THE ECONOMIC RECESSIONARY PRESSURE ON SUSTAINABLE GROWTH STRATEGIES OF AGRICULTURAL AND NON-AGRICULTURAL BANKS

by

MAOYONG ZHENG

(Under the Direction of Cesar L. Escalante)

ABSTRACT

This study's findings could identify important signals that could promptly warn of an impending bank failure by sustainable growth paradigm and seemingly unrelated regression (SUR). The sustainable growth model provides us with a linkage between bank growth and corresponding financial performance indicators (profit margin, earning retention, asset turnover, and financial leverage). These signals could identify specific areas of concern that need to be more carefully monitored and/or plans or strategies modified for the sake of averting economic failures or disasters. Moreover, this study conducts its SUR analysis on two banking classifications: agricultural and non-agricultural banks (as classified using the FDIC criterion). The results indicate that, compared with non-agricultural banks, agricultural banks have a higher profit margin, lower earnings retention ratio and the same asset turnover rate and lower financial leverage. Agricultural banks have a higher sustainable growth rate, but also experience constrained actual revenue growth during the recession.

INDEX WORDS: Agricultural Banking, Financial crisis, Decision Making, Bank Survival, Sustainable growth Analysis, Capital structure

THE ECONOMIC RECESSIONARY PRESSURE ON SUSTAINABLE GROWTH STRATEGIES OF AGRICULTURAL AND NON-AGRICULTURAL BANKS

by

MAOYONG ZHENG

B.A., China Agricultural University, China, 2017

B.S., Oklahoma State University, 2017

A Thesis Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of the Requirements for the Degree

MASTER OF SCIENCE

ATHENS, GEORGIA

2019

THE ECONOMIC RECESSIONARY PRESSURE ON SUSTAINABLE GROWTH

STRATEGIES OF AGRICULTURAL AND NON-AGRICULTURAL BANKS

by

MAOYONG ZHENG

Major Professor: Cesar L. Escalante
Committee: Chen Zhen
Benjamin Campbell

Electronic Version Approved:

Suzanne Barbour
Dean of the Graduate School
The University of Georgia
May 2019

DEDICATION

Dedicated to my parents, Qian Ye and Mingyuan Zheng, and my beloved Kexin Ding, for their unconditional support, help, and love.

ACKNOWLEDGEMENTS

As I enter the final stages of my master degree in Agricultural and Applied Economics, I am pleased to thank all those who made this paper possible.

I would like to express my deepest gratitude to my major professor, Dr. Cesar L. Escalante, for his continued support and guidance. I was lucky to have him as my advisor. Academically, I was impressed by his serious and responsible attitude. And what’s more, he also taught me a lot of life philosophy. Without his careful guidance, this thesis would not have been fruitful. His patient guidance enabled me to overcome the difficulties and finally finish this thesis. I also owe special gratitude to him for his encourage and help in my application. Additionally, I would like to thank my committee members, Dr. Chen Zhen, and Dr. Benjamin Campbell, for sharing their knowledge and giving me practical advice and support.

Moreover, I would like to thank my parents, it is their selfless love and support gave me the motivation to move forward.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 The Late 2000s Financial Crisis

The late 2000s financial crisis in the United States has become one of the most serious crises in the financial history of the United States with far-reaching significant impacts on the global economy. This financial crisis storm swept the global and the U.S. financial markets and caused serious, debilitating blows on the stock markets in the United States, Europe, Japan, South Korea, and China, among others. The repercussions of this crisis have affected other sectors of the economy that a general slowdown in economic and business activities ensued. Some late predicts suggest the U.S. economy may be on the verge of another recession because some of the signals are similar to previous economic conditions. This makes it necessary for us to reconsider the analysis and research of bank survival during the late 2000s financial crisis. The aim of this study is to reinvestigate the performance signals of commercial banks during the last recession through innovative methods.

During the late 2000s financial crisis, declining real estate values, sharp fall of the stock market, high unemployment, and other adverse consequences plagued the U.S. economy. More than 26 million Americans lost their jobs, about nine million families have lost their homes to foreclosure or could not afford to pay their mortgages payments, approximately eleven trillion dollars in household wealth were obliterated, notably including retirement accounts and life savings (Financial Crisis Inquiry Commission, 2011). Financial institutions in the United States, especially those with significant real estate-related transactions, suffered huge losses, with some forced to shut down. Hedge funds and investment Banks also experienced heavy losses. Delinquencies on single-family residential mortgages soared from 2% in the first quarter of 2007 to 10% in the fourth quarter of 2009, according to reports filed by domestic commercial banks (Board of Governors of the Federal Reserve System, 2018).

1.2 Bank Survival Strategy

The late 2000s financial crisis caused a surge of bank failures in the U.S. The bank failure rate was notably too high and has not been registered by the industry in many years. Add up to 325 bank failures were recorded between 2007 and 2010. By comparison, but only 24 banks had bankrupted in the seven-year period prior to 2007 (Li, Escalante, Epperson, & Gunter, 2013). In the two-year period from 2008 to 2009 alone, 165 bank failures were recorded. These bank failures only exacerbated the serious financial damage of the economic crises on the entire economy. The financial crisis has fully demonstrated the complex nature of managing modern financial risks, which is a very important consideration in the framing of financial policies among commercial banks. In this regard, much closer scrutiny of financial risk management strategies would be very beneficial in understanding the nature of bank survival and exploring their root causes. From such an analysis, one can draw valuable lessons that could help in effectively and efficiently managing future financial risks.

The last recession in the United States has not brought the United States agricultural credit agencies back to the plight of the 1980s agricultural credit crisis. The main reason is that most agricultural banks didn't make more risky home mortgages as many non-agricultural banks did. Most U.S. agricultural credit agencies have adopted a more conservative investment strategy. As a result, agricultural lenders in the U.S. were less affected by the financial crisis by avoiding risky investments. The U.S. agricultural sector has higher net income and better capital liquidity compared with other loans. Therefore, agricultural borrowers have strong short-term debt paying ability and less possibility to have financial distress when their income decreases.

1.3 Research Objectives

This study revisits the period around the onset of the financial crises and examines the business decisions of different types of survived banks under the light of the business strategy prescriptions of the sustainable growth model. This model captures several facets of business operations and sheds light on specific business strategic decisions affecting such financial factors as profitability, dividend policy, leverage, and asset management efficiency factors. This model can specifically identify certain configuration decisions that could either lead to bank collapse or survival through such a tough economic period. The difference between the calculated sustainable growth rate and the actual growth rate provides important signals on a bank's growth tendencies as linked to specific operating and financial decisions. This direct judgment could help managers and decision makers to formulate more effective, growth-conducive (or proper growth-regulating) financial strategies that are attuned more to the firm's actual financial and operating resources.

Moreover, this study will employ a comparative analysis of growth patterns registered by non-agricultural and agricultural banks as they relate to their respective cost efficiency and investment allocation decisions. Agricultural banks always have more liquidity concerns compared to non-agricultural banks (Li, Brewer, & Escalante, 2018). Generally, the scale of agricultural banks is relatively small due to capital constraints, and the specialization of agricultural banks' lending operations and the uncertainty of agricultural prices usually lead to greater risks (Li et al., 2018). Still, the study shows that agricultural banks outperformed non-agricultural banks during the recent recession (Kauffman & Akers, 2013).

CHAPTER II

REVIEW OF LITERATURE

2.1 Analyses of Bank Failure or Survival Determinants and Prediction

Recently certain discussions predicted an impending recurrence of recessionary times for the economy as some indicators resemble those in similar previous economic episodes. These prognoses create the need to recall and resurrect bank failure analyses and discussions. This study aims to contribute to these discussions from a new perspective by revisiting the bank survival of the last recession. This study's specific focus is on survived bank growth trends and strategies. Some previous studies have investigated the determinants of bank failures of previous financial crises. Earlier studies that analyzed the management decision of banks that failed contend that those failed banks invested higher percentages of assets in agricultural production loans, and lower percentages in federal government securities (Belongia & Gilbert, 1987). Another study determined four aspects of operations that need to be carefully addressed to avert bank failures. These aspects are bank regulations, market structure, net interest margins and overhead costs the impacts of net interest margins and overhead costs. The results of this study indicate that tighter regulations and inflation exert a positive impact on banking business survival and viability (Demirgüç-Kunt, Laeven, & Levine, 2003). The profit efficiency at *de novo* banks which mean the banks have been in operation for five years or less takes a longer time to reach established bank levels, and the lower profit efficiency causes excess branch capacity and reliance on large deposits (Deyoung & Hasan, 1998). Another study measures the impact of selected accounting and audit quality on bank failure, and the results indicate that banks audited by reputable auditors have a lower probability of failure (Jin, Kanagaretnam, & Lobo, 2011). In terms of survival and failure durations, a study applied the split-population model to separate the determinants of bank failure from the factors influencing the survival duration of failing banks. An interesting result of this study shows that bank liquidity and bank size are not associated with the failure time (Cole & Gunther, 1995). Another study developed the split-population duration model in finding commercial banks' operating strategies and structural attributes during the late 2000s financial crisis, and the results recognized the isolated negative effects of certain variables such as delinquency rates for consumer or industrial loans on a bank’s temporal endurance (Li & Escalante, 2016). Dynamic methodology techniques were also used to identify factors related to the operation of the banking system that led to the recent crisis (Kahn & Papanikolaou, 2011). Several other recent studies relied on an early warning model to predict threats of bank failures. A particular study considered several variables, such as asset quality, interest rate risk, funding arrangements, and structural factors as possible signals to predict bank failure. This study also provided a comparative assessment of survival strategies employed by agricultural and non-agricultural banks-paying careful attention to the very volatile nature of agricultural loans. The study’s results confirm that the agricultural sector operations do not necessarily increase the possibility of bank failure (Li et al., 2013).

An efficiency analysis model under the stochastic frontier framework was also employed to analyze technical efficiency and allocative efficiency differences between agricultural banks and non-agricultural banks. And this study also aimed to identifying certain warning signals of an impending bank failure. Results show that banks which have cheaper inputs and were more technically efficient were more likely to survive, and agricultural banks seem to be more efficient than non-agricultural banks (Li et al., 2018).

In addition to the analysis of bank failures, the studies of the surviving banks are also necessary. The study focuses on conflicts between bank managers and owners over risk for the survived banks, the results indicate that bank risk-taking varies positively with the comparative power of shareholders and regulation also effects bank risk taking (Laeven & Levine, 2009). Another two studies investigated how surviving banks responded to liquidity shock during the financial crisis. And the conclusion is the efforts to manage the liquidity crisis by banks led to a decline in credit supply (Cornett, McNutt, Strahan, & Tehranian, 2011), high liquidity creation (particularly off-balance sheet liquidity creation) helps predict crises (Berger & Bouwman, 2017). Risk management-related corporate governance of financial institutions is another aspect for the bank survival. The results indicate standard corporate governance variables are mostly insignificantly or negatively related to the banks' financial performance during the recession (Aebi, Sabato, & Schmid, 2012). An empirical analysis examines how capital affects bank survival and market share. And the results show capital helps small banks to increase their probability of survival and market share during the financial crisis (Berger & Bouwman, 2013).

2.2 Sustainable Growth Model

This current study differentiates itself from previous studies with its approach in analyzing financial and operating strategies of survived banks under the sustainable (or balanced) growth principle. This study replicates the previous focus on the interesting dichotomy between the unique, peculiar operating environments or conditions of agricultural banks and non-agricultural banks during the financial crisis.

The sustainable growth model is actually related, but not identical, to another financial performance analysis method that was introduced ahead of it. This earlier model is called the DuPont analysis, and this model was developed to find out interactions among important financial variables (Van Voorhis, 1981). Previous research utilized the DuPont analysis to understand the impacts of different management variables on the farm's financial performance (Melvin, Boehlje, Dobbins, & Gray, 2004). Several studies calculated Return on Equity of different types of banks by using the DuPont model to measure financial efficiency and management effectiveness (Kyriazopoulos, 2016; Ramesh, 2015). However, the DuPont analysis has some limitations, such as its inherent static nature that provides less financial decision information. By comparison, the sustainable growth model makes the analysis more dynamic and efficient by its ante-growth perspective whereby business strategic prescriptions of the model can be compared with actual growth strategies employed. The sustainable growth model identified the variables that influence the sustainable growth rate and explained how growth in banks is constrained by equity growth and regulations on leverage (Vasiliou & Karkazis, 2002), Another study uses the sustainable growth model to measure growth rates for Illinois grain and livestock farmers and understand the economic conditions and business decisions made by farmers (Escalante, Turvey, & Barry, 2009). Nonetheless, the sustainable growth model has not been used to investigate banks' operating strategies within the agricultural sector. This study would bring in new ideas in the analysis of bank performance and survival (growth) strategies, especially with its focus on the influence of agricultural lending portfolios of commercial banks that could either have had growth-enhancing or reducing effects, especially during the more volatile economic conditions of the late 2000s financial crisis.

Chapter III

METHODOLOGY

3.1 The sustainable Growth Paradigm

From the perspective of corporate finance, the development of a firm must be coordinated with its economic resources. If enterprises just depend on the growth of their own endogenous capital, certain opportunities for more business growth will be foregone. On the other hand, enterprises that rely solely on external financing scale to achieve their growth targets could make them beset with greater financial risks or could even cause bankruptcy. To some extent, traditional evaluation indexes such as the revenue growth rate, profitability, and growth in dividends can help enterprises analyze their development capacity and capability. However, these static indicators can only capture overall business growth registered in a certain period in the past. They cannot guide enterprises in evaluating decisions involving investment choices, growth considerations, and optimal capital structure choices. It is in this light that a new indicator called sustainable growth rate (Higgins, 1977) becomes relevant and useful as a supplementary business decisions and planning tool, in addition to such traditional indicators. The sustainable growth rate is the appropriate indicator that ensures that the growth of enterprises is coordinated with its financial capacity as defined by the financial resources of enterprises.

In this study, we focus on the financial performance and decisions of survived banks that operated during the late 2000s financial crisis – analyzing such parameters from a new perspective. The goal of this study is to introduce the application of sustainable growth challenge

(SGC) model (Higgins, 1977) as a conceptual paradigm and then utilize the model to estimate sustainable growth rates for U.S. commercial banks in the dataset. We adopt the sustainable growth paradigm (Higgins, 2012) to recognize linkages between financial strategies within the agricultural sector and bank failures. By analyzing these banks' levels of sustainable growth challenge (Higgins, 2012) – which is the difference between ideal, sustainable growth rates and their actual growth rates – important deductions on the nature of the banks' actual growth strategies can be made that will have important implications to these banks' probability of business success or failure. Traditional evaluation indicators such as revenue growth rate, profit growth rate, and cash flow can help banks to analyze the development ability. However, these indicators can only reflect the specific character of the bank's financial performance and partially guide the bank's operating strategies and risk management. Therefore, in addition to these traditional indicators, new indicators should be introduced, and the sustainable growth rate is one of them. Relying on this rate that called sustainable growth rate determines several components of operating decisions made by banks that either became bankrupt or survived during the late 2000s financial crisis. The Higgins model tells us that the sustainable growth rate can be expressed as the addition to revenue. We can be further expressed as the percentage change in equity under certain assumptions.

$$g_s = \frac{\Delta Revenue}{Revenue} = \frac{\Delta Equity}{Equity_{beg}} \tag{1}$$

In this basic scenario, we have an initial assumption that the bank will not use external equity financing such that an increase in equity can only be achieved through an increase in retained earnings. Given the identity defined in equation (1), we can then expand the definition of certain terms (equation 2) and subsequently make some substitutions:

$$\Delta \text{Equity} = Equity_{end} - Equity_{beg} = Net\ Income - Dividends \tag{2}$$

$$\frac{\Delta Equity}{Equity_{beg}} = \frac{\Delta Equity}{Equity_{beg}} \times \frac{Net\ Income}{Net\ Income} \times \frac{Revenue}{Revenue} \times \frac{Total\ Assets}{Total\ Assets} \Rightarrow$$

$$\frac{\Delta Equity}{Equity_{beg}} = \frac{Net\ Income - Dividends}{Equity_{beg}} \times \frac{Total\ Assets}{Net\ Income} \times \frac{Net\ Income}{Revenue} \times \frac{Revenue}{Total\ Assets} \quad (3)$$

Thus, we just rearranged equation (3) to get equation (4). Sustainable growth decomposes the returns to equity into four levers of growth: profit margin, earning retention rate, asset turnover and financial leverage (assets-beginning equity ratio). As the ratio is more a prescriptive (ante) measure of growth (instead of a historically descriptive measure of past performance), note that the financial leverage ratio uses beginning equity instead of year-end level to capture financial resources at the beginning of the year being analyzed. So, the sustainable growth rate equation can be transformed as follows:

3.2 The Sustainable Growth Rate（SGR）

$$g_s = \left[\frac{Net\ Income}{Revenue}\right] \times \left[\frac{Net\ Income - Dividends}{Income}\right] \times \left[\frac{Revenue}{Assets}\right] \times \left[\frac{Assets}{Euity_{beg}}\right] = SGR \quad (4)$$

Where

$$\text{Profit margin} = \frac{Income}{Revenue}$$

$$\text{Retention ratio} = \frac{Income - Dividends}{Income}$$

$$\text{Assets turnover} = \frac{Revenue}{Assets}$$

$$\text{Financial leverage} = \frac{Assets}{Equity_{beg}}$$

In the sustainable growth rate (SGR) equation, there are four financial determinants of the bank's growth representing several businesses operating strategic options. Decision makers and board of directors may consider these four key financial ratios as growth levers that can be used to adjust operating strategies.

The profit margin is a pivotal element for any financial performance and crucial to measuring sustainable growth rates. Its implication in the model is straightforward whereby higher profits can drive growth. For example, banks can increase sustainable growth rate by controlling costs and directly enhance their financing capacity by generating higher profit margins that eventually translate to higher equity (through the retained earnings effect).

The earnings retention rate is another key factor that may affect sustainable growth. Increasing the earnings retention rate further expands the earlier profitability effect for increasing the availability of financial resources for banks to achieve growth targets. Increasing the earnings retention rate not only enables banks to use retained earnings to support revenue growth but also provides a basis for them to take on debt financing and increases their ability to manage risk.

The asset turnover ratio measures the efficiency of bank asset management and also plays an important role in the SGR equation. Asset turnover rate reflects the revenue generating the ability of the bank's assets. This ratio provides an indication of the asset profile of the bank's operations – whether the composition is dominated by productive ones that are instrumental in maximizing revenue generation versus those that are idle, obsolete or unreliable in aiding with revenue generation. Generally, the faster the speed of asset turnover, the higher the efficiency of asset utilization. Shareholders and managers assess the assets management and income capacity of the bank through the asset turnover rate.

Theoretically, the financial leverage coefficient can reflect the financial risk brought by debt. Because banks usually make profits by absorbing deposits and making loans. In this sense, the financial leverage of banks is higher than that of other industries.

3.3 The Sustainable Growth Challenge（SGC）

The difference between actual growth in revenue and the sustainable growth rate is referred to as the sustainable growth challenge (SGC). These concepts are laid out below.

$$\mathrm{SGC} = \ln\left(\frac{Revenue_t}{Revenue_{t-1}}\right) - g_s \quad (5)$$

When the actual revenue growth rate exceeds the sustainable growth rate, the SGC is positive. Under this scenario, decision makers need to make operational and financial adjustments to attain a balanced growth scenario (i.e. SGC=0). The balanced growth scenario is the ideal target of the model as this is the condition whereby the firm is growing at just the proper pace – this pace defined by the level and extent of availability of financial resources and capabilities as prescribed by the four levers of growth in the sustainable growth model. When SGC >0, there will be a need to increase the sustainable growth rate in order to bring the SGC close or equal to 0. According to the SGR equation, the sustainable growth rate is directly proportional to profit margin, asset turnover, and financial leverage, and inversely proportional to dividend payment rate. Banks can increase profitability by lowering costs, reducing dividends, increasing asset turnover or increasing financial leverage. The banks can choose one or a combination of several of these financial and operating adjustments.

Conversely, if the SGC is negative, the real revenue growth rate is lower than the sustainable growth rate. Under this condition, we can infer that the bank seems to have surplus financing capacity. When this happens, the bank may consider one or several of the following operating and financial adjustments: reducing the level of financial leverage, reducing earnings retention, decreasing the assets turnover rate.

It is a vital warning sign for Banks to spot potential growth challenges ahead of the financial crisis. To overcome the challenges of growth, Banks must take deliberate action in anticipation of unforeseen circumstances. It is this ability to anticipate and be proactive in discerning necessary adjustments to regulate growth tendencies closer to the balanced growth scenario that could distinguish successful from failing banks. Banks could adopt more suitable and effective strategic operating, financing, and investment decisions to adjust SGR or SGC. Banks that can change or respond more effectively to growing demand are likely to last longer. Utilizing earnings retention, financial leverage, profit margins or assets turnover to regulate growth will not only achieve balanced growth, but more importantly will help avoid an impending bank failure. On the contrary, employing improper strategies involving the growth levers may hurt balanced and sustainable growth.

In this analysis, we empirically validate the sustainable growth model's application to banking institutions by employing seemingly unrelated regression (SUR) techniques. The SUR model is defined to determine the relative relevance of the four performance levers as well as factors that influence the banks' choices of strategies. An additional dimension is introduced in the analytical framework through the comparative study of operating strategies employed agricultural banks and non-agricultural banks.

3.4 Seemingly Unrelated Regression（SUR）

Assuming that each unit has its own linear regression model and that each individual observation i has M cross-sectional units, we also assume strict exogeneity of X_i and homoscedasticity (Greene, 2007). Therefore, we introduced an SUR system to measure the joint effects of the endogenous variables. The basic SUR system can be express as equation (7).

$$X_i = X_j = X \;\Rightarrow\; X_i' X_j = X' X \tag{6}$$

$$y_{ij} = X_{ij}\beta_j + \varepsilon_{ij}, \qquad where \;\; i = 1, \dots, N, \qquad j = 1, \dots, M \tag{7}$$

Utilizing an OLS regression requires zero correlation among error terms to avoid heteroscedasticity. If this condition is not satisfied, the OLS method will lead to inaccurate estimation. The SUR model was developed to properly allow non-zero covariance between error terms.

$$\mathrm{E}(\varepsilon_{it}, \varepsilon_{js}) = \begin{cases} \sigma_{ij}, & t = s \\ 0, & t \neq s \end{cases} \tag{8}$$

In this study, the object of the SUR system model is to identify the determinants of each of the four growth levers and the SGC. We apply the sureg procedure in Stata, which uses the asymptotically efficient, feasible generalized least-squares algorithm developed in Greene (2007). We can effectively address the interference of autocorrelation and heteroscedasticity through GLS that uses an efficient estimator. Denoting the i jth element of Σ^{-1} by σ_{ij}, the GLS estimator is given by the following equation (10):

$$\Omega = \Sigma \otimes I \;\Rightarrow\; \Omega^{-1} = \Sigma^{-1} \otimes I \tag{9}$$

$$\beta = [X'\Omega^{-1}X]^{-1}X^{-1}\Omega^{-1}y \;\Rightarrow \beta = [X'(\Sigma^{-1}\otimes I)X]^{-1}X^{-1}(\Sigma^{-1}\otimes I)y \tag{10}$$

Our SUR model system includes five equations (11)-(15), with one equation for each of the four growth levers of financial performance as the dependent variable, with a lagged measure of the dependent variable and sustainable growth challenge (SGC) included among the independent variables. In each equation, structural variables and financial indicator variables were included as additional explanatory variables. A fifth equation is also defined with SGC as the dependent variable regressed against the year-to-year changes in each growth lever as independent variables, in addition to other structural and financial indicator variables. These equations are defined as follows:

$$PM_t = \beta_{01} + \beta_{11}PM_{t-1} + \beta_{21}SGC_t + \beta_{31}HI_t + \beta_{41}DL_t + \beta_{51}SIZE_t + \beta_{61}AG + \varepsilon_1 \tag{11}$$

$$ER_t = \beta_{02} + \beta_{12}ER_{t-1} + \beta_{22}SGC_t + \beta_{32}AG + \varepsilon_2 \tag{12}$$

$$AT_t = \beta_{03} + \beta_{13}AT_{t-1} + \beta_{23}SGC_t + \beta_{33}DL_t + \beta_{43}SIZE_t + \beta_{53}AG + \varepsilon_3 \quad (13)$$

$$LEV_t = \beta_{04} + \beta_{14}LEV_{t-1} + \beta_{24}SGC_t + \beta_{34}DL_t + \beta_{44}SIZE_t + \beta_{54}AG + \varepsilon_4 \quad (14)$$

$$SGC_t = \beta_{05} + \beta_{15}\Delta PM_{t-1tot} + \beta_{25}\Delta ER_{t-1tot} + \beta_{35}\Delta AT_{t-1tot} + \beta_{45}\Delta LEV_{t-1tot} + \beta_{55}HI_t + \beta_{65}DL_t + \beta_{75}SIZE_t + \beta_{85}AG + \varepsilon_5 \quad (15)$$

In the above equations, PM is the Profit margin, ER is the Earnings retention rate, AT is the asset turnover ratio, LEV is the financial leverage (also called the asset-beginning equity ratio), and AG is the bank type dummy variable taking a value of 1 for agricultural banks (otherwise takes a 0 value). HI denotes the Herfindahl index as a measure of loan diversification, DL is the deposit to liability ratio, SIZE is the bank size variable, and the prefix Δ in the fifth equation denotes the year-to-year change for the given variables.

Deposit to liability ratio is used to evaluate a bank's liquidity by comparing a bank's total deposits to its total liabilities during a specific period. The lower deposit to liability ratio means that the bank might not have enough liquidity to pay any unforeseeable financial demands from its creditors, including depositors. When this ratio is high, the bank has a better liquidity position. Bank size measured in total assets and size could be related to financial performance. Herfindahl index measures the bank's loan diversification to capture how a bank's total loan portfolio is distributed or broken down into different type loans. The diversification index is calculated using the following Herfindahl index definition:

$$\text{HI} = \sum_{i-1}^{n} (Loan\ share_i)^2 \quad (16)$$

Under this methodology, a lower index indicates a higher level of diversification (Escalante & Barry, 2016). We utilize four different categories of loans which are agricultural loans, individual loans, real estate loans and leasing financing receivables to calculate the Herfindahl index. The SUR model is applied to three datasets: the full dataset that utilizes all bank observations and two sub-sets of datasets for agricultural and non-agricultural banks. Results of the Breusch and Pagan test are significant and thereby suggesting the existence of significant contemporaneous correlation among the error terms of the components of the 3 systems of equations.

CHAPTER IV

DATA AND VARIABLES DESCRIPTION

4.1 Bank Call Report Data Sources

A panel dataset is utilized which is obtained from the call report database published by the Federal Reserve Board of Chicago (FRB). These data are of available on a quarterly basis and, for purposes of this study, the quarterly figures were annualized. The bank-level database in this study was compiled using the following filtering conditions: only banks that consistently filed their quarterly financial reports during the years 2005 to 2011 were retained while banks with missing important observations for any of the variables of interest were removed. These filtering conditions resulted in a total of 30,665 panel data observations for 6133 survived commercial banks over the 5-year period. Of these banking units, 647 are agricultural banks and 5,486 are non-agricultural banks. Agricultural banks comprise 10.5 % of this study's sample of commercial banks.

In categorizing agricultural and non-agricultural banks in the sample, the classification criterion defined by the Federal Deposit Insurance Corporation (FDIC) was used. The FDIC defines agricultural banks as banks whose total portfolio of agricultural production loans and real estate loans secured by farmland exceeds 25 percent of its total loans and leases (FDIC, 2018). This approach allows for closer scrutiny of the role of inter-industry structural differences and conditions in explaining any discrepancy in operating strategies and vulnerability to economic shocks between these two types of banking firms. The dataset includes observations of agricultural banks and non-agricultural banks that survived the Great Recession of the Late 2000s -- a time period characterized by significant economic decline and a surge of bank failures.

4.2 Variables Definitions

In this study, we collected information on six accounts in the bank's financial statements, namely, net income, total assets, equity capital, gross revenue, preferred dividends, and common dividends. These data were used to calculate the four components of the sustainable growth model: profit margin (PM_t), earnings retention ratio (ER_t), asset turnover (AT_t), and financial leverage (LEV_t). Dividends were used to capture earnings withdrawals in the sustainable growth equation and are derived as the sum of preferred dividends and common dividends.

Loan diversification was included in the model by constructing a Herfindahl index (HI_t) that accounts for the relative contribution of each loan type to the total loan portfolio. In calculating the index, we use four different types of loans: agricultural loans, individual loans, real estate loans, and leasing financing receivables. Notably, we take the sum of these four loans' share to the total loan portfolio in the Herfindahl index equation. Deposits to liabilities ratio (DL_t) is included to account for liquidity effects.

CHAPTER V

EMPIRICAL RESULTS

5.1 Bank-level Descriptive Summary

Table 1 presents a summary of the mean values of the financial indicators for the entire dataset and for the subsets of agricultural and non-agricultural banks in the sample. The results indicate that, compared with non-agricultural banks, agricultural banks on average have higher profit margins, lower earnings retention ratio, and the same asset turnover rates. In terms of financial leverage, agricultural banks have lower leverage than non-agricultural banks. Over the five-year period, the average non-agricultural bank revenue growth rate was 1.05%, higher than agricultural banks. The non-agricultural banks' sustainable growth rate is 1.80%, almost the same as agricultural banks. Agricultural banks have a higher sustainable growth rate, and their average sustainable growth challenge levels are also much higher than non-agricultural banks' SGC during the five-year period. Tables 2 to 4 present year-to-year changes in the sustainable growth rates, actual revenue growth rates, and SGC levels, respectively. It is very clear from the data in the tables that, regardless of the type of banks and indicators, there was a significant decline in financial activity in the banking industry during the years immediately preceding the late 2000s financial crises. Indeed, growth within the banking industry and elsewhere in the economy has been minimal, if not non-existent, since the recession period. However, the sustainable growth rate of the agricultural banks has been kept at a level without much fluctuation.

Figure 2 plots the annual changes in the revenue growth rates and sustainable growth rates, as well as the sustainable growth challenge for all banks. The trends shown in figure 2 indicate that sustainable growth rates experienced a gradual decline during years of recessionary conditions. Such declining trend has also been mirrored by the declining trend in annual revenue growth rates. The trends in the historical sustainable growth rates, however, registered some recovery during the subsequent periods. Throughout this study's sample period, the overall SGC levels for both banking groups have remained below the X-axis. During the period between 2007 and 2009, commercial banks felt such downward trends in their revenues and incomes due to declining real estate values and a very volatile stock market that caused those sharp declines in revenue growth. These declining trends consequently affected the levels of their SGCs.

Figure 3 graphically shows the annual changes in sustainable growth rates and SGCs for different types of banks. Before the financial crisis began, the SGC quickly went from positive to negative. The SGC of these banks has been negative throughout the recession period. A negative SGC value indicates that the bank is growing at a slower rate than the growth pace prescribed by the sustainable growth model, which implies that banks have not fully exhausted its financial resources. By plotting the annual changes between agricultural banks and non-agricultural banks, we can observe the relative financial predicament of agricultural banks during the recessionary period. The plots indicate that during such period, agricultural banks have better sustainable growth rate levels and are less challenged by such sustainable growth parameters during the financial crisis. Figures 4 to 6 present the trends in the four financial determinants of the sustainable growth model for all banks in the sample and the two banking groups – agricultural and non-agricultural banks, respectively, during the five-year period. From the plots, we can easily see that the non-agricultural banks' profit margins have fallen considerably during this period. Conversely, agricultural banks experienced less fluctuation in their profit margins. The plots also indicate that agricultural banks' profit margins seem to have recovered quickly after the financial crisis. In contrast, non-agricultural banks' profit margins fell sharply during the recession and only began to recover in 2010.

As for earnings retention, the raised slowly in retained earnings rates from both types of banks during the recession. Increased retention rates to withstand shocks from financial crises. From the plots, we can deduce that the financial leverage conditions of non-agricultural bank gradually deteriorated during this period. On the contrary, the financial leverage conditions of the agricultural bank improved on a year to year basis. Table 5 presents the summary statistics of relevant bank performance variables used in the SUR estimation.

5.2 Estimated Results

The results of seemingly unrelated regression (SUR) model are presented in tables 6 and 7. A similar SUR system of equations was estimated for the study's entire banking sample (Table 6) as well as for the subsets of agricultural and non-agricultural banks (Table 7). In each SUR system of equation, an equation is defined for each of the four growth levers of financial performance (that served as dependent variables). The consistent component in each equation included among explanatory variables would be a lagged measure of the dependent variable and the sustainable growth challenge (SGC). Additional regressors are included wherever they are relevant in certain equations. These additional explanatory variables include the Herfindahl index as a diversification variable, deposits to liabilities ratio as a liquidity measure, and a bank size proxy variable. Each system of the equation would then have a fifth equation that involves SGC as its dependent variable regressed against the year-on-year changes in each growth lever as independent variables. Certain structural and financial indicator variables are also included as additional explanatory variables to this equation.

5.3 The Profit Margin and Earnings Retention Components

Based on the SUR regression results, the lagged profit margin variable in all three banking models is significantly positively correlated with the current year's profit margin. Results indicate that the current year's profit margin would tend to increase by 70.3 and 8.9 percent for every unit increase in the lagged value for agricultural and non-agricultural banks, respectively. This indicates that the profit margin in the previous period will lead to a positive effect on the profit margin this year and, based on the results, such effect for agricultural banks will be even greater. The SGC equation produced an interesting result for the profit margin variable. The SGC of agricultural banks is negatively correlated with the profit margin, which indicates that an upward change in the SGC level will be slowed down by changes in the profit margin. Interestingly, the result is reversed for non-agricultural banks. When the Herfindahl index was introduced, higher Herfindahl index values indicate worse levels of diversification. The results indicate that diversification has no significant effect on the profit margins of agricultural banks. However, for non-agricultural banks, the lower diversification has a negative impact on profit margin according to the nonpositive coefficient. The deposit to liability ratio variable that captures liquidity conditions produced an insignificant effect on the profit margin. The bank size variable had an insignificant effect on profit margins for non-agricultural banks, but a significant positive effect is noted for agricultural banks. Its reason lies in the scale of agricultural banks is generally small, there will be a phenomenon named the economy of scale for agricultural banks. Diseconomies of scale occur when a bank grows until it exceeds a certain limit, which is consistent with our results.

The earnings retention component produced the weakest results. The model's chi-square statistic is insignificant.

5.4 The Asset Management Component

For both agricultural and non-agricultural banks, the lagged asset turnover ratio and SGC variables produced significant positive results. The effects of lagged asset turnover rates on observed asset turnover rates are much higher at 98.5 and 97.8 percent for agricultural and non-agricultural banks, respectively. The positive SGC results for both models imply that under more aggressive growth strategies that exceed the growth prescription of the sustainable growth model (thus leading to positive SGCs), banks tend to adopt more efficient asset management strategies. The Bank size coefficient is significantly negative for agricultural banks only – thus suggesting that high levels of asset management efficiency are associated with smaller banks. This is indicative of the larger banks' tendencies to expand with the opening of more banking branches that brought down asset turnover rates. Through the results for the agricultural bank dummy variable, it can be inferred that agricultural banks tend to more effective asset management strategies.

5.5 The Financial Leverage Component

In the fourth equation, the lagged leverage variable is significantly positive for both agricultural and non-agricultural banks. The higher coefficient in agricultural banks shows that agricultural banks' past financial leverage decisions have a stronger impact on the current year's financial leverage position. The SGC variable is also significantly positive for both agricultural and non-agricultural lenders. The SGC effect is a bit higher for non-agricultural banks. The positive SGC effect suggests that banks with aggressive growth strategies that usually exceed sustainable growth levels usually have higher financial leverage ratios. As the dependent variable is defined as the ratio of assets to equity, higher ratios indicate tendencies to rely a bit more on external debts. Thus, putting the results into perspective, banks with aggressive growth strategies are those that tend to rely more on external debts.

The liquidity effect is quite different for the two sets of specialized banks. A positive liquidity effect for agricultural banks means that more liquid banks tend to rely on external debts more. In contrast, non-agricultural banks resort to external borrowing to improve their liquidity conditions.

5.6 The Sustainable Growth Challenge Consolidation

The fifth equation consolidates all model arguments into the SGC estimating equation. Looking at the results of the fifth equation, we find that the annual changes in the profit margin and asset turnover rate are positively correlated and significant for non-agricultural banks. This indicates that the momentum of maintaining favorable profitability conditions leads to faster actual growth rates exceeding sustainable growth rates (positive, higher SGCs). The result for agricultural banks, however, is the reverse. The negative correlation coefficient of the agricultural bank dummy variable indicates that intertemporal profitability trends are associated with those who take more calculated growth strategies well within the financial resource limits established by the sustainable growth model.

These two sets of banks have similar asset management and financial leverage results whereby more effective and efficient asset management strategies are associated with aggressive growth trends (positive SGCs). Greater reliance on debt (higher financial leverage ratios) also lead to aggressive growth strategies.

There are a significant positive loan diversification results in the non-agricultural banks model that suggests that more specialized banks are usually those that implement aggressive growth strategies. A significant negative liquidity effect is obtained for both bank models, thus suggesting that those that exhaust their short-term financial resources (that lead to lower deposits to liabilities ratios) are the ones that implement aggressive growth strategies. Bank size has a significant positive effect only for agricultural banks, thus indicating that large banks in that sub-sample would tend to grow faster than they should.

Among the first four equations for the four growth levers, the most estimating equations resulted in marginal R^2 range from 40 to 90 percent. The results to provide important insights on the question about the agricultural lending portfolio and the probability of failure from different types of banks during the late 2000s financial crisis.

CHAPTER VI

CONCLUSION AND IMPLICATIONS

The study proposes an innovative method to investigate the determinants of avoiding bank failures during the late 2000s financial crisis within the agricultural sector by adopting the sustainable growth paradigm.

6.1 Sustainable Growth Signals

The study introduces an innovative method to understand more the survival of banking institutions during the late 2000s financial crisis by adopting the sustainable growth paradigm. The sustainable growth model provides us with a linkage between bank growth and corresponding financial performance indicators (profit margin, earning retention, asset turnover, and financial leverage). We found that sustainable growth model could be used to explain the financial and operational strategies of survived banks observed during the late great depression. Notably, the results indicate that, compared with non-agricultural banks, agricultural banks have a higher profit margin, lower earnings retention ratio and the same asset turnover rate and lower financial leverage. Agricultural banks have a higher sustainable growth rate, but also experience constrained actual revenue growth during the recession. All commercial banks experienced declining growth due to the declining real estate values, sharp fall of the stock market. The SGC of these banks has been negative throughout the whole crisis period. A negative SGC value indicates that the bank is growing at a slower rate than the sustainable growth rate. Non-agricultural banks' average profit margin has fallen significantly during the financial crisis. However, agricultural banks' profit margins showed less fluctuation which confirms previous studies' assertions on these banks' relative financial strength. These banks' profit margins have been shown to quickly recover or even increase in the period after the recession.

Using seemingly unrelated regression techniques, the analysis demonstrated the importance of certain financial determinants in determining SGC trends. This approach will enable bank decision makers to efficiently adjust specific, crucial levers of growth to overcome any impending disruption to business growth during the financial crisis. Agricultural banks are most dependent on profit margin, asset turnover, and financial leverage. On the other hand, profit margin and asset turnover are more important for non-agricultural banks in overcoming growth challenge.

Moreover, diversification, liquidity, and bank size effects were considered in the analysis. The SGC of agricultural banks is negatively correlated with the profit margin, while the results for asset turnover and leverage are totally opposite. We observed that greater levels of diversification could bring more favorable profitability conditions for non-agricultural banks as deduced from the Herfindahl index variable result. Larger bank size is associated with better profitability but worse asset turnover in agricultural lenders, since banks earn most of their revenue from the interest rate spread between deposits and loans, but their assets are the sum of loans, reserves, and other investments, the larger banks always have the lower turnover ratio. The negative coefficient of deposit to liability ratio indicates that non-agricultural banks resort to external borrowing to improve their liquidity conditions. Nevertheless, higher liquidity means more buildup of financial leverage for agricultural lenders. From the results, we identify that agricultural banks are more dependent on the leverage strategies. Through our analysis, we have obtained the key factors for agricultural banks and non-agricultural banks to survive the late

2000s financial crisis, and these determinants have a very important guiding significance for the bank's business decisions depending on our empirical results.

6.2 Results Implications

Even as the US and global economies have survived the Great Recession of the late 2000s, lessons learned from such economic debacle should not be ignored. As the economy braces for an impending economic crisis, those lessons emphasize the need for prudence and vigilance among various economic decision-makers. The potential damages of an eventual bank crisis, if it cannot be completely averted, can be minimized if proper mitigating operating decisions are made as early as now. This study can help identify certain warning signals that hopefully banks can heed to in order to allow them to weather any approaching storm, no matter how turbulent it may turn out to be.

REFERENCES

Aebi, V., Sabato, G., & Schmid, M. (2012). Risk management, corporate governance, and bank performance in the financial crisis. *Journal of Banking and Finance*, *36*(12), 3213–3226. https://doi.org/10.1016/j.jbankfin.2011.10.020

Belongia, M., & Gilbert, Al. (1987). Agricultural Banks : Causes of Failures and the Condition of Survivors. *Federal Reserve Bank of St. Louis*, (May), 30–37.

Berger, A. N., & Bouwman, C. H. S. (2013). How does capital affect bank performance during financial crisesα. *Journal of Financial Economics*, *109*(1), 146–176. https://doi.org/10.1016/j.jfineco.2013.02.008

Berger, A. N., & Bouwman, C. H. S. (2017). Bank liquidity creation, monetary policy, and financial crises. *Journal of Financial Stability*, *30*, 139–155. https://doi.org/10.1016/j.jfs.2017.05.001

Board of Governors of the Federal Reserve System. (2018). Delinquency Rate on Single-Family Residential Mortgages, Booked in Domestic Offices, All Commercial Banks.

Cole, R. A., & Gunther, J. W. (1995). Separating the likelihood and timing of bank failure. *Journal of Banking and Finance*. https://doi.org/10.1016/0378-4266(95)98952-M

Cornett, M. M., McNutt, J. J., Strahan, P. E., & Tehranian, H. (2011). Liquidity risk management and credit supply in the financial crisis. *Journal of Financial Economics*, *101*(2), 297–312. https://doi.org/10.1016/j.jfineco.2011.03.001

Demirgüç-Kunt, A., Laeven, L., & Levine, R. (2003). *Regulations, Market Structure, Institutions, and the Cost of Financial Intermediation*. *SSRN*. https://doi.org/10.2139/ssrn.427200

Deyoung, R., & Hasan, I. (1998). The performance of de novo commercial banks: A profit efficiency approach. *Journal of Banking and Finance*. https://doi.org/10.1016/S0378-4266(98)00025-9

Escalante, C. L., & Barry, P. J. (2016). Determinants of the Strength of Strategic Adjustments in Farm Capital Structure. *Journal of Agricultural and Applied Economics*, *35*(01), 67–78. https://doi.org/10.1017/s1074070800005940

Escalante, C. L., Turvey, C. G., & Barry, P. J. (2009). Farm business decisions and the sustainable growth challenge paradigm. *Agricultural Finance Review*, *69*(2), 228–247. https://doi.org/10.1108/00021460910978706

FDIC. (2018). FDIC: FDIC Quarterly Banking Profile. Retrieved May 22, 2018, from https://www.fdic.gov/bank/analytical/qbp/glossary.html

Financial Crisis Inquiry Commission. (2011). *Final Report of the National Commission on the Causes of the Financial and Economic Crisis in the United States*. *The Financial Crisis Inquiry Report*. https://doi.org/10.1057/9781137311054

Greene, W. H. (2007). *Econometric Analysis*. *Pearson, Prentice Hall* (6thEdtion ed.). New Jersey, NJ: Prentice Hall.

Higgins, R. C. (1977). How Much Growth Can a Firm Afford? *Financial Management*, *6*(3), 7. https://doi.org/10.2307/3665251

Higgins, R. C. (2012). *Analysis for financial management*. *Analysis for financial management / Robert C. Higgins*. https://doi.org/10.1002/9781119208723.ch5

Jin, J. Y., Kanagaretnam, K., & Lobo, G. J. (2011). Ability of accounting and audit quality variables to predict bank failure during the financial crisis. *Journal of Banking and Finance*. https://doi.org/10.1016/j.jbankfin.2011.03.005

Kahn, C. M., & Papanikolaou, N. I. (2011). What problem banks reveal about future financial distress : Evidence from the late 2000s financial crisis. *Social Science Electronic Publishing.*, 1–29.

Kauffman, N., & Akers, M. (2013). Agricultural Lending Shifts to Large Banks. *Agricultural Finance Databook National Trends In Farm Lending*, (eral Reserve Bank of Kansas City), 2–5.

Kyriazopoulos, G. (2016). Profitability Of Cooperative Banks With DuPont Analysis : Evidence Of Greek Banking System, (May 2014).

Laeven, L., & Levine, R. (2009). Bank governance, regulation and risk taking. *Journal of Financial Economics*, *93*(2), 259–275. https://doi.org/10.1016/j.jfineco.2008.09.003

Li, X., Brewer, B., & Escalante, C. (2018). Pre-recession efficiencies and input allocation decisions of agricultural and critically insolvent banks. *Applied Economics*. https://doi.org/10.1080/00036846.2018.1430333

Li, X., & Escalante, C. L. (2016). Determinants of Financial and Temporal Endurance of Commercial Banks during the Late 2000s Recession: A Split-Population Duration Analysis of Bank Failures. *Journal of Applied Finance & Banking*, *6*(4), 1–16.

Li, X., Escalante, C. L., Epperson, J. E., & Gunter, L. F. (2013). Agricultural lending and early warning models of bank failures for the late 2000s Great Recession. *Agricultural Finance Review*. https://doi.org/10.1108/00021461311321357

Melvin, J., Boehlje, M., Dobbins, C., & Gray, A. (2004). The DuPont profitability analysis model: An application and evaluation of an e-learning tool. *Agricultural Finance Review*, *64*(1), 75–89. https://doi.org/10.1108/00214660480001155

Ramesh, M. P. (2015). DuPont Analysis of Axis Bank. *Asian Journal of Management Research*, *5*(4), 566–569. Retrieved from http://ipublishing.co.in/ajmrvol1no1/volfive/EIJMRS5233.pdf

Van Voorhis, K. R. (1981). The Dupont Model Revisited: a Simplified Application to Small Business. *Journal of Small Business Management*, *19*(2), 45–51.

Vasiliou, D., & Karkazis, J. (2002). The sustainable growth model in banking: An application to the national bank of Greece. *Managerial Finance*, *28*(5), 20–26. https://doi.org/10.1108/03074350210767843

Table 1. Mean Values of Bank-Level Financial Performance and Growth Measure, Commercial Banks, 2006-2011

Measures	**All banks**	**Agricultural banks**	**Non-Agricultural banks**
Number of banks	**6133**	**647**	**5486**
Profit margin	0.10	0.18	0.09
Retention ratio	0.67	0.55	0.68
Assets turnover rate	0.04	0.04	0.04
Financial leverage	10.66	9.91	10.74
Sustainable growth rate (%)	1.89	2.62	1.80
Annual revenue growth rate (%)	-0.93	-2.47	1.05
SGC (%)	0.95	0.15	-0.75

Table 2. Mean Sustainable Growth Rate (percent) of Commercial Banks, 2006-2011

Year	All banks	Agricultural banks	Non-Agricultural banks
2006	3.73%	2.61%	3.86%
2007	3.02%	2.38%	3.09%
2008	1.58%	2.22%	1.51%
2009	0.27%	2.22%	0.05%
2010	1.13%	2.90%	0.92%
2011	1.57%	3.42%	1.36%
Mean	1.89%	2.62%	1.80%
Median	1.58%	2.50%	1.43%
Std. dev.	0.013	0.005	0.014

Table 3. Mean Revenue Growth Rate (percent) of Commercial Banks, 2006-2011

Year	All banks	Agricultural banks	Non-Agricultural banks
2006	11.21%	8.65%	11.51%
2007	6.25%	5.93%	6.28%
2008	-4.47%	-6.49%	-4.23%
2009	-6.03%	-6.49%	-5.98%
2010	-5.87%	-8.36%	-5.57%
2011	-6.69%	-8.10%	-6.53%
Mean	-0.93%	-2.47%	-0.75%
Median	-5.17%	-6.49%	-4.90%
Std. dev.	0.077	0.077	0.077

Table 4. Mean Sustainable Growth Challenge (percent) of Commercial Banks, 2006-2011

Year	All banks	Agricultural banks	Non-Agricultural banks
2006	14.94%	11.27%	15.38%
2007	9.26%	8.31%	9.38%
2008	-2.88%	-4.27%	-2.72%
2009	-5.76%	-4.27%	-5.94%
2010	-4.74%	-5.46%	-4.65%
2011	-5.12%	-4.68%	-5.17%
Mean	0.95%	0.15%	1.05%
Median	-3.81%	-4.27%	-3.69%
Std. dev.	0.089	0.075	0.090

Table 5. Seemingly Unrelated Regression Summary Statistics for Commercial Banks

Variable	Definition	Obs	Mean	Std. Dev.
Sustainable growth rate	*PM*ER*AT*LEV*	30,519	0.0152	0.0723
Dependent Variables				
Profit Margin	*Income/Revenue*	30,665	0.0830	2.1302
Earnings retention ratio	*(Income-Dividends)/Income*	30,519	0.6881	14.3781
Assets turnover	*Revenue/Assets*	30,665	0.0398	0.0406
Financial leverage	*Assets/Euity_beg*	30,665	10.5936	3.3103
SGC	*ln((Revenue_t/Revenue_t-1)-SGR)*	30,519	-0.0196	0.1750
Independent Variables				
Lagged profit margin	*PMt-1*	30,665	0.1005	1.8717
Lagged earnings retention ratio	*ERt-1*	30,519	0.6616	14.3478
Lagged assets turnover	*ATt-1*	30,665	0.0421	0.0415
Lagged financial leverage	*LEVt-1*	30,665	10.7116	4.1103
Deposits to liabilities ratio	*Total deposits/Total Liabilities*	30,520	0.9266	0.0878
Bank size	*Total assets*	30,665	7,673,456	139,000,000
Herfindahl index	$\sum_{i-1}^{n}(Loan\ share_i)^2$	30,389	0.7467	0.1900
Change in Profit	*PMt - PMt-1*	30,665	-0.0175	2.8188
Change in Earnings Retention rate	*ERt - ERt-1*	30,518	0.0265	20.3045
Change in Assets turnover	*ATt - ATt-1*	30,665	-0.0023	0.0122
Change in Financial leverage	*LEVt - LEVt-1*	30,665	-0.1180	2.6605

Table 6. Results of Bank-level Econometrics Analyses by Seemingly Unrelated Regressions for All Banks, 2006-2011

Variables	**All banks**
Dependent Variable: Profit margin	
Intercept	0.3816282** (0.1560319)
Lagged profit margin	0.0852515*** (0.0062371)
Sustainable growth challenge	3.064874*** (0.0678083)
Herfindahl index	-0.4682861*** (0.0728709)
Deposits to liabilities ratio	0.1153944 (0.143589)
Bank size	0.000000027 (8.56e-11)
Agricultural bank dummy variable	-0.0122722 (0.0438842)
$\chi 2$	2114.85***
R2	0.0011
Dependent Variable: Retention ratio	
Intercept	0.7044565*** (0.0878837)
Lagged retention ratio	0.0007887 (0.0057487)
Sustainable growth challenge	-0.0832343*** (0.4795342)
Agricultural bank dummy variable	-0.1409764 (0.2679013)
$\chi 2$	0.32
R2	0.0001
Dependent Variable: Assets turnover	
Intercept	-0.0016635*** (0.000566)

Table 6. Continued

Variables	All banks
Lagged assets turnover	0.9782184*** (0.0015104)
Sustainable growth challenge	0.0320366*** (0.0002667)
Deposits to liabilities ratio	0.0009641 (0.0005942)
Bank size	-5.87e-13* (3.57e-13)
Agricultural bank dummy variable	0.0002238*** (0.0001574)
$\chi 2$	441605.96***
R2	0.9186
Dependent Variable: Financial leverage	
Intercept	4.808369*** (0.142063)
Lagged financial leverage	0.5930355*** (0.002918)
Sustainable growth challenge	3.697564*** (0.0688491)
Deposits to liabilities ratio	-0.5007144*** (0.0045833)
Bank size	1.31e-11 (8.72e-11)
Agricultural bank dummy variable	-0.1271915*** (0.0384645)
$\chi 2$	49076.12***
R2	0.598
Dependent Variable: Sustainable growth challenge	
Intercept	0.0930275*** (0.0117198)
Change in profit margin	0.0172903*** (0.0002995)
Change in retention ratio	0.0000179 (0.0000398)

Table 6. Continued

Variables	All banks
Change in assets turnover	11.50508*** (0.1557879)
Change in financial leverage	0.0118264*** (0.0003066)
Herfindahl index	0.0196086*** (0.0052121)
Deposits to liabilities ratio	-0.025154*** (0.0904626)
Bank size	9.62e-12 (6.55e-12)
Agricultural bank dummy variable	-0.0062052* (0.0033036)
$\chi 2$	21132.76***
R2	0.13

Notes: *, **, *** denote significance at the 10%, 5%, 1% confidence levels, respectively.

Standard errors in parentheses

Table 7. Results of Bank-level Econometrics Analyses by Seemingly Unrelated Regressions in Bank Types, 2006-2011

Variables	**Agricultural banks**	**Non-agricultural banks**
Dependent Variable: Profit margin		
Intercept	0.0580611 (0.035999)	0.3890417** (0.1689147)
Lagged profit margin	0.7028514*** (0.0128653)	0.0894158*** (0.0065979)
Sustainable growth challenge	-0.0741214*** (0.0142561)	3.291188*** (0.0738676)
Herfindahl index	0.0142561 (0.0276236)	-0.4784242*** (0.0776918)
Deposits to liabilities ratio	-0.0136327 (0.0322847)	0.1198862 (0.155928)
Bank size	0.0000000288*** (5.59e-09)	-2.87e-11 (9.05e-11)
$\chi 2$	3163.79***	2042.95***
R2	0.3858	0.0004
Dependent Variable: Retention ratio		
Intercept	0.5229169*** (0.1197998)	0.7060294*** (0.0919573)
Lagged retention ratio	0.0002331 (0.0182381)	0.0008026 (0.0060768)
Sustainable growth challenge	-1.383814 (0.9110603)	0.0057818 (0.5168272)
$\chi 2$	2.31	0.02
R2	0.0005	0.0001

Table 7. Continued

Variables	Agricultural banks	Non-agricultural banks
Dependent Variable: Assets turnover		
Intercept	-0.0011003 (0.0008932)	-0.0015827* (0.0006111)
Lagged assets turnover	0.9846942*** (0.0044132)	0.9779239*** (0.0016013)
Sustainable growth challenge	0.0276083*** (0.0003496)	0.0318357*** (0.0002898)
Deposits to liabilities ratio	0.0003588 (0.0008925)	0.000886 (0.0006418)
Bank size	-4.80e-10*** (1.54e-10)	-5.89e-13 (3.76e-13)
$\chi2$	57021.83***	392049.25***
R2	0.8452	0.9192
Dependent Variable: Financial leverage		
Intercept	-0.5073168 (0.3539481)	5.03321*** (0.1502917)
Lagged financial leverage	0.9309628*** (0.0055478)	0.5761158*** (0.0030951)
Sustainable growth challenge	3.151374*** (0.1541506)	3.715816*** (0.0732269)
Deposits to liabilities ratio	1.463269*** (0.3557008)	-0.5448249*** (0.1527564)
Bank size	-9.67e-08 (6.17e-08)	2.21e-11 (9.00e-11)
$\chi2$	29901.20***	41159.91***
R2	0.8331	0.5836
Dependent Variable: Sustainable growth challenge		
Intercept	-0.1444791 (0.0252186)	0.0872556*** (0.0123914)

Table 7. Continued

Variables	Agricultural banks	Non-agricultural banks
Change in profit margin	-0.2266487*** (0.0081283)	0.0175509*** (0.0003101)
Change in retention ratio	-0.0000442 (0.0000964)	0.0000216 (0.0000417)
Change in assets turnover	28.74496*** (0.2712528)	10.99069*** (0.0945157)
Change in financial leverage	0.0401226*** (0.0007766)	0.0110662*** (0.0003208)
Herfindahl index	-0.0100265 (0.015199)	0.0205306*** (0.0054463)
Deposits to liabilities ratio	-0.1180272*** (0.0242779)	-0.1022572*** (0.0116149)
Bank size	2.46e-08*** (4.20e-09)	9.50e-12 (6.76e-12)
$\chi 2$	12129.57***	18062.20***
R2	0.6104	0.125

Notes: *, **, *** denote significance at the 10%, 5%, 1% confidence levels, respectively.

Standard errors in parentheses

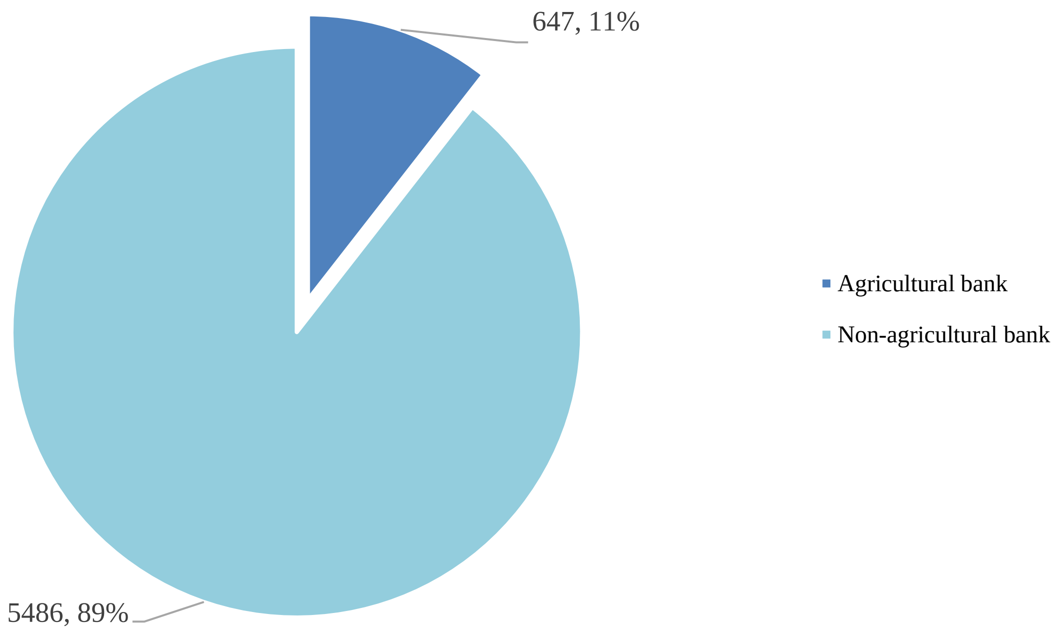

Figure 1. Numbers of Agricultural Banks and Non-Agricultural Banks, 2006-2011

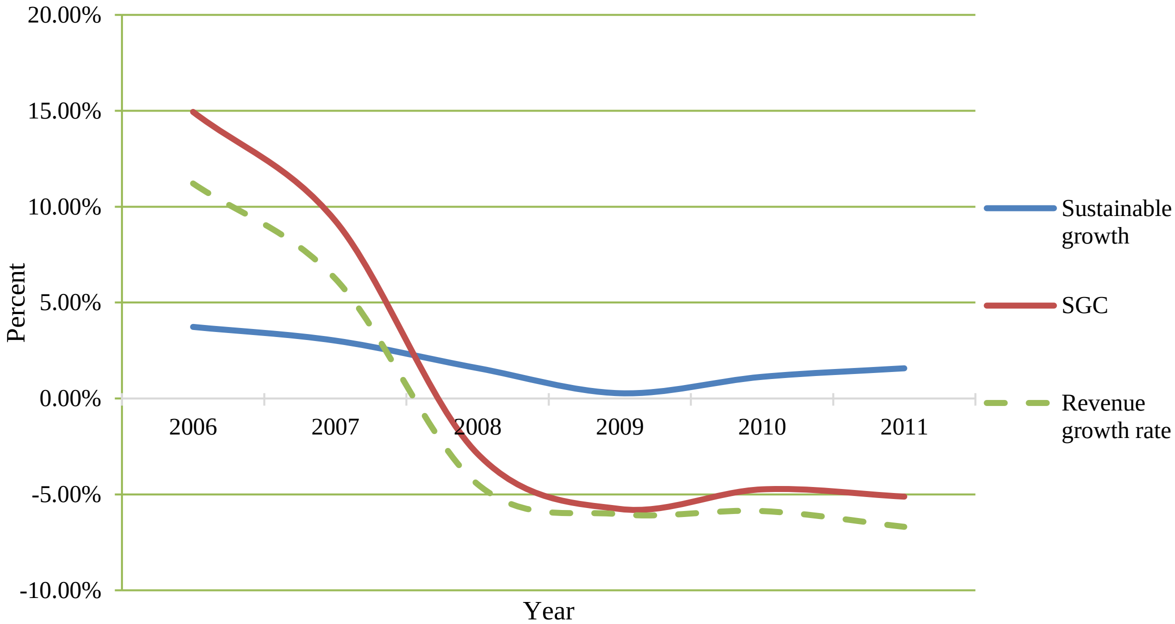

Figure 2. Rates of revenue growth, sustainable growth and SGC, All Banks, 2006-2011

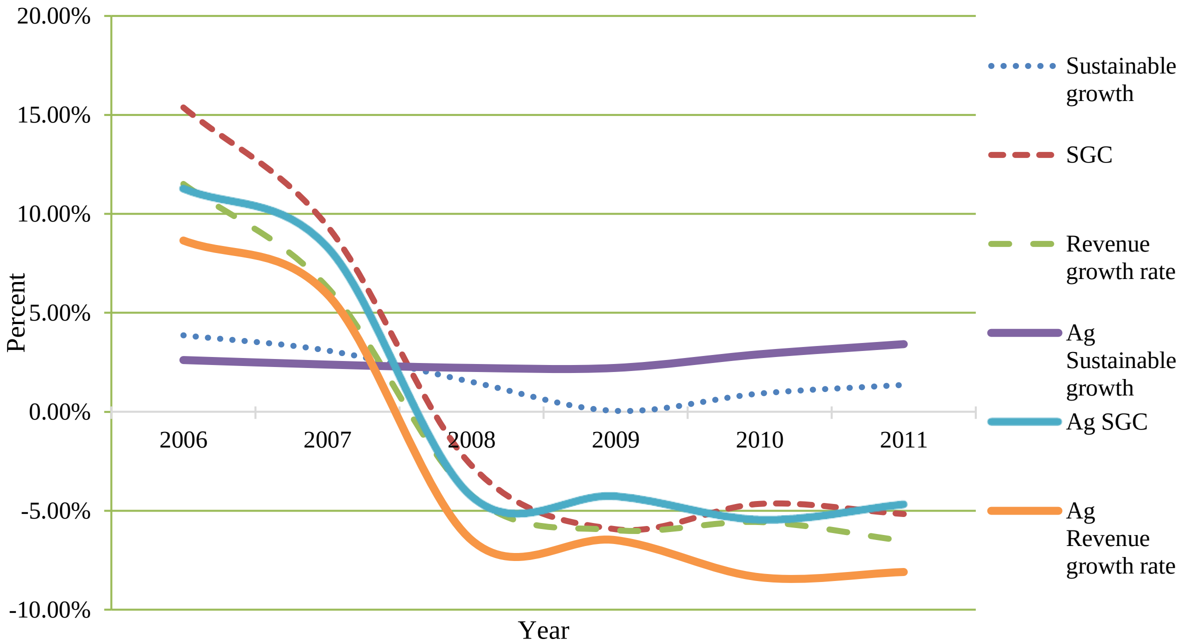

Figure 3. Rates of revenue growth, sustainable growth and SGC, Agricultural Banks and Non-Agricultural Banks, 2006-2011

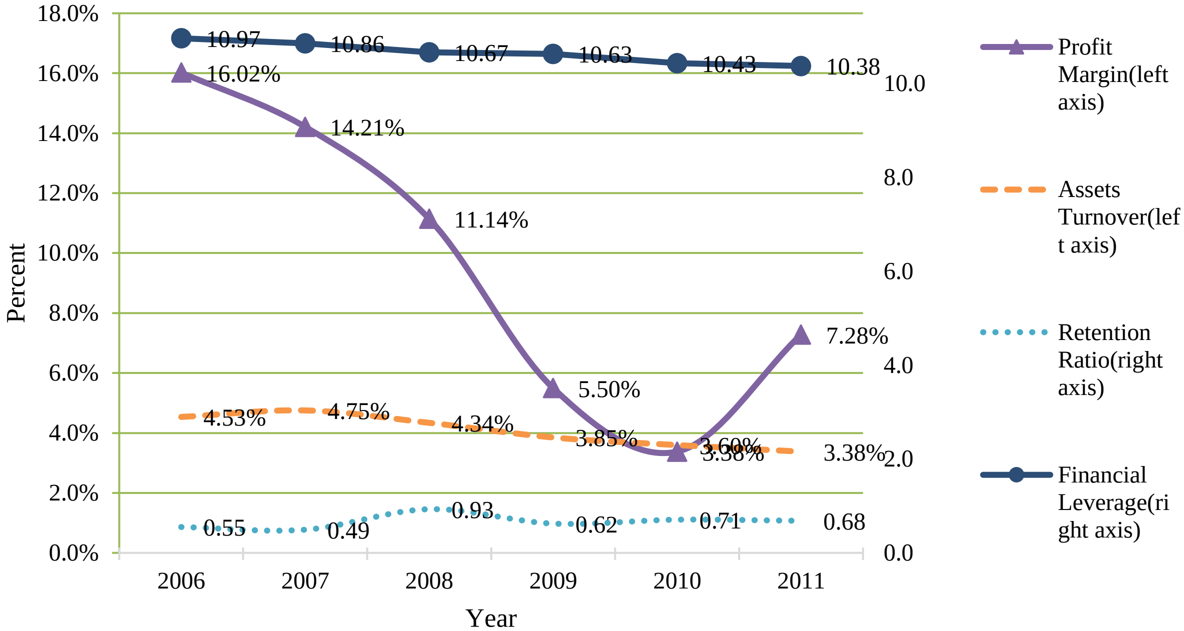

Figure 4. Growth Levers of the Sustainable Growth Rate for All Banks, 2006-2011

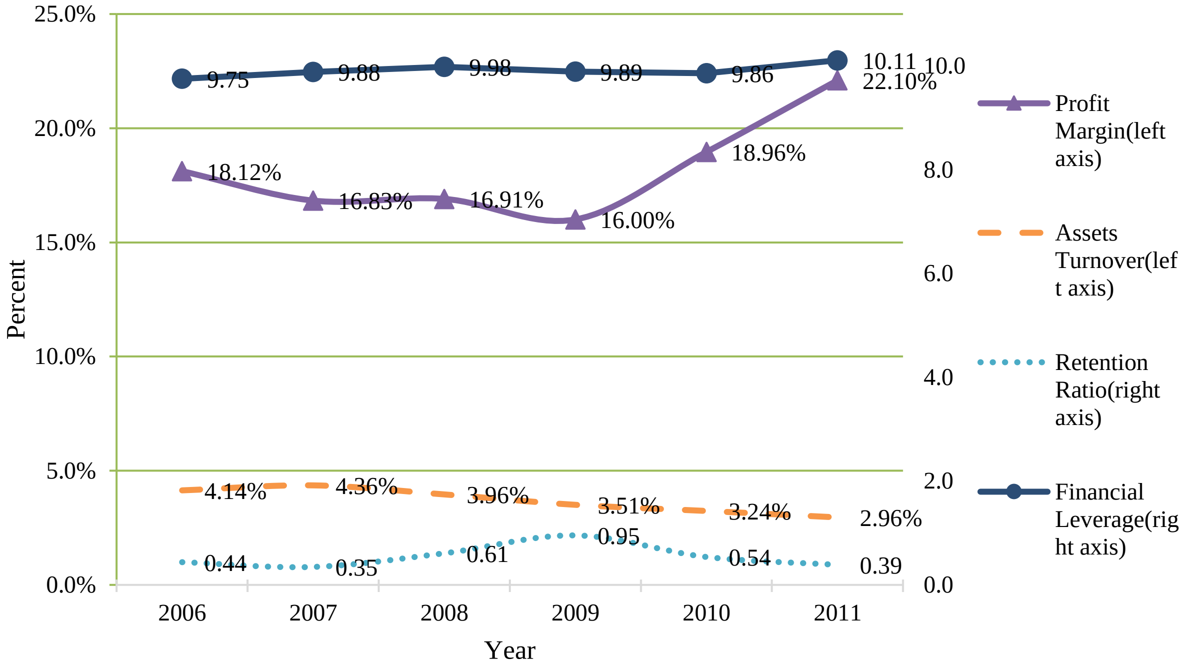

Figure 5. Growth Levers of the Sustainable Growth Rate for Agricultural Banks, 2006-2011

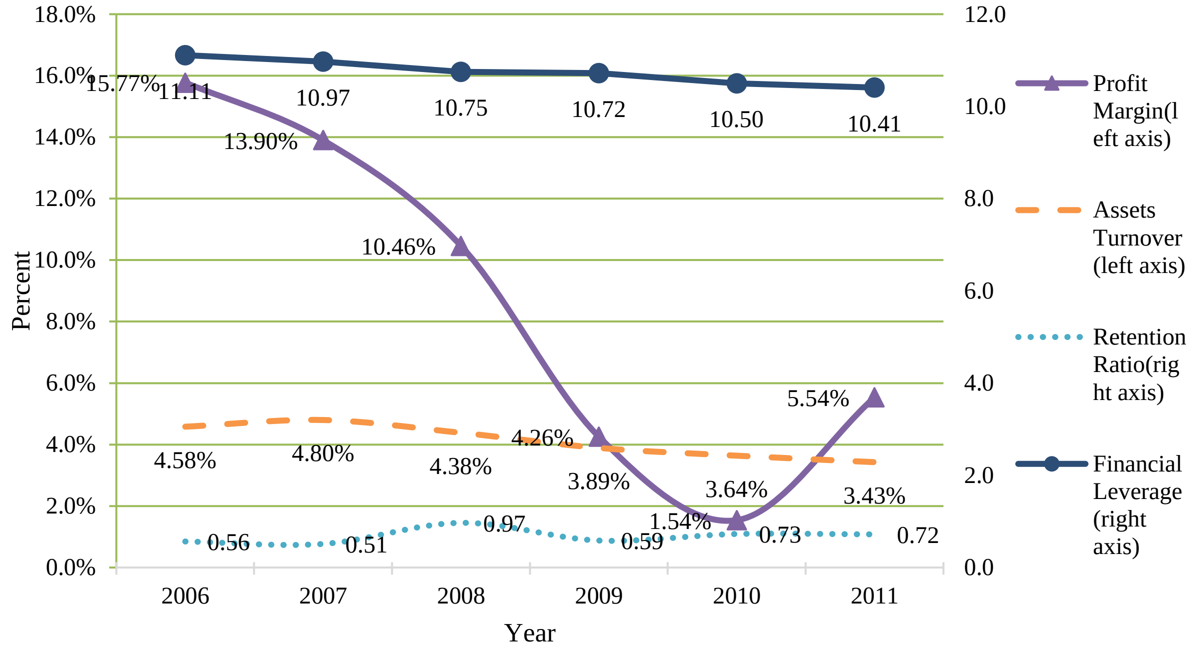

Figure 6. Growth Levers of the Sustainable Growth Rate for Non-agricultural Banks, 2006-2011