possible causal effect of financial industry robustness on commercial deposit magnitude. My hypothesis is that both the office/branch variables and the financial sector weight variable will result in positive first-order conditions, which means that branch convenience (representing the source of funds on the right-hand side of the balance sheet) and financial sector income weight (a partial proxy for left-hand side *effectiveness* relative to state GDP) both simultaneously feed the magnitude of commercial deposits.

**Sixth Group:**

$$fs_{it} = b_0 + b_1 br_{it} + b_2 ub_{it} + b_3 popln_{it} + u_{it} \quad \textbf{(18)}$$

$$fs_{it} = b_0 + b_1 brpt_{it} + b_2 ubpt_{it} + b_3 popln_{it} + u_{it} \quad \textbf{(19)}$$

$$cns_{it} = b_0 + b_1 br_{it} + b_2 ub_{it} + b_3 popln_{it} + u_{it} \quad \textbf{(20)}$$

$$trade_{it} = b_0 + b_1 br_{it} + b_2 ub_{it} + b_3 popln_{it} + u_{it} \quad \textbf{(21)}$$

$$trans_{it} = b_0 + b_1 br_{it} + b_2 ub_{it} + b_3 popln_{it} + u_{it} \quad \textbf{(22)}$$

The sixth group of equations uses natural logarithms of the following industry subsets: financial and insurance services GDP ($fs_{it}$), construction GDP ($cns_{it}$), trade GDP ($trade_{it}$) and transportation GDP ($trans_{it}$). I used the sector-industry GDP expressions as dependent variables, and I used the “branches vs unit banks” expressions as independent variables. Equation (18) tests the effects of branch banking versus unit banks on financial and insurance services GDP, and equation (19) does the same, replacing the branch and unit bank variables with the *branches per 100,000 residents* variable and the *unit-banks per 100,000 residents* variable. Equations (20), (21) and (22) test the effects of branch banking and unit banking on construction ($cns_{it}$), trade ($trade_{it}$) and transportation ($trans_{it}$) respectively. Existing literature implies the expectation that branch-banking elasticity signs should remain positive throughout, and unit banking signs should remain negative. If my hypothesis is correct, it would indicate that certain homogeneous industries – or, industries abundant to *most states* regardless of climate, topography and/or natural resource abundance – should be positively affected by the proliferation of commercial bank branching.

For robustness, I calculated R-squared, t-test and Wald test values. I also conducted two additional tests, regressing log of state GDP (dependent variable) on log of commercial deposits (independent variable) using both one lag and two lags of the "$dl_{it}$" variable.

## VI. Results

I used random effects panel regression to estimate all coefficients because of two factors 1.) The slow-moving nature of the variables, and 2.) The Fed Funds Rate variable, which is a national statistic with the same figures for all 50 states. This means the "$ff_{it}$" statistic will be cluster-invariant for each year of the sample. The following model results reveal coefficients that support the descriptive statistics in Table A1 – unit banks followed a trend of reducing, while branches showed a trend of increasing weight, and both statistics were related to increases in state GDP on the aggregate.

The first group of equations produced elasticity estimates that mostly support the existing literature on banking factors, and their effects on economic growth. In the first group of equations, elasticity coefficients for deposits turned out positive, but less than unit-elastic, in all experiments. When placed in perspective with the large size of state GDP (totaling hundreds of billions of dollars in some states), this indicates that commercial banking deposits maintained a decently important correlation with state GDP.

Elasticity coefficients for the "*branch banking vs. unit banking"* effects also support existing literature. Table B1 in the Appendix section shows the results of regression model (1): The log of deposits was 0.0380766, with a robust standard error of 0.0152868. The positive sign of this estimated coefficient suggests that sheer deposit size is positively correlated with state GDP levels. The log of total bank offices also was positive, and slightly more elastic than the deposits log, indicating that convenience for lenders and customers might have a positive correlation with state GDP magnitude.

Branch banking throughout the second through the fifth models showed coefficients that were positive and less than unit-elastic, and unit bank coefficients remained negative and less than unit-elastic. The model (2) results (see Table B2) show the branch banks log coefficient was 0.5418656, and the unit banks log coefficient was -0.1379699, suggesting that the population of unit banks may be negatively correlated with state GDP, notwithstanding fluctuations of the federal funds rate. Model (3) results maintained the similar results (see Table B3): The coefficient for the log of deposits per office was 0.0330969, very close to the pure deposits coefficient. The bank branches log coefficient was 0.599838, and the unit banks log coefficient was -0.1363223, also proximal to the same levels shown in the model (2) results.

Model (4) continues this trend: the coefficient of deposits per capita was 0.0308956, the branch banking coefficient was 0.5418656, and the unit banking coefficient was -0.1379699 (see Table B4). Bearing in mind the economic recession that occurred during the last two years of the observation period, the results of the first four models suggest that unit banks may indeed have been swallowed by larger, more efficient banks since the beginning of the 2000 decade, causing branches to increase simultaneously with the decrease of unit banks. Considering the fact that elasticity coefficients for bank offices also remained positive throughout the experiment, the "*branch vs unit"* results also support the assertion that larger banks with visible branching networks may indeed have more efficient qualities than unit banks, as they are more convenient to a larger array of customers, and the merger activity that occurred during the recession may have enabled larger banks to reduce costs by converting unit banks' subsidiaries into branches.

Model 5 suggests possible importance of the deposits to state GDP ratio. The coefficient for this variable was positive, 0.007959, and the coefficients for branching banks log and unit banks log were 0.5689024 and -0.1358097 respectively (See Table B5). From an economic-intuition perspective, the "deposits to state GDP" ratio, when converted to a whole number percentage, represents the number of dollars people are willing to invest into a state's commercial banking system for every one dollar of existing economic transaction activity in that state. When this ratio is positively correlated with state GDP, it suggests: 1.) That people are "betting" that the state's economy will provide some type of return, and 2.) This level of confidence might have a self-perpetuating, positive effect on state GDP, similar to the appreciative effect that widespread buying can have on the price of a corporate stock. The fact that this value was positive notwithstanding the branch-log and unit banking-log coefficients suggests that merger and acquisition activity – that is, shuffling of the ratio of branches to unit banks – should not affect the economic character and the economic influence of the “deposits to state GDP” ratio – especially where this shuffling is driven by efficiency motive. Fluctuations in federal funds rate also should not affect the properties of these coefficients. In total, these findings suggest that efficiency and confidence factors may enable a state’s economy to withstand a wave of bank mergers and acquisitions.

The second group of equations resulted in positive relationships between commercial branch weight and state GDP, even despite the negative effect of bank failures (see C-series Tables). I find these results remarkable because the “$bpo_{it}$” variable (*branches per total number of bank offices*), produces the strongest coefficient of all banking variables – it exceeds 4.1 in models (6) and (7), implying that a bank office population comprised of a *growing* percentage of branches correlates with a slightly faster-growing state GDP. As shown in tables A2 and A3 of the descriptive statistics, it is worth noting that the “$bpo_{it}$” variable (*branches per total bank offices*) produced positive compound annual growth rates (CAGR), as well as positive 11-year growth rates, for *all fifty states*, even in states where deposit growth and overall bank-population growth were negative. This suggests branch penetration can positively affect economic growth regardless of whether commercial deposits are increasing, or if commercial deposits show signs of "streamlining" or "rightsizing" during a wave of bank failures and/or industry recessions. This phenomenon could be occurring because of FDIC deposit payouts from one or more bank failures. David Wheelock and Paul Wilson (1995) stated that bank failures are often associated with low capitalization, which indicates poor asset performance. In addition, Wheelock (2011) mentioned that a large number of commercial banks that failed during the financial crisis were relatively small – operating a median of three branches each, and operating in a relatively limited geographic area. This means statewide deposit losses may represent "inefficient money" that gained poor returns on assets, and eventually caused insolvency. Under this scenario, a small, inefficient bank with poor asset performance and limited geographic penetration would have a negligible impact on state GDP whether it survives or fails, regardless of the size of its deposits. This, however, is conjecture, and further empirical research in this area might yield a better understanding of deposit streamlining.

Elasticity coefficients within the third group of equations further exemplify a trend toward consolidation – the total number of banks, along with the number of banks with branches, both showed a negative relationship toward state GDP, notwithstanding the positive relationship between deposits and state GDP. This indicates that deposits, by-and-large, did not decrease on the aggregate, despite the decrease in overall banking institutions (see D-series tables). This trend fits the literature, which theorizes that bank consolidations are the inevitable result of profit-maximizing institutions seeking greater size and efficiency – causing the total number of institutions to shrink (including smaller or less efficient banks that operate a few branches), as the overall strength and depth of the financial-services industry increases.

Within the fourth group (see E-series tables), the deposit variables remained positive and less-than unit elastic for models (12) through (14). In model (15), the share of banks as a percentage of state GDP, maintained a positive and less-than unit elastic coefficient despite the effect of unemployment. Note that unemployment rate produces positive coefficients throughout models (12) through (15), indicating the economy's possible efforts to profit via workforce streamlining in the face of low consumption during the recession period.

The fifth group of models revealed positive relationships between commercial bank branching and commercial deposits. In addition, the robustness of the financial services industry, as measured by the percentage of state GDP comprised by financial and insurance services income, showed a positive influence on deposits (see F-series tables). These two results represent a remarkable finding – they lend support to Klein's theory (1971) of bank branching *convenience* as a competitive inducement for new customers among commercial banks.

The sixth group of equations reveals positive relationships between commercial bank branching and various homogenous industries, including construction, financial/insurance services, trade and transportation, with a negative influence of unit banking on these same sectors (see G-series Tables). This branching vs unit banking relationship, however, did not hold for the manufacturing, oil & gas, mining and farming industries.

These findings suggest that banking factors have a visible association with the construction, transportation, trade and financial industries. This relationship may exist for the manufacturing industry, but my study failed to produce significant coefficients for manufacturing – presumably due to Schumpeter's law of "creative destruction." The experiments also failed to produce significant overall associations between banking factors and the aggregate incomes of natural resource-based industries, such as oil & gas extraction, farming and mining. Therefore, these models and results were eliminated from the study.

Lagged regression tests revealed a small but significant relationship between bank deposits and state GDP, where log of state GDP was the dependent variable, and log of deposits was independent. In all versions, the one-year lagged variables had the strongest coefficients, with positive and inelastic relationships with state GDP, (in the one-year lagged model, the coefficient was 0.0871451, and in the two-year lagged model, it was 0.0479005 for the first lag and 0.0341647 for the second lag). For these lagged variable tests, the p-values and F-statistics were significant at five (5) percent probability levels. Wald chi-square tests confirmed an overall significant fit for all models throughout the experiment.

## VII. Conclusion

This paper studied the influence of commercial bank deposits and commercial bank branching on state GDP. The findings suggest the following: 1.) The magnitude of commercial bank deposits generally has a positive relationship with state GDP, with a substantial but less than unit-elastic influence. 2.) The proliferation of commercial bank branches is also positively correlated with state GDP, with a substantial but less than unit-elastic influence. 3.) The percentage of commercial bank offices comprised of branches has a positive relationship with state GDP, even against a backdrop volatile bank merger-and-acquisition activities and/or bank failures. Current trends indicate that proliferation of unit banking is negatively related to state GDP. 4.) The number of commercial bank branches per capita has a positive influence on the magnitude of commercial bank deposits, notwithstanding changes in the federal funds rate. 5.) The robustness of a state's financial services industry, as measured by the percentage of state GDP comprised by the state's financial and insurance sector income, also is positively correlated with commercial bank deposit growth. 6.) Commercial bank branching depth is positively correlated with the growth of homogenous sectors, as measured by construction GDP, trade GDP, transportation GDP and financial and insurance services GDP (but not weight). Unit bank depth is negatively related with growth in these same sectors. These "branching vs. unit bank" relationships do not hold for the manufacturing sector, as well as the oil, mining and farming sectors.

The empirical results imply that commercial bank branching may be an essential building block that 1.) Advances and fortifies a state's financial structure, 2.) Creates geographic convenience necessary to create substantial deposit magnitude, and 3.) Enables a state's economy to withstand and/or recover from adverse economic shocks – even shocks as drastic and unexpected as the financial crisis of 2007-2010. However, as the literature indicates, there is dual causality involved within the relationship between commercial banking and state economic growth. From this study, we can loosely theorize that commercial banking deposits might represent the metaphorical axis that gauges the relationship between commercial branching (a generator of saving and investment) and state economic growth. The ratio of *commercial bank deposits to state GDP*, which has a positive correlation with overall state GDP growth, suggests that commercial banking agents (on the fund supply *and* demand sides) need to have a certain degree of confidence in a state's economy to effectuate a strong relationship between commerce and state economic growth. As Joan Robinson indicates, economic activity must already show a certain level of robustness to supply funds (in the form of deposits), and as Joseph Schumpeter suggests, this same economic activity must also be robust enough for the banking system to further invest in industrial prospects. This confidence-breeds-confidence relationship suggests a state's economy may benefit from policies that strengthen commercial bank branching penetration, which generates the deposit depth necessary to incubate new investment, sectoral-industry profits and overall state economic growth.

This study creates further opportunities for research. The statistics in Tables A2 and A3 reveal the possibility that bank deposits may indeed follow a "cycle," similar to GDP and employment. It seems logical during a wave of bank failures that bank deposit fluctuation is a self-adjusting device that automatically fosters financial-industry efficiency during times of adverse economic shocks. This is obvious on its face, considering the money-supply goals of the “quantitative easing” program devised by the Federal Reserve Bank during the financial crisis. However, in today’s world of increased technology, it seems plausible that maximizing the population of banked citizens can further enhance deposit strength, which can minimize economic risks and shorten the length of economic recessions in future years.

From a development standpoint, another worthwhile extension could involve widening the research time-interval, and testing the overall relationship between deposits and rapid-growth industries from the beginning of the American industrial-revolution era until today. By now, mainstream economists already know capital accumulation is necessary for growth, and that banking is a necessary mechanism for investment in capital. What is needed for developing nations (and communities) is an in-depth dynamic model that pinpoints the best industries to compliment the natural resources of an area, and the level of funds a state should invest to manufacture Joan Robinson’s concept of “economic confidence.” Once economic confidence penetrates a culture as a self-correcting mechanism, as it has in the United States, developing cultures may adapt a greater affinity for entrepreneurship.

## REFERENCES

**Allen, Franklin, and Douglas Gale.** 1995. "A Welfare Comparison of Intermediaries and Financial Markets in Germany and the US." *European Economic Review,* 39(2): 179-209.

**Aly, Hassan Y., Richard Grabowski, Carl Pasurka, and Nanda Rangan.** 1990. "Technical, Scale, and Allocative Efficiencies in US Banking: An Empirical Investigation." *The Review of Economics and Statistics*: 211-218.

**Aubuchon, Craig P., and David C. Wheelock.** 2010. "The Geographic Distribution and Characteristics of US Bank Failures, 2007-2010: Do Bank Failures Still Reflect Local Economic Conditions?" *Federal Reserve Bank of St. Louis Review,* 92(5): 395-415.

**Benston, George J., Gerald A. Hanweck, and David B. Humphrey.** 1982. "Scale Economies in Banking: A Restructuring and Reassessment." *Journal of Money, Credit and Banking*: 435-456.

**Berger, Allen N.** 2003. "The Economic Effects of Technological Progress: Evidence from the Banking Industry." *Journal of Money, Credit, and Banking,* 35(2): 141-176.

**Cameron, Rondo E., et al.** 1967. *Banking in the Early Stages of Industrialization: A Study in Comparative Economic History*. New York: Oxford University Press.

**Demirgüç-Kunt, Asli, and Leora F. Klapper.** 2012. "Measuring Financial Inclusion: The Global Findex Database." *World Bank Policy Research Working Paper 6025.*

**Emmons, William R., R. Alton Gilbert, and Timothy J. Yeager.** 2004. "Reducing the Risk at Small Community Banks: Is it Size or Geographic Diversification that Matters?" *Journal of Financial Services Research,* 25(2-3): 259-281.

**Gerdes, Geoffrey R., and Jack K. Walton.** 2005. "Trends in the Use of Payment Instruments in the United States." *Fed. Res. Bull.* 91: 180.

**Gerschenkron, Alexander.** 1962. "Economic Backwardness in Historical Perspective."*Economic Backwardness in Historical Perspective*. Cambridge, MA: Harvard University Press.

**Goldsmith, Raymond W.** 1969. *Financial Structure and Development*. New Haven, CT: Yale University Press.

**Greenwood, Jeremy, and Boyan Jovanovic.** 1990. "Financial Development, Growth and the Distribution of Income," *The Journal of Political Economy*, 98(5): Part 1, 1076-1107.

**Hoyt, Homer.** 1941. “Economic Background of Cities,” *The Journal of Land and Public Utility Economics*, 17(2): 188-195.

**Jayaratne, Jith, and Philip E. Strahan.** 1996. “The Finance-Growth Nexus: Evidence from Bank Branch Deregulation,” *The Quarterly Journal of Economics*, 111(3): 639-670.

**King, Robert G., and Ross Levine.** 1993. "Finance and Growth: Schumpeter Might Be Right." *The Quarterly Journal of Economics*, 108(3): 717-737.

**Klein, Michael A.** 1971. "A Theory of the Banking Firm." *Journal of Money, Credit and Banking*, 3(2): 205-218.

**Levine, Ross.** 2002. “Bank-Based or Market-Based Financial Systems: Which Is Better?” *Journal of Financial Intermediation*, 11(4): 398-428.

**Levine, Ross, Asli Demirguc-Kunti, Eric Feyen, and Martin Cihak.** 2013. “Financial Development in 205 Economies, 1960 to 2010,” *Journal of Financial Perspectives*, 1(2): 17-36.

**Marshall, Alfred.** 1923. *Money, Credit and Commerce*. London, UK: Macmillan.

**Mayer, Colin.** 1988. “New Issues in Corporate Finance,” *European Economic Review*, 32: 1167-1189.

**McKinnon, Ronald I.** 1973. *Money and Capital in Economic Development*. Washington, DC: Brookings Institution Press.

**Modigliani, Franco, and Merton Miller.** 1958. “The Cost of Capital, Corporation Finance, and the Theory of Investment,” *American Economic Review*, 48: 261-297.

**North, Douglas C.** 1956. “Location Theory and Regional Economic Growth,” *Journal of Political Economy*, 63: 243-258.

**Powers, John A.** 1969. "Branch Versus Unit Banking: Bank Output and Cost Economies." *Southern Economic Journal*: 153-164.

**Robinson, Joan.** 1952. *The Generalization of the General Theory*. London, UK: Macmillan.

**Schumpeter, Joseph A.** 1911. *The Theory of Economic Development*. Cambridge, MA: Harvard University Press.

**Shaw, Edward S.** 1973. *Financial Deepening in Economic Development*. New York, NY: Oxford University Press.

**Shiers, Alden F.** 2002. "Branch Banking, Economic Diversity and Bank Risk," *The Quarterly Review of Economics and Finance*, 42: 587-598.

**Strahan, Philip E.** 2003. "The Real Effects of US Banking Deregulation," *Review-Federal Reserve Bank of St. Louis*, 85(4): 111-128.

**Tobin, James.** 1964. "*Commercial Banks as Creators of 'Money,'*" Cowles Foundation for Research in Economics at Yale University.

**Wheelock, David C., and Paul W. Wilson.** 2000. "Why Do Banks Disappear? The Determinants of US Bank Failures and Acquisitions." *Review of Economics and Statistics*, 82(1): 127-138.

**Wheelock, David C.** 2011. "Have Acquisitions of Failed Banks Increased the Concentration of US Banking Markets?" *Review-Federal Reserve Bank of St. Louis,* 93(3): 155-168.

**Zou, YongDong, Stephen M. Miller, and Bernard Malamud.** 2011. "Geographic Deregulation and Commercial Bank Performance in US State Banking Markets." *The Quarterly Review of Economics and Finance*, 51(1): 28-35.

# APPENDIX

**Table A2 - Compound Annual Growth Rates**

| State | State GDP | Bank Deposits | Banks | Branches Per Offices | Unit Banks Per Offices |
|---|---|---|---|---|---|
| Alabama | 0.035285252 | 0.025636018 | -0.01354 | 0.002090866 | -0.033838491 |
| Alaska | 0.062878412 | -0.019319656 | -0.03619 | 0.001408812 | 0 |
| Arizona | 0.037313263 | -0.085673549 | -0.01292 | 0.001953562 | -0.100520555 |
| Arkansas | 0.039688323 | 0.069746648 | -0.03572 | 0.007323952 | -0.110969918 |
| California | 0.03292892 | 0.020863269 | -0.01727 | 0.002719125 | -0.019463158 |
| Colorado | 0.034230688 | 0.004937802 | -0.04666 | 0.009763555 | -0.095456017 |
| Connecticut | 0.030529227 | 0.194462749 | -0.00403 | 0.0018909 | -0.05881203 |
| Delaware | 0.02975346 | 0.188380624 | -0.04026 | 0.006479992 | -0.071518516 |
| Florida | 0.03691678 | 0.052488115 | -0.01678 | 0.002113087 | -0.098884966 |
| Georgia | 0.027776264 | 0.061642033 | -0.02704 | 0.005448545 | -0.060399206 |
| Hawaii | 0.046132322 | 0.032354111 | -0.01207 | 0.000208239 | 0.006628343 |
| Idaho | 0.034279147 | 0.079518207 | -0.01065 | 0.001415409 | 0.012508867 |
| Illinois | 0.026181733 | -0.00423466 | -0.02686 | 0.009395552 | -0.074965339 |
| Indiana | 0.029363346 | -0.018052372 | -0.03619 | 0.003278711 | -0.082730458 |
| Iowa | 0.03742408 | 0.030102792 | -0.02003 | 0.013302284 | -0.070715055 |
| Kansas | 0.035205041 | 0.024535741 | -0.01711 | 0.010737476 | -0.055073504 |
| Kentucky | 0.033931179 | 0.004954495 | -0.02368 | 0.004716005 | -0.071918014 |
| Louisiana | 0.051461517 | 0.010716371 | -0.01095 | 0.00211614 | -0.051527003 |
| Maine | 0.031649572 | 0.076965764 | -0.04538 | 0.001340024 | 0.014404602 |
| Maryland | 0.045378723 | -0.056463334 | -0.03859 | 0.002294288 | 0.021014726 |
| Massachusetts | 0.029375883 | 0.051224048 | -0.01854 | 0.00166173 | -0.010496382 |
| Michigan | 0.008557732 | -0.075498187 | -0.02847 | 0.002053903 | -0.059155775 |
| Minnesota | 0.032051359 | -0.084210512 | -0.02279 | 0.011827421 | -0.043219792 |
| Mississippi | 0.033953913 | 0.055033777 | -0.01347 | 0.001897296 | -0.075704885 |
| Missouri | 0.028687696 | 0.053004425 | -0.01458 | 0.005339538 | -0.050379981 |
| Montana | 0.049780277 | 0.060569477 | -0.01644 | 0.009846002 | -0.044813521 |
| Nebraska | 0.043401236 | 0.040860578 | -0.02286 | 0.01631667 | -0.076675731 |
| Nevada | 0.042303439 | 0.452529031 | -0.0187 | 0.003031383 | -0.045645643 |
| New Hampshire | 0.032684991 | -0.162890143 | -0.05096 | 0.003258643 | -0.091793201 |
| New Jersey | 0.029029761 | -0.047035393 | -0.02401 | 0.000925504 | -0.082372833 |
| New Mexico | 0.038193737 | 0.021115696 | -0.01065 | 0.001621029 | -0.056002132 |
| New York | 0.03467023 | -0.065479489 | -0.01741 | 0.001389723 | -0.037083996 |
| North Carolina | 0.039049975 | 0.059261206 | -0.0037 | 0.000490773 | -0.019984587 |
| North Dakota | 0.06320362 | 0.01088721 | -0.01808 | 0.008056074 | -0.055771341 |
| Ohio | 0.021439466 | 0.183930291 | -0.03173 | 0.002213868 | -0.073642432 |
| Oklahoma | 0.046693011 | 0.043173809 | -0.0147 | 0.009701512 | -0.05349348 |
| Oregon | 0.044942864 | 0.104558151 | -0.02723 | 0.002402956 | -0.095042527 |
| Pennsylvania | 0.033066892 | -0.02957164 | -0.02919 | 0.001223878 | -0.024341673 |
| Rhode Island | 0.033313076 | -0.022760279 | 0 | 0.000917831 | 0.016214664 |
| South Carolina | 0.032096772 | 0.031237315 | -0.02036 | 0.00231007 | -0.124326596 |
| South Dakota | 0.047385587 | 0.469062197 | -0.01849 | 0.0080452 | -0.055604383 |
| Tennessee | 0.030211452 | 0.00236595 | -0.01019 | 0.002467995 | -0.082291174 |
| Texas | 0.047094297 | 0.059320984 | -0.02011 | 0.008697828 | -0.083884567 |
| Utah | 0.048266405 | 0.10324304 | -0.00499 | 0.0013787 | 0.000373107 |
| Vermont | 0.034301318 | -0.06372458 | -0.06107 | 0.00310232 | -1 |
| Virginia | 0.042216644 | 0.195948105 | -0.02854 | 0.002252882 | -0.057116553 |
| Washington | 0.038229475 | 0.079556718 | -0.0187 | 0.002366647 | -0.063452806 |
| West Virginia | 0.041160928 | 0.034983031 | -0.01392 | 0.002536552 | -0.078224174 |
| Wisconsin | 0.030959512 | 0.051540749 | -0.02368 | 0.006308962 | -0.071700101 |
| Wyoming | 0.079619386 | 0.003836303 | -0.02711 | 0.013704429 | -0.128584078 |

**Table A3 - 11-Year Growth Rate (2000-2010)**

| State | State GDP | Bank Deposits | Banks | Branches Per Offices | Unit Banks Per Offices |
|---|---|---|---|---|---|
| Alabama | 0.464401966 | 0.321070217 | -0.139240506 | 0.023241481 | -0.315226337 |
| Alaska | 0.955777514 | -0.193132586 | -0.333333333 | 0.015606557 | 0 |
| Arizona | 0.496267489 | -0.626651746 | -0.133333333 | 0.021700318 | -0.688180208 |
| Arkansas | 0.534386711 | 1.09937623 | -0.32972973 | 0.08357947 | -0.725791434 |
| California | 0.428153236 | 0.254998944 | -0.174342105 | 0.03032036 | -0.19443038 |
| Colorado | 0.448076891 | 0.055676883 | -0.408839779 | 0.112798702 | -0.668314429 |
| Connecticut | 0.392077607 | 6.061528449 | -0.043478261 | 0.02099767 | -0.486618705 |
| Delaware | 0.380593613 | 5.675920918 | -0.363636364 | 0.073634859 | -0.557915058 |
| Florida | 0.489988543 | 0.755452989 | -0.169811321 | 0.0234911 | -0.68188614 |
| Georgia | 0.351712785 | 0.93089721 | -0.26035503 | 0.061593746 | -0.49606198 |
| Hawaii | 0.642301258 | 0.419435315 | -0.125 | 0.002293018 | 0.075376884 |
| Idaho | 0.448823407 | 1.32022279 | -0.111111111 | 0.015680155 | 0.146534653 |
| Illinois | 0.328822816 | -0.045607409 | -0.258790436 | 0.108345731 | -0.575636458 |
| Indiana | 0.374851196 | -0.181588773 | -0.333333333 | 0.036662922 | -0.613217603 |
| Iowa | 0.498026752 | 0.385754208 | -0.199535963 | 0.156456333 | -0.553688668 |
| Kansas | 0.463154404 | 0.305564251 | -0.17287234 | 0.124662087 | -0.463736427 |
| Kentucky | 0.443470632 | 0.055869793 | -0.231759657 | 0.053116766 | -0.560002939 |
| Louisiana | 0.736709596 | 0.124403793 | -0.11409396 | 0.023525401 | -0.441176471 |
| Maine | 0.408815833 | 1.26058516 | -0.4 | 0.014839424 | 0.17037037 |
| Maryland | 0.629334384 | -0.472349204 | -0.351351351 | 0.025528681 | 0.25704859 |
| Massachusetts | 0.375035399 | 0.732399949 | -0.186046512 | 0.01843166 | -0.109587489 |
| Michigan | 0.098268162 | -0.578317634 | -0.272189349 | 0.022826388 | -0.488677434 |
| Minnesota | 0.414863072 | -0.620027476 | -0.224032587 | 0.138075031 | -0.384916595 |
| Mississippi | 0.4438198 | 0.802727162 | -0.138613861 | 0.021069377 | -0.579353544 |
| Missouri | 0.364957087 | 0.764948999 | -0.149171271 | 0.060328394 | -0.433697507 |
| Montana | 0.706406507 | 0.909547056 | -0.166666667 | 0.113798573 | -0.396093326 |
| Nebraska | 0.595749857 | 0.553524698 | -0.224637681 | 0.19486692 | -0.584188249 |
| Nevada | 0.57737836 | 59.72577028 | -0.1875 | 0.033855248 | -0.401855288 |
| New Hampshire | 0.424447717 | -0.858548677 | -0.4375 | 0.036434852 | -0.65323741 |
| New Jersey | 0.36995811 | -0.411367165 | -0.234567901 | 0.010227791 | -0.611555577 |
| New Mexico | 0.510297318 | 0.258416692 | -0.111111111 | 0.01797655 | -0.469505178 |
| New York | 0.454860951 | -0.525236616 | -0.175675676 | 0.015393617 | -0.340108624 |
| North Carolina | 0.52405556 | 0.883795424 | -0.04 | 0.005411772 | -0.199130106 |
| North Dakota | 0.962370074 | 0.126496174 | -0.181818182 | 0.092274007 | -0.468076772 |
| Ohio | 0.262812801 | 5.406007653 | -0.298578199 | 0.024623916 | -0.568912736 |
| Oklahoma | 0.6520096 | 0.591928007 | -0.15034965 | 0.112046817 | -0.453789919 |
| Oregon | 0.621877276 | 1.985894319 | -0.261904762 | 0.026752396 | -0.66664277 |
| Pennsylvania | 0.430253033 | -0.281216204 | -0.278074866 | 0.013545343 | -0.237437733 |
| Rhode Island | 0.434006685 | -0.22373104 | 0 | 0.010142607 | 0.193548387 |
| South Carolina | 0.41554806 | 0.402635464 | -0.202531646 | 0.02570632 | -0.767852637 |
| South Dakota | 0.664073581 | 67.77680798 | -0.18556701 | 0.092144412 | -0.467041257 |
| Tennessee | 0.387362998 | 0.026335517 | -0.106598985 | 0.027485438 | -0.611175166 |
| Texas | 0.658989876 | 0.884965167 | -0.200282087 | 0.099947465 | -0.618537201 |
| Utah | 0.679532247 | 1.947020527 | -0.053571429 | 0.015270673 | 0.004111842 |
| Vermont | 0.44916507 | -0.515337024 | -0.5 | 0.03465982 | -1 |
| Virginia | 0.575934085 | 6.158725092 | -0.272727273 | 0.025062746 | -0.476353596 |
| Washington | 0.510869293 | 1.321133434 | -0.1875 | 0.026343372 | -0.513787257 |
| West Virginia | 0.55846295 | 0.45970644 | -0.142857143 | 0.028258648 | -0.591794872 |
| Wisconsin | 0.398484665 | 0.738149691 | -0.231746032 | 0.071629707 | -0.558865185 |
| Wyoming | 1.322616024 | 0.043018172 | -0.260869565 | 0.161514898 | -0.77997076 |

**Table B1 -**

Regression of State GDP on Deposits and Offices
Random Effects - Generalized Least Squares

| Variable | Estimated Parameter |
|---|---|
| Deposits Log | 0.0380766** |
| | (0.013) |
| Offices Log | 0.402812*** |
| | (0.000) |
| Fed Funds Rate | -0.0145308*** |
| | (0.000) |
| Population Log | 0.6851535*** |
| | (0.000) |
| Constant | 11.66506*** |
| | (0.000) |
| | |
| Observations | 550 |
| R-Squared | 0.9331 |

Note: P-values are in parentheses. Robust Standard Errors Used.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

**Table B2 -**
Regression of State GDP on Branches and Unit Banks
Random Effects - Generalized Least Squares

| Variable | Estimated Parameter |
|---|---|
| Deposits Log | 0.0308956*** |
| | (0.008) |
| Branches Log | 0.5418656*** |
| | (0.000) |
| Unit Banks Log | -0.1379699*** |
| | (0.000) |
| Fed Funds Rate | -0.0061011*** |
| | (0.009) |
| Population Log | 0.6248693*** |
| | (0.000) |
| Constant | 12.22094*** |
| | (0.000) |
| Observations | 550 |
| R-Squared | 0.9356 |

Note: P-values are in parentheses. Robust Standard Errors Used.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

**Table B3 -**

Regression of State GDP on Deposits Per Office
Random Effects - Generalized Least Squares

| Variable | Estimated Parameter |
|---|---|
| Deposits Per Office Log | 0.0330969*** |
| | (0.005) |
| Branches Log | 0.5699838*** |
| | (0.000) |
| Unit Banks Log | -0.1363223*** |
| | (0.000) |
| Fed Funds Rate | -0.0060466*** |
| | (0.010) |
| Population Log | 0.6253016*** |
| | (0.000) |
| Constant | 12.19328*** |
| | (0.000) |
| Observations | 550 |
| R-Squared | 0.936 |

Note: P-values are in parentheses. Robust Standard Errors Used.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

**Table B4 -**

Regression of State GDP on Deposits Per Capita
Random Effects - Generalized Least Squares

| Variable | Estimated Parameter |
|---|---|
| Deposits Per Capita | 0.0308956*** |
| | (0.008) |
| Branches Log | 0.5418656*** |
| | (0.000) |
| Unit Banks Log | -0.1379699*** |
| | (0.000) |
| Fed Funds Rate | -0.0061011*** |
| | (0.009) |
| Population Log | 0.6557649*** |
| | (0.000) |
| Constant | 12.22094*** |
| | (0.000) |
| Observations | 550 |
| R-Squared | 0.9356 |

Note: P-values are in parentheses. Robust Standard Errors Used.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

**Table B5-**

Regression of State GDP on Deposits Per State GDP
Random Effects - Generalized Least Squares

| Variable | Estimated Parameter |
|---|---|
| Deposits Share of State GDP | 0.007959*** |
| | (0.000) |
| Branches Log | 0.5689024*** |
| | (0.000) |
| Unit Banks Log | -0.1358097*** |
| | (0.000) |
| Fed Funds Rate | -0.0062608*** |
| | (0.007) |
| Population Log | 0.6302198*** |
| | (0.000) |
| Constant | 12.70164*** |
| | (0.000) |
| Observations | 550 |
| R-Squared | 0.9332 |

Note: P-values are in parentheses. Robust Standard Errors Used.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

**Table C1 -**
Regression of State GDP on Branches Per Office
Random Effects - Generalized Least Squares

| Variable | Estimated Parameter |
|---|---|
| Deposits Log | 0.0337274*** |
| | (0.009) |
| Branches Per Office | 4.134844*** |
| | (0.000) |
| Fed Funds Rate | -0.0045819*** |
| | (0.004) |
| Failed Banks | -0.0023382* |
| | (0.062) |
| Population Log | 0.9884759*** |
| | (0.000) |
| Constant | 6.259391*** |
| | (0.000) |
| Observations | 550 |
| R-Squared | 0.9185 |

Note: P-values are in parentheses. Robust Standard Errors Used.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

**Table C2 -**

Regression of State GDP on Weight of Deposits & Branches
Random Effects - Generalized Least Squares

| Variable | Estimated Parameter |
|---|---|
| Deposits Per Capita | 0.0337274*** |
| | (0.009) |
| Branches Per Office | 4.134844*** |
| | (0.000) |
| Fed Funds Rate | -0.0045819*** |
| | (0.004) |
| Failed Banks | -0.0023382* |
| | (0.062) |
| Population Log | 1.022203*** |
| | (0.000) |
| Constant | 6.259391*** |
| | (0.000) |
| Observations | 550 |
| R-Squared | 0.9185 |

Note: P-values are in parentheses. Robust Standard Errors Used.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

**Table C3 -**
State GDP on Branches Per 100,000 Residents
Random Effects - Generalized Least Squares

| Variable | Estimated Parameter |
|---|---|
| Deposits Log | 0.0236123* |
| | (0.070) |
| Branches Per 100,000 Residents | 0.020294*** |
| | (0.000) |
| Unit Banks Per 100,000 Residents | -0.0881815*** |
| | (0.001) |
| Fed Funds Rate | -0.00761*** |
| | (0.001) |
| Population Log | 1.052273*** |
| | (0.000) |
| Constant | 8.809177*** |
| | (0.000) |
| Observations | 550 |
| R-Squared | 0.9354 |

Note: P-values are in parentheses. Robust Standard Errors Used.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

**Table D1 -**

Regression of State GDP on Banking Institutions
Random Effects - Generalized Least Squares

| Variable | Estimated Parameter |
|---|---|
| Deposits Log | 0.0531638*** |
| | (0.000) |
| Banks Log | -0.3107647*** |
| | (0.000) |
| Fed Funds Rate | -0.0077762*** |
| | (0.000) |
| Population Log | 1.28112*** |
| | (0.000) |
| Constant | 6.462778*** |
| | (0.000) |
| Observations | 550 |
| R-Squared | 0.9310 |

Note: P-values are in parentheses. Robust Standard Errors Used.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

**Table D2 -**

Regression of State GDP on Banks With Branches
Random Effects - Generalized Least Squares

| Variable | Estimated Parameter |
|---|---|
| Deposits Log | 0.0517972*** |
| | (0.002) |
| Banks With Branches Log | -0.2363368*** |
| | (0.000) |
| Fed Funds Rate | -0.0114348*** |
| | (0.000) |
| Population Log | 1.23311*** |
| | (0.000) |
| Constant | 6.831968*** |
| | (0.000) |
| Observations | 550 |
| R-Squared | 0.9512 |

Note: P-values are in parentheses. Robust Standard Errors Used.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

**Table D3 -**

State GDP on Banks With Branches Per Total Banks
Random Effects - Generalized Least Squares

| Variable | Estimated Parameter |
|---|---|
| Deposits Log | 0.0515294*** |
| | (0.001) |
| Banks With Branches Per Total Banks | 0.699074*** |
| | (0.005) |
| Fed Funds Rate | -0.0123901*** |
| | (0.000) |
| Population Log | 1.043129*** |
| | (0.000) |
| Constant | 8.195262*** |
| | (0.000) |
| | |
| Observations | 550 |
| R-Squared | 0.9557 |

Note: P-values are in parentheses. Robust Standard Errors Used.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

**Table E1 -**

State GDP on Deposits and Unemployment

Random Effects - Generalized Least Squares

| Variable | Estimated Parameter |
| --- | --- |
| Deposits Log | 0.0466053*** |
| | (0.008) |
| Fed Funds Rate | -0.0070294** |
| | (0.035) |
| Unemployment Rate | 0.0142168*** |
| | (0.004) |
| Population Log | 1.052115*** |
| | (0.000) |
| Constant | 8.619838*** |
| | (0.000) |
| Observations | 550 |
| R-Squared | 0.9602 |

Note: P-values are in parentheses. Robust Standard Errors Used.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

**Table E2 -**

State GDP on Deposits Per Office and Unemployment
Random Effects - Generalized Least Squares

| Variable | Estimated Parameter |
|---|---|
| Deposits Per Office Log | 0.0363904** |
| | (0.048) |
| Fed Funds Rate | -0.0068104** |
| | (0.038) |
| Unemployment Rate | 0.0152026*** |
| | (0.002) |
| Population Log | 1.093733*** |
| | (0.000) |
| Constant | 8.489432*** |
| | (0.000) |
| Observations | 550 |
| R-Squared | 0.9615 |

Note: P-values are in parentheses. Robust Standard Errors Used.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

**Table E3 -**

State GDP on Deposits Per Capita and Unemployment
Random Effects - Generalized Least Squares

| Variable | Estimated Parameter |
|---|---|
| Deposits Per Capita Log | 0.0466053*** |
| | (0.008) |
| Fed Funds Rate | -0.0070294** |
| | (0.035) |
| Unemployment Rate | 0.0142168*** |
| | (0.004) |
| Population Log | 1.098721*** |
| | (0.000) |
| Constant | 8.619838*** |
| | (0.000) |
| | |
| Observations | 550 |
| R-Squared | 0.9602 |

Note: P-values are in parentheses. Robust Standard Errors Used.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

**Table E4 -**

GDP on Banks With Branches Per Total Banks and Unemployment
Random Effects - Generalized Least Squares

| Variable | Estimated Parameter |
|---|---|
| Banks With Branches Per Total Banks | 0.6543091*** |
| | (0.009) |
| Fed Funds Rate | -0.0048612* |
| | (0.080) |
| Unemployment Rate | 0.0141749*** |
| | (0.001) |
| Population Log | 1.085487*** |
| | (0.000) |
| Constant | 8.755773*** |
| | (0.000) |
| Observations | 550 |
| R-Squared | 0.9533 |

Note: P-values are in parentheses. Robust Standard Errors Used.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

**Table F1 -**
Regression of Deposits on Offices
Random Effects - Generalized Least Squares

| Variable | Estimated Parameter |
| --- | --- |
| Offices Log | 1.144823*** |
| | (0.000) |
| Fed Funds Rate | -0.0233734** |
| | (0.020) |
| Financial Svcs Per State GDP | 8.534381* |
| | (0.074) |
| Constant | 16.04489*** |
| | (0.000) |
| Observations | 550 |
| R-Squared | 0.5222 |

Note: P-values are in parentheses. Robust Standard Errors Used.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

**Table F2 -**

Regression of Deposits on Branches

Random Effects - Generalized Least Squares

| Variable | Estimated Parameter |
|---|---|
| Branches Log | 1.12504*** |
| | (0.000) |
| Fed Funds Rate | -0.019585** |
| | (0.045) |
| Financial Svcs Per State GDP | 8.842435* |
| | (0.060) |
| Constant | 16.27683*** |
| | (0.000) |
| Observations | 550 |
| R-Squared | 0.5303 |

Note: P-values are in parentheses. Robust Standard Errors Used.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

**Table G1 -**

Financial Svcs on Branches and Unit Banks

Random Effects - Generalized Least Squares

| Variable | Estimated Parameter |
|---|---|
| Branches Log | 0.3689651*** |
| | (0.001) |
| Unit Banks Log | -0.0911513*** |
| | (0.009) |
| Population Log | 0.8860582*** |
| | (0.000) |
| Constant | 7.266605*** |
| | (0.000) |
| Observations | 550 |
| R-Squared | 0.7676 |

Note: P-values are in parentheses. Robust Standard Errors Used.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

**Table G2 -**

Financial Svcs on Branches Per 100,000 Residents

Random Effects - Generalized Least Squares

| Variable | Estimated Parameter |
|---|---|
| Branches Per 100,000 Residents | 0.0150061*** |
| | (0.000) |
| Unit Banks Per 100,000 Residents | -0.0619785* |
| | (0.057) |
| Population Log | 1.176897*** |
| | (0.000) |
| Constant | 4.79976*** |
| | (0.003) |
| Observations | 550 |
| R-Squared | 0.7668 |

Note: P-values are in parentheses. Robust Standard Errors Used.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

**Table G3 -**

Construction on Branches and Unit Banks

Random Effects - Generalized Least Squares

| Variable | Estimated Parameter |
|---|---|
| Branches Log | 0.2528897*** |
| | (0.009) |
| Unit Banks Log | -0.0727728*** |
| | (0.001) |
| Population Log | 0.8178397*** |
| | (0.000) |
| Constant | 8.777996*** |
| | (0.000) |
| Observations | 550 |
| R-Squared | 0.9237 |

Note: P-values are in parentheses. Robust Standard Errors Used.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

**Table G4 -**

Trade on Branches and Unit Banks

Random Effects - Generalized Least Squares

| Variable | Estimated Parameter |
|---|---|
| Branches Log | 0.4684415*** |
| | (0.000) |
| Unit Banks Log | -0.09703*** |
| | (0.000) |
| Population Log | 0.7119141*** |
| | (0.000) |
| Constant | 9.924611*** |
| | (0.000) |
| Observations | 550 |
| R-Squared | 0.9646 |

Note: P-values are in parentheses. Robust Standard Errors Used.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

**Table G5 -**

Transportation on Branches and Unit Banks

Random Effects - Generalized Least Squares

| Variable | Estimated Parameter |
|---|---|
| Branches Log | 0.7519366*** |
| | (0.000) |
| Unit Banks Log | -0.1277685*** |
| | (0.000) |
| Population Log | 0.5237414*** |
| | (0.003) |
| Constant | 9.518039*** |
| | (0.000) |
| Observations | 550 |
| R-Squared | 0.8227 |

Note: P-values are in parentheses. Robust Standard Errors Used.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

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Bachelor of Arts, Economics, May 2014

Research Paper Title:

Commercial Bank Branching, Deposit Depth and State Economic Growth

Major Professor: Dr. Alison Watts