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Understanding the economic factors that impact the financial health of local governments

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UNDERSTANDING THE ECONOMIC FACTORS THAT IMPACT THE FINANCIAL
HEALTH OF LOCAL GOVERNMENTS

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ABSTRACT

The state of Louisiana has been hit by several severe hurricanes in recent years, and these disaster events have placed a financial burden on parish budgets. As such, local governments have been compelled to bear various cleanup and recovery costs in the short and long term. Therefore, this research sought to evaluate the factors that drive the variation in the financial health of local governments in Louisiana. This research made two contributions. The first contribution sought to develop a comprehensive measure of economic activity at the county level, and the second contribution used econometric methods to estimate the effect of selected macroeconomic indicators on the financial health of local governments.

Gross domestic product (GDP) was selected as the economic activity metric because it was found to be a more comprehensive economic activity metric than the other economic metrics historically applied to measure the size and scope of a region. Three methods to estimate GDP at the county level were developed, and a systematic approach was used to select the best method. Whenever earnings data were fully disclosed, this research used a ratio of state earnings to state GDP to estimate GDP at the county level. When earnings data were not fully disclosed, however, a ratio of state employment to state GDP was used.

To examine the effect macroeconomic indicators of local government financial health, nine financial ratios were generated using data from county financial statements. These ratios came from the categories of profitability, liquidity, capital structure, and performance. Two methods were developed to regress each of these ratios against selected economic and demographic indicators, including GDP, assessed valuation, hurricane damage, and lagged or initial values of the ratio being examined. The first method was a double-log random effects model, and the second method was an ordinary least squares model, which used the change over

time in each of the variables as the parameters. Both methods found the damage variable to have

a significant negative effect on county government financial health, supporting our hypothesis.

CHAPTER 1: INTRODUCTION

The purpose of this research is to improve upon the data and analysis available to those stakeholders (elected officials, concerned citizens, business leaders, etc.) concerned with the financial stability and health of local governments, particularly with their ability to prepare for and to recover from the destruction caused by natural disasters. The financial stability of parish[1] governments in Louisiana is the specific focus of this research, since Louisiana has been hit by several severe hurricanes in recent years, and these disaster events have placed a financial burden on parish budgets.

With the recent increase in natural disasters affecting Louisiana, local governments now have been compelled to pay for various cleanup and recovery costs both in the short and long term. The regions have needed to carry the full costs in the short term because it has taken up to a year for the state and federal government to provide reimbursement (Anderson, 2008). More recently, a greater share of the long-term costs of these recent natural disaster events has been carried by local parishes, since the federal government has decided to provide reimbursement for only a majority of the costs (90%), leaving the local government to pay 10% of the total (Harper and Dyer, 2008).

For a region to be resilient to natural disaster events, policy makers now need not only to prepare themselves by having contracts for debris cleanup and suitable levee systems, but also to prepare some means of paying for a share of the cleanup costs of future disasters. This will require parishes to either find ways to operate efficiently enough to save the necessary money (which may not be possible based on the magnitude of the costs arising from the most recent hurricanes, Katrina, Rita, Gustav, and Ike) or to structure themselves in such a way that lenders will not hesitate to lend the necessary funds.

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[1] In the state of Louisiana, the term for a county is "parish."

Currently, several tools have been developed that are able to aid decision makers in predicting the effects on local financial health from different economic events and policy decisions. For instance, hybrid conjoined models combine input-output matrices and Social Accounting Matrices with econometric forecasting methods (Shaffer, Deller, and Marcouiller, 2004) in order to predict in detail the effects of a certain policy on a local region. Additionally, Community Policy Analysis modeling (COMPAS) provides another tool for examining changes in revenues and expenditures. It is used to improve the financial health of a local region (Johnson, Otto, and Deller, 2006).

Financial ratios are another tool used to examine the financial health of a local region (Wang et al, 2007; Cohen, 2008). These ratios originated in corporate finance literature, but they have been increasingly applied to the public financial sector because of the valuable information that they can provide to stakeholders. Policy makers and local leaders can use these ratios to know how their region's statement of net assets (public sector balance sheet), statement of cash flows, and statement of net activities (public sector income statement) compare to other similar regions.

These financial ratios can also be used by lenders to gauge a region's borrowing capacity. For example, if a region's net assets (equity) are substantially less than its liabilities, then the region may not have sufficient collateral for further borrowing. In addition, if operating revenues do not exceed operating expenses, then the region would have trouble making current debt payments; and if this phenomenon continues, the region would likely have to declare bankruptcy. If policy makers plan on future borrowing, they may want to structure their region to meet certain specifications about financial ratios.

Generating these financial ratios was difficult in the past because of a lack of proper data. Recent policy changes have required local governments to change their accounting methods and to standardize their financial records. This has made using financial ratios much more convenient and the results more conclusive for use in analyzing the public financial sector (Mead 2001). Both the data availability and harmonization of the data definitions across multiple jurisdictions have made the detailed financial health analysis in this research feasible.

General Research Objective

Using GDP and other economic indicators, evaluate the factors that drive the variation in the financial health of local governments in Louisiana.

Specific Research Objectives

(1) Develop and test methods of estimating local area GDP, to determine which method is the most appropriate form of estimation.

(2) Estimate the effect of selected economic indicators on the fiscal health of parish governments.

Approach to Accomplishing Objective 1

To analyze the fiscal health of parish governments, a comprehensive economic activity metric must be developed. Specifically, Objective 1 will be achieved by modifying the method of estimating metropolitan area GDP set forth by the Bureau of Economic Analysis (BEA). These GDP estimates will serve to provide an improved measure of the comprehensive structure of the parish economy in order to better explain how economic factors influence financial health.

Problem Statement

Regional economists are often asked to provide data and analysis for regions smaller than a state. To accomplish this task, they acquire data from many sources, with varying levels of

accuracy and disclosure (disclosure issues occur when data are withheld because providing them for a given firm in a given sector in a given region would disclose confidential information). The U.S. Bureau of Economic Analysis (BEA) publishes county level earnings data (BEA Local Area Personal Income, 2008). The BEA, however, does not provide estimates for county level Gross Domestic Product (value-added) data. Given the pressure from many rural development officials for increased "value-added agriculture," there is a need to better identify the value-added contributions of specific county industries. The objective of this research is to augment previously applied methods with additional new methods so that Gross Domestic Product (GDP) may be estimated at the county level. By estimating county-level GDP, this research further analyzes the economic condition of county economies, particularly rural county economies that often are left out of economic analyses.

Literature Review

<u>**Economic Activity Metrics**</u>

Economists and regional planners use several methods for measuring the economic activity of an area. Some more commonly used metrics are employment, output, earnings, and value-added (Andrews, 1954; Shaffer, Deller, and Marcouiller, 2004). Each activity metric has its advantages and disadvantages; however, certain metrics provide a more comprehensive and informative snapshot than others. A detailed discussion of these measures follows.

Employment is a very clear and easily understood unit of measurement. Collection of employment data is relatively simple, and the data series over time are generally consistent and accurate (Shaffer, Deller, and Marcouiller, 2004). For example, the Census Bureau estimates employment annually for every county by industry (subject to disclosure rules). Companies such as Wholedata have supplemented such federal datasets with methodologies that estimate

employment that could not be disclosed by the government (Isserman and Westervelt 2006). Yet, employment as an economic metric is limited in its usefulness, as it does not take worker productivity or worker salaries into account (Andrews 1954; Shaffer, Deller, and Marcouiller, 2004). The economic effect of an increase of fifty jobs paying $30,000 is fundamentally different from the same number increase in jobs paying $120,000. Additionally, seasonal and part-time employment is typically counted together in federal agency reports; by not recognizing these limitations in the analysis, incorrect inferences could be made. Finally, when considered intuitively, jobs are inputs into the production process, not an output of production. A more desirable economic activity metric would measure the output of the economy.

Therefore, a need for a measurement unit based on the value of the product or service being produced would be preferred. *Output*, which is the value of the production of all industries in an economy, is an alternative economic metric[2]. The drawback to this measure is that it inflates the size of an economy since it does not subtract intermediate product sales among firms in its measurement, which leads to double counting (Shaffer, Deller, and Marcouiller, 2004). Double counting occurs when the value of an input is not subtracted from the value of a firm's output thereby overestimating the size of the economy. For example, assume a county's agricultural sector grows only corn and hogs and the total output value of each commodity is $1 million resulting in a total county agricultural output value of $2 million. The total value of the hogs is a function of the value of the inputs that are applied to grow the hogs. Assuming the hog producer purchases 100% of the corn produced by the corn farmers in the county, then the $2 million agricultural output value for the county overestimates (double counts) the actual

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[2] Output in agricultural datasets is approximately equal to gross farm value (LSU AgCenter Annual Summary 2009) or Gross Farm Income (National Agricultural Statistics Service) with a few exceptions.

economic contribution of agriculture to the county by the value of the corn purchases by the hog producer.

The *earnings* metric does not suffer from double counting. It is defined as the labor and property earnings from current production. It includes wage and salary disbursements, supplements to wages and salaries, and proprietors' income (BEA Local Area Personal Income, 2009). The problem with this metric is that it does not include taxes on production and imports less subsidies and the components of gross operating surplus apart from proprietor's income. Taxes on production and imports net of subsidies represents the net transfer of the earned value of goods and services produced in a regional economy that are paid (transferred) to various institutions of the economy. For most industries, taxes paid to the government are greater than the subsidies received, so not counting this value would underestimate a regional economy's overall activity. However, for an industry like agriculture that receives more subsidies than it typically pays in taxes, failing to make this adjustment would overestimate the region's economic activity by including unearned income. Since corporate forms of governance are a dominant business structure in most regions of the country, not including their operating surplus would further underestimate the region's economic contribution.

Gross Domestic Product (GDP) is considered a comprehensive measure of economic activity. In the U.S., the Bureau of Economic Analysis uses three methods to measure GDP: the *expenditure* approach, the *value-added* approach, and the *gross domestic income* approach (Landefeld, Seskin, and Fraumeni, 2008). The estimates generated by these methods are conceptually equal, but their estimates may vary slightly because of the different data sources and methods used in their estimation. Detailed definitions of each GDP method are presented in the next section.

Definitions of GDP

The *expenditure* approach generates final sales of domestic product to producers, and it is calculated by using the formula provided in Equation (1.1).

(1.1) $GDP=C+I+G+X-M$;

where C = consumption, I = gross investment, G = government spending, X = exports, and M = imports (Landefeld, Seskin, and Fraumeni, 2008). This is one of the most common definitions presented in introductory macroeconomics textbooks (Cramer, Jensen, and Southgate, 2001; Mankiw, 2009).

Alternatively, the *value-added* approach estimates GDP for each industry by subtracting intermediate inputs from gross output (gross sales less changes in inventories) as described by Equation (1.2).

(1.2) $GDP = Gross\ Output - Intermediate\ Inputs$

where *Gross Output* is defined as "the market value of an industry's production, including commodity taxes and an adjustment for inventories," and *Intermediate Inputs* are the value of the "goods or services that are used in the production process to produce other goods or services rather than for final consumption" (GDP by State, 2006). This approach focuses on the conceptualization that GDP measures only "new" value created in an economy and avoids the pitfalls of economic metrics such as output.

Finally, the *income* approach estimates GDP in terms of total domestic incomes earned. This method sums wages and salaries, supplements to wages and salaries, taxes on production and imports (less subsidies), and gross operating surplus (GDP by State, 2006). The formula is presented in Equation (1.3).

(1.3) *GDP = Wages and Salaries + Supplements to wages and salaries + Taxes on production and imports – Subsidies + Gross operating Surplus*

In Equation (1.3), *Wages and salaries* represents the wage and salary disbursements before deductions from the BEA state personal income (SPI) accounts, which have been adjusted to follow an accrual basis. *Supplements to wages and salaries* are made up of employer contributions to social insurance funds and other labor income. *Taxes on production and imports* is composed of federal excise taxes and customs duties, state and local sales taxes, property taxes (including residential real estate taxes), motor vehicle licenses, severance taxes, and special assessments. *Gross operating surplus* consists of consumption of fixed capital, proprietor's income, corporate profits, nontax payments, and business current transfer payments (net) (GDP by State, 2006). Due to data availability, this is the method used by the Bureau of Economic Analysis for calculating annual estimates of state-level GDP since 1963. Typically, the expenditure and value-added approaches are only used to calculate GDP at the national level.

In recent decades, GDP has gained widespread use as an economic metric due to its ability to provide comprehensive snapshots of economies at high levels of aggregation, i.e. at the national level. It has been typically utilized in macroeconomic growth models such as the Neoclassical Growth Theory (Mankiw, Roemer, and Weil, 1992). As researchers tested these theories on large economic regions (nations), they desired to apply this knowledge to smaller, more localized areas to see if these theories held. Having sub-state GDP estimates would allow for testing of such neoclassical growth concepts as convergence rather than making assertions based on the analysis of larger geographic units.

In summary, GDP is a more comprehensive economic activity metric than the other metrics historically applied to measure the size and scope of the economic activity in a region.

Moreover, the estimates of GDP represent the value-added activity that has occurred in a region, as opposed to a summation of all activities. The value-added definition provides the opportunity of applying the GDP metric to measuring the creation of new value in a regional economy.

Since the income and value-added definitions of GDP are conceptually equal, and the income approach is typically applied for sub-national estimates of GDP, this research develops a strategy for measuring value-added contribution at the county level (or "parish" level to be consistent with the terminology used in Louisiana) based on the income approach. This is the focus of the next section.

Methodology

Currently, the BEA releases GDP estimates for the national and state level, and in more recent years, the agency has released these estimates at the metropolitan level. The metropolitan level statistics are calculated using a ratio of GDP to earnings. Earnings works well for this process because all components of earnings exist within GDP, with the exception that earnings uses a cash-flow basis for wages and salaries (when the money changed hands) and GDP uses an accrual basis for wages and salaries (when the money was accounted or expensed to the individuals). Therefore, earnings and GDP can be assumed to move together proportionally. Yet, this method of using earnings to estimate GDP cannot provide a complete set of estimates due to earnings data disclosure restrictions (when data are withheld because publishing them would disclose confidential earnings information). This is where our research seeks to contribute. The original concept for parish level GDP estimates was derived from the work of Baumgardner (2008) and the basis for our methodology was the metropolitan GDP estimation approach by BEA.

Three methods are used to arrive at estimates for parish level gross domestic product (GDP). The first method uses a ratio of state GDP to state earnings by sector, multiplied by the sector earnings at the parish level. Since, as previously stated, earnings data are a component of GDP data, the two measures of industry size would tend to fluctuate together. The first method, however, cannot be used comprehensively due to the earnings disclosure limitations for many sectors at the parish level and for a few sectors at the state level. The formula in Equation (1.4) is

$$(1.4) \quad GDP_{i,p,y} = \frac{GDP_{i,st,y}}{Earnings_{i,st,y}} \times Earnings_{i,p,y}$$

where p = parish; i = industry; st = state; and y = year.

The second method, the state productivity method, uses a ratio of state GDP to state employment by sector, multiplied by parish employment for each sector. This method provides estimates for every industry, but it assumes that worker productivity for each industry at the parish level exactly matches average productivity for that industry at the state level. The formula is presented in Equation (1.5):

$$(1.5) \quad GDP_{i,p,y} = \frac{GDP_{i,st,y}}{Employment_{i,st,y}} \times Employment_{i,p,y}$$

where the variables retain their specification from Equation 1.4.

The third method is based on the concept that contiguous parishes (those parishes that are adjacent) will have similar earnings profiles. For each parish industry, the disclosed earnings of all of the contiguous parishes are summed, and then the corresponding industry employment is likewise summed. The earnings total is then divided by the employment total to find the regional industry earnings to employment ratio that can then be applied to each parish.

Finally, each of the regional industry earnings ratios is multiplied by the parish's industry employment to get an estimate of earnings for each sector in the parish. These earnings estimates can be used when parish level earnings are not disclosed by BEA. The formulas are:

$$(1.6) \quad Estimated\_Earnings_{i,p,y} = \frac{\sum_{c=1}^{n} Earnings_{i,c,y}}{\sum_{c=1}^{n} Employment_{i,c,y}} \times Employment_{i,p,y}$$

(1.7)

$$GDP_{i,p,y} = \frac{GDP_{i,st,y}}{Earnings_{i,st,y}} \times Estimated\_Earnings_{i,p,y}$$

where c = contiguous parishes for parish p, and all other variables retain their prior specification. How and when each method was used is discussed in Chapter 2.

To estimate each of these equations, several data sources are used. All earnings data will be obtained from the Regional section of the Bureau of Economic Analysis website (BEA Local Area Personal Income, 2008). State-level GDP data will also be obtained from the regional section of the BEA website (BEA Gross Domestic Product by State, 2008). Employment data for non-farm industries will come from the fully disclosed County Business Patterns (CBP) dataset created by Isserman and Westervelt (2006). Farm employment will come from BEA (BEA State Area Personal Income, 2008). All data and results are for the counties (parishes) of the state of Louisiana for the years 2001 – 2007.

Approach to Accomplishing Objective 2

Specifically, Objective 2 will be achieved by using financial data from parish government statements of activities (public sector income statement) and statements of net assets (public sector balance sheet) to generate financial ratios. These ratios will then be regressed against selected economic and demographic indicators (including the parish GDP estimated in Chapter

2) to determine relationships between current economic activity and local government financial health.

Problem Statement

In recent years, Louisiana has been hit by several severe hurricanes, particularly hurricanes Katrina, Rita, Ike, and Gustav. These storms destroyed large portions of the Louisiana coastline and presented challenges for parish governments in financing and managing cleanup efforts. As such, stakeholders (elected officials, concerned citizens, business leaders, etc.) inside and outside parish governments have realized the tremendous costs that accompany these events (Anderson, 2008; Colvin, 2008; Lundin, 2008).

Parish governmental leaders continue to develop an understanding of the issues related to preparing for and responding to natural disasters. For example, contracts have been made with entities, whether private or otherwise, for most post-disaster concerns, such as debris removal, search and rescue, medical aid, food and water relief, etc. Less attention, or rather less research, however, has gone toward the financial costs that these relief efforts carry and the strain that these costs place on local government.

Historically, local governments have been reimbursed for all or nearly all of the disaster relief costs by higher levels of government. For Hurricanes Katrina and Rita, the federal government reimbursed Louisiana parishes 100% of the disaster and recovery costs; for more recent hurricanes, however, this has changed. After Hurricane Gustav, the federal government initially informed parishes that reimbursement for expenses would be capped at 75%; however, it was eventually raised to 90% due to the chief administrative officer of the mayor of Baton Rouge, LA traveling to Washington D.C. to lobby federal officials to increase the federal match (Harper and Dyer, 2008). Yet, this reimbursement has not been immediate, and therefore, local

governments have been required to carry these costs until the time that reimbursement became available. The combination of these two factors has forced parish governments to consider increasing cash reserves or have other forms of liquid resources, which can be drawn upon to finance the recovery efforts in the short term. The occurrence of four storms of such large magnitude over a three-year period has raised concerns over future possible storms and led decision makers to see a need for increased planning. Little research, however, has been done to determine the magnitude of these short-term financial burdens or the size of the liquid reserves that parish governments need to maintain. This provides the motive for the present research.

Methods and Data

Parish financial condition will be measured using financial ratios, which have been shown to be useful in evaluating entities in the public sector (Wang, Dennis, and Tu, 2007; Cohen, 2008). These ratios can provide a balanced representation of a parish government's overall financial situation. Four common types of ratios applied to financial health analysis are profitability, liquidity, capital structure, and performance ratios.

Profitability ratios measure an organization's ability to efficiently utilize resources to generate profits. Achieving a profit is not generally a top priority for governments. However, a government should be operating at a surplus if it is going to be able to complete long-term projects without using large amounts of debt. Therefore, the ratios can be considered indicators of a government's operating efficiency and capacity for effective growth management. A government does not necessarily have to generate a large amount of profit to be viewed as efficient, a small amount in excess of costs will do. But, if a government is operating at a substantial loss over an extended period of time, it could be viewed as financially unsound, and it

should have difficulty in obtaining credit, leading to further problems (Wang, Dennis, and Tu, 2007; Cohen, 2008).

Liquidity ratios indicate an organization's ability to meet its short-term financial obligations with the financial resources that the organization keeps on hand. They can also be used to determine if the organization is not using its cash on hand efficiently. For example, if the liquid assets that the organization is maintaining could be used elsewhere to generate greater returns, the organization should reallocate these funds to these activities. An example of a liquidity ratio is the current ratio, which is defined as current assets divided by current liabilities. While a value around 2.0 is appropriate, an insufficiently low current ratio (less than 1.0) could foreshadow a financial crisis in the short term; and an excessively high ratio could indicate mismanagement in asset investing (Finkler, 2010).

Capital structure (or leverage) ratios point toward how much an organization uses debt to finance its activities. These ratios deal with the organization's ability to meet long-term obligations. Using debt financing can be an efficient and cost effective way of paying for large projects, but the organization must be careful not to take on too much risk. The debt to equity ratio (or debt to net assets ratio in public finance) is an example of this type of ratio. This ratio measures the extent to which an organization obtains new assets using debt financing. Generally, this ratio should not exceed 1.0 for an organization to be considered healthy (Finkler, 2010).

Performance ratios relate revenues and expenses. One example of this type of ratio is the assets turnover ratio, defined as total revenues divided by total assets, which measures how efficiently an organization is using its assets. A high ratio is favorable and indicates that organization's existing assets are generating large revenues (Finkler, 2010; Cohen, 2008).

Another example is the operating ratio, which is defined as total revenues divided by total expenses. A ratio of 1.0 or higher indicates budget solvency (Wang, Dennis, and Tu, 2007).

Regional economic conditions can be expected to influence the region's financial health, and as a result, these ratios. The local government's tax revenues are a function of the spending occurring in the area. If the economy is prosperous, the government should have more funds to use. If, however, there is an economic downturn, not only will there be fewer funds available for economic enhancing activities, there will also likely be an increased demand for public services (Johnson, Otto, and Deller, 2006). Consequently, it is expected that the net effect between the demand for public services (expenditures) and the financing arm for that demand (public revenue) will have an impact on the balance sheets of parish governments over time. If revenues exceed expenditures over time, then assets and net assets are likely to improve. However, given that parish governments are required to maintain balanced budgets, shortfalls in revenues can lead to the deterioration of a parish's balance sheet as fund reserves are drawn down to meet expenditure demands.

It is assumed that a parish's financial health will be a function of certain regional socioeconomic characteristics and exogenous macroeconomic shocks, as described in the following conceptual equation:

(1.8) *Financial Health = f(Regional Socioeconomic Characteristics, Exogenous Macroeconomic Shocks)*

This conceptual relationship was tested using linear regression methods, where each ratio was regressed against selected economic and demographic factors including local GDP, population, assessed valuation data (a proxy for property value/wealth), and damage estimates from recent cleanup and emergency operations of tropical natural disasters.

The first year for full compliance for Louisiana parishes with the new accounting

standards set forth by the Governmental Accounting Standards Board (GASB) was 2004 (Mead,

2001). Therefore, the full data set of parish financial statements (and thereby the financial ratios)

exists for the period 2004-2007, with additional data coming from larger parishes that complied

in earlier years. These data will be used to construct the dependent variables in the model. To be

consistent with Cohen (2008) in using GDP as a regressor, a data set generated by Barreca and

Fannin (2009) is utilized, which provides estimates of GDP for all Louisiana parishes.

Population data are gathered from the U.S. Census Bureau website (U.S. Census Bureau, 2009).

The assessed valuation data comes from the biannual report of the Louisiana Tax Commission

(Louisiana Tax Commission, 2009). Lastly, damage estimates come from a data set created by

the Louisiana Office of Homeland Security and Emergency Preparedness (Louisiana Public

Assistance, 2009).

CHAPTER 2: ESTIMAING COUNTY LEVEL GDP

Introduction

Regional economists are often asked to provide data and analysis for regions smaller than a state. To accomplish this task, they acquire data from many sources, with varying levels of accuracy and disclosure (disclosure issues occur when data are withheld because providing them for a given firm in a given sector in a given region would disclose confidential information). The U.S. Bureau of Economic Analysis (BEA) publishes county level earnings data (BEA Local Area Personal Income, 2008). The BEA, however, does not provide estimates for county level Gross Domestic Product (value-added) data. Given the pressure from many rural development officials for increased "value-added agriculture," there is a need to better identify the value-added contributions of specific county industries. The objective of this research is to augment previously applied methods with additional new methods so that Gross Domestic Product (GDP) can be estimated at the county level[3]. By estimating county-level GDP, we further analyze the economic condition of county economies, particularly rural county economies that often are left out of economic analyses.

The key findings of this research are that when earnings data are not fully disclosed, the approach of estimating county-level GDP using a ratio of state GDP to state employment by sector proved more accurate than the approach of using an earnings per employment ratio of contiguous counties. Other findings were that there was a shift in Louisiana parish GDP and employment growth rates. Between the periods 2001-2004 and 2004-2007, there was a shift among the parishes from having employment growth above, and GDP growth below, the corresponding state averages to having GDP growth above and employment growth below the corresponding state averages. This result suggests that a larger proportion of economic benefits

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[3] In the state of Louisiana, the term for a county is "parish."

may be going to owners of capital rather than to laborers. Lastly, this research found that the Chemical, Petroleum and Coal Products Manufacturing sector and the Mining sector proved to have both the highest GDP growth by county industry for the period 2001-2007 and the highest percent of total county GDP for the year 2007.

The rest of this chapter will proceed as follows. The first part of the literature section contains a discussion of the types of economic activity metrics that have been used in public finance research. Then, definitions of GDP are explained, followed by a rationalization for the use of GDP in measuring value-added. In the methodology section, three methods of imputing county-level GDP are discussed, followed by a section on which GDP method works best when all data are not disclosed. Here the main findings are presented on how to best estimate county-level GDP. Next, performance metrics are calculated based on these GDP estimates. The last section summarizes the needs of, methods for, and results from doing this research, including the limitations of this study.

Literature Review

<u>**Economic Activity Metrics**</u>

Economists and regional planners use several methods for measuring the economic activity of an area. Some more commonly used metrics are employment, output, earnings, and value-added (Andrews, 1954; Shaffer, Deller, and Marcouiller, 2004). Each activity metric has its advantages and disadvantages; however, certain metrics provide a more comprehensive and informative snapshot than others. A detailed discussion of these measures follows.

Employment is a very clear and easily understood unit of measurement. Collection of employment data is relatively simple, and the data series over time are generally consistent and accurate (Shaffer, Deller, and Marcouiller, 2004). For example, the Census Bureau estimates

employment annually for every county by industry (subject to disclosure rules). Companies such as Wholedata have supplemented such federal datasets with methodologies that estimate employment that could not be disclosed by the government (Isserman and Westervelt 2006). Yet, employment as an economic metric is limited in its usefulness, as it does not take worker productivity or worker salaries into account (Andrews 1954; Shaffer, Deller, and Marcouiller, 2004). The economic effect of an increase of fifty jobs paying $30,000 is fundamentally different from the same number increase in jobs paying $120,000. Additionally, seasonal and part-time employment is typically counted together in federal agency reports; by not recognizing these limitations in the analysis, incorrect inferences could be made. Finally, when considered intuitively, jobs are inputs into the production process, not an output of production. A more desirable economic activity metric would measure the output of the economy.

Therefore, a need for a measurement unit based on the value of the product or service being produced would be preferred. *Output*, which is the value of the production of all industries in an economy, is an alternative economic metric[4]. The drawback to this measure is that it inflates the size of an economy since it does not subtract intermediate product sales among firms in its measurement, which leads to double counting (Shaffer, Deller, and Marcouiller, 2004). Double counting occurs when the value of an input is not subtracted from the value of a firm's output thereby overestimating the size of the economy. For example, assume a county's agricultural sector grows only corn and hogs and the total output value of each commodity is $1 million resulting in a total county agricultural output value of $2 million. The total value of the hogs is a function of the value of the inputs that are applied to grow the hogs. Assuming the hog producer purchases 100% of the corn produced by the corn farmers in the county, then the $2

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million agricultural output value for the county overestimates (double counts) the actual economic contribution of agriculture to the county by the value of the corn purchases by the hog producer.

The *earnings* metric does not suffer from double counting. It is defined as the labor and property earnings from current production. It includes wage and salary disbursements, supplements to wages and salaries, and proprietors' income (BEA Local Area Personal Income, 2009). The problem with this metric is that it does not include taxes on production and imports less subsidies and the components of gross operating surplus apart from proprietor's income. Taxes on production and imports net of subsidies represents the net transfer of the earned value of goods and services produced in a regional economy that are paid (transferred) to various institutions of the economy. For most industries, taxes paid to the government are greater than the subsidies received, so not counting this value would underestimate a regional economy's overall activity. However, for an industry like agriculture that receives more subsidies than it typically pays in taxes, failing to make this adjustment would overestimate the region's economic activity by including unearned income. Since corporate forms of governance are a dominant business structure in most regions of the country, not including their operating surplus would further underestimate the region's economic contribution.

Gross Domestic Product (GDP) is considered a comprehensive measure of economic activity. In the U.S., the Bureau of Economic Analysis uses three methods to measure GDP: the *expenditure* approach, the *value-added* approach, and the *gross domestic income* approach (Landefeld, Seskin, and Fraumeni, 2008). The estimates generated by these methods are conceptually equal, but their estimates may vary slightly because of the different data sources

and methods used in their estimation. Detailed definitions of each GDP method are presented in the next section.

Definitions of GDP

The *expenditure* approach generates final sales of domestic product to producers, and it is calculated by using the formula provided in Equation (2.1)

(2.1)   *GDP=C+I+G+X-M*

where C = consumption, I = gross investment, G = government spending, X = exports, and M = imports (Landefeld, Seskin, and Fraumeni, 2008). This is one of the most common definitions presented in introductory macroeconomics textbooks (Cramer, Jensen, and Southgate, 2001; Mankiw, 2009).

Alternatively, the *value-added* approach estimates GDP for each industry by subtracting intermediate inputs from gross output (gross sales less changes in inventories) as described by Equation (2.2).

(2.2)   *GDP = Gross Output – Intermediate Inputs*

where *Gross output* is defined as "the market value of an industry's production, including commodity taxes and an adjustment for inventories," and *intermediate inputs* are the value of the "goods or services that are used in the production process to produce other goods or services rather than for final consumption" (GDP by State, 2006). This approach focuses on the conceptualization that GDP measures only "new" value created in an economy and avoids the pitfalls of economic metrics such as output.

Finally, the *income* approach estimates GDP in terms of total domestic incomes earned. This method sums wages and salaries, supplements to wages and salaries, taxes on production

and imports (less subsidies), and gross operating surplus (GDP by State, 2006). The formula is presented in Equation (2.3).

(2.3)   *GDP = Wages and Salaries + Supplements to wages and salaries + Taxes on production and imports – Subsidies + Gross operating Surplus*

In Equation (2.3), *Wages and salaries* represents the wage and salary disbursements before deductions from the BEA state personal income (SPI) accounts, which have been adjusted to follow an accrual basis. *Supplements to wages and salaries* are made up of employer contributions to social insurance funds and other labor income. *Taxes on production and imports* is composed of federal excise taxes and customs duties, state and local sales taxes, property taxes (including residential real estate taxes), motor vehicle licenses, severance taxes, and special assessments. *Gross operating surplus* consists of consumption of fixed capital, proprietor's income, corporate profits, nontax payments, and business current transfer payments (net) (GDP by State, 2006). Due to data availability, this is the method used by the Bureau of Economic Analysis for calculating annual estimates of state-level GDP since 1963. Typically, the expenditure and value-added approaches are only used to calculate GDP at the national level.

In recent decades, GDP has gained widespread use as an economic metric due to its ability to provide comprehensive snapshots of economies at high levels of aggregation, i.e. at the national level. It has been typically utilized in macroeconomic growth models such as the Neoclassical Growth Theory (Mankiw, Roemer, and Weil, 1992). As researchers tested these theories on large economic regions (nations), they desired to apply this knowledge to smaller, more localized areas to see if these theories held. Having sub-state GDP estimates would allow for testing of such neoclassical growth concepts as convergence rather than making assertions based on the analysis of larger geographic units.

Applications of Value-Added Definitions

One method of measuring and understanding a region's economic activity that has already gained widespread use is concept of value-added. *Value-added* can be defined both technically and intuitively. Shafer, Deller, and Marcouiller (2004) define value-added as the final sales less the cost of materials purchased, a simplified version of the value-added definition of GDP. Value-added can be intuitively described as the value that a firm or entity adds to its inputs through processing. For instance, in the case of wood product manufacturing, one firm takes timber and produces lumber products, thereby adding value to the wood. Another firm takes the lumber and produces furniture, adding additional value to the raw product. Even primary industries such as agriculture and mining create value-added products. Farmers add value by transforming inputs such as seed, fertilizer, soil, and irrigation into a bushel of corn. Oil drillers use drilling tools and pipe to extract crude trapped beneath the ocean floor that would have very little value were it still remaining there.

A greater understanding of value-added has led to new agribusiness strategies for farmers and firms. In the post World War II industrialization period of agriculture, farmers typically followed strategies based on the concept of *cost minimization*. This strategy was used because farm produce and agricultural commodities had traditionally been viewed as *homogeneous products*. Homogeneous products are those products which are so similar that there can be no favoring or discriminating against any one firm's product in the market (Cramer, Jensen, and Southgate, 2001). This type of product prevents firms from raising or lowering the price due to the demand and supply for the product being completely met at the going market price. Raising one's price would wipe out sales, and lowering the price would needlessly reduce revenue due to

a perfectly elastic supply curve facing the individual farmer. Therefore, without the ability to change output prices, firms needed to rely on controlling costs to generate greater profits.

Firms face two types of costs in business, variable costs and fixed costs. Variable costs change as the amount of output changes (more output = more total cost), but fixed costs occur without respect to the level of output (Cramer, Jensen, and Southgate, 2001). Variable costs can be reduced or offset through better technology, which would allow for greater output per level of input. Fixed costs can be addressed through measures such as increasing the firm's size (i.e. increased farm acreage), which would spread those fixed costs over even greater output. For a long time, one of the only ways that a farmer could maintain profitability with a homogeneous farm commodity was to increase farm size. This led to a situation where small farmers were increasingly unable to operate profitably.

Small farming operations, however, are looking to make a comeback because of recent social trends to buy locally grown produce and to shop at farmers' markets. People now place a higher value on produce coming from the local area and are therefore willing to pay a premium to obtain these goods (Loureiro and Hine, 2002). Locally grown farm products represent one attribute of differentiation of the agricultural commodity. Additional differentiation may include attributes such as organically grown and hormone free. A growing number of studies have shown consumers' willingness to pay additional premiums for these attributes (Darby et al 2008; Lusk, Fields, and Prevatt 2008). Although the farm product itself may not have physically changed, the perception of the produce as not coming from some unknown place, but from one's own area, transforms the produce from a homogeneous product into a heterogeneous product. Now, through selling directly to the consumers, the farmer is able to have more control over the prices

that are charged. What were once indistinguishable products have now increased in value through differentiation[5]. Using value-added strategies, small farmers have found a niche market.

In summary, GDP is a more comprehensive economic activity metric than the other metrics historically applied to measure the size and scope of the economic activity in a region. Moreover, the estimates of GDP represent the value-added activity that has occurred in a region, as opposed to a summation of all activities. The value-added definition provides the opportunity of applying the GDP metric to measuring the creation of new value in a regional economy.

Since the income and value-added definitions of GDP are conceptually equal, and the income approach is typically applied for sub-national estimates of GDP, this research develops a strategy for measuring value-added contribution at the county level (or "parish" level to be consistent with the terminology used in Louisiana) based on the income approach. This is the focus of the next section.

Methodology

Currently, BEA releases GDP estimates for the national and state level, and in more recent years, the agency has released these estimates at the metropolitan level. The metropolitan level statistics are calculated using a ratio of GDP to earnings. Earnings works well for this process because all components of earnings exist within GDP, with the exception that earnings uses a cash-flow basis for wages and salaries (when the money changed hands) and GDP uses an accrual basis for wages and salaries (when the money was accounted or expensed to the individuals). Therefore, earnings and GDP can be assumed to move together proportionally. Yet, this method of using earnings to estimate GDP cannot provide a complete set of estimates due to

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[5] The differentiated product model has a conceptual basis in the Dixit-Stiglitz model of monopolistic competition. This conceptual framework is one of the fundamental micro level assumptions in two regional/macro economic models, Romer's endogenous growth model (Romer 1990), and Krugman's New Economic Geography Models (Fujita, Krugman, and Venables, 1998).

earnings data disclosure restrictions (when data are withheld because publishing them would disclose confidential earnings information). This is where our research seeks to contribute. The original concept for parish level GDP estimates was derived from the work of Baumgardner (2008), and the basis for our methodology was the metropolitan GDP estimation approach by BEA.

This research uses earnings and employment data to generate estimates of GDP by parish. Therefore, it is important to know how closely the earnings and employment data correlate with the GDP data. In order to decide which metric would be preferred, we evaluate their relative correlations using our state-level data sets. The correlation between earnings and GDP for the disclosed portions of the sixty-one GDP sectors for Louisiana overall is 0.7087. In other words, the two metrics move together about 71% of the time. However, the correlation between GDP and employment is 0.3877. It is no surprise that earnings, instead of employment, so closely correlates with GDP since earnings includes both compensation of employees, which is approximately 57% of national GDP, and non-corporate gross operating surplus. For employment, the correlation is smaller (only 39%), but the recent availability of detailed and fully disclosed parish-level employment statistics makes this metric very valuable, particularly when the earnings data are undisclosed.

Three methods are used to arrive at estimates for parish level gross domestic product (GDP). The first method uses a ratio of state GDP to state earnings by sector, multiplied by the sector earnings at the parish level. Since, as previously stated, earnings data are a component of GDP data, the two measures of industry size would tend to fluctuate together. The first method, however, cannot be used comprehensively due to the earnings disclosure limitations for many sectors at the parish level and for a few sectors at the state level. The formula in Equation (2.4) is

$$(2.4) \quad GDP_{i,p,y} = \frac{GDP_{i,st,y}}{Earnings_{i,st,y}} \times Earnings_{i,p,y}$$

where p = parish; i = industry; st = state; and y = year.

The second method, the state productivity method, uses a ratio of state GDP to state employment by sector, multiplied by parish employment for each sector. This method provides estimates for every industry, but it assumes that worker productivity for each industry at the parish level exactly matches average productivity for that industry at the state level. The formula is presented in Equation (2.5):

$$(2.5) \quad GDP_{i,p,y} = \frac{GDP_{i,st,y}}{Employment_{i,st,y}} \times Employment_{i,p,y}$$

where all variables retain their specification from Equation 2.4.

The third method is based on the concept that contiguous parishes (those parishes that are adjacent) will have similar earnings profiles. For each parish industry, the disclosed earnings of all of the contiguous parishes are summed, and then the corresponding industry employment is likewise summed. The earnings total is then divided by the employment total to find the regional industry earnings to employment ratio that can then be applied to each parish.

Finally, each of the regional industry earnings ratios is multiplied by the parish's industry employment to get an estimate of earnings for each sector in the parish. These earnings estimates can be used when parish level earnings are not disclosed by BEA. The formulas are:

$$(2.6) \quad Estimated\_Earnings_{i,p,y} = \frac{\sum_{c=1}^{n} Earnings_{i,c,y}}{\sum_{c=1}^{n} Employment_{i,c,y}} \times Employment_{i,p,y}$$

(2.7)

$$GDP_{i,p,y} = \frac{GDP_{i,st,y}}{Earnings_{i,st,y}} \times Estimated\_Earnings_{i,p,y}$$

where c = contiguous parishes for parish p, and all other variables retain their prior specification.

To estimate each of these equations, several data sources were used. All earnings data were obtained from the regional section of the Bureau of Economic Analysis website (BEA Local Area Personal Income, 2008). State-level GDP data were also obtained from the regional section of the BEA website (BEA Gross Domestic Product by State, 2008). Employment data for non-farm industries came from the fully disclosed County Business Patterns (CBP) dataset created by Isserman and Westervelt (2006). Farm employment came from BEA (BEA State Area Personal Income, 2008). All data and results are for the counties (parishes) of the state of Louisiana for the years 2001 – 2007.

Identifying the Optimal Method

GDP was estimated for each industry in each Louisiana parish based on the following steps. In the first step, using Equation (2.4), GDP was estimated for each parish industry where the industry level earnings data were available. We used the 61 industries from which GDP is provided for each state from the regional section of BEA (BEA Gross Domestic Product by State, 2008). This method was chosen because of the aforementioned high correlation between earnings and GDP at the state level. This method provided data for 48.83% of parish industries. The second step involved estimating GDP for the remaining 51.17% of parish industries by choosing between either the GDP productivity approach from Equation (2.5) or the Regional Contiguous Earnings approach from Equations (2.6) and (2.7).

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In order to determine which approach provided the best estimate of the true unknown parish GDP by sector, elements of the two estimation techniques were compared to the true parish industry earnings estimates for industries that were disclosed (approximately 49% of all parish industry earnings estimates). The first element was a ratio of state earnings to state employment multiplied by parish employment. The alternative element was the parish earnings estimate from the contiguous earnings approach.

The two estimation methods were evaluated for all seven years of data using pooled estimates and using Theil's coefficient of inequality. A pooled estimate represents the percentage difference between the summed estimated values and the summed observed values. Theil's coefficient is a frequently cited technique for comparing statistical estimates to corresponding observed values (Bliemel 1973). It is displayed below.

$$(2.8) \quad U = \frac{\left[\frac{1}{n}\sum_{i=1}^{n}\left[(A_i - P_i)^2\right]\right]^{\frac{1}{2}}}{\left[\frac{1}{n}\sum_{i=1}^{n}A_i{}^2\right]^{\frac{1}{2}} + \left[\frac{1}{n}\sum_{i=1}^{n}P_i{}^2\right]^{\frac{1}{2}}}$$

where the parameter *A* represents the actual observations and the parameter *P* represents the predicted values. The results of the formula range from 0, which denotes a perfect forecast, to 1, which denotes maximum inequality, such as in a negative relationship.

Across all parishes, industries, and years, the Theil coefficient for the state productivity method was 0.15, and for the contiguous method, it was 0.64, as shown in Table 2.1. The total pooled estimate was -0.62% for the state productivity method and 14.85% for the contiguous method. Thus, as a whole, the state productivity method underestimated actual disclosed earnings by parish by approximately one percent, and the contiguous method overestimated the same disclosed earnings by around fifteen percent.

Table 2.1. Comparison Across All Parishes, Industries, and Years

	Theil	Pooled Estimate
State Productivity Method	0.15	-0.62%
Contiguous Method	0.64	14.85%

However, the large differences in the magnitudes of the values can be attributed to the structure of the methods more than the accuracy of the predictions. The contiguous method in the aggregate may reduce forecasting performance for a couple of reasons. First, limitations in the number of disclosed earnings estimates for contiguous parishes may generate a contiguous earnings profile that is not an accurate estimate of the true earnings profile. Second, an urban contiguous parish may have a highly dissimilar productivity profile to neighboring rural parishes with establishments in the same industry reducing the forecasting performance of the contiguous method.

Table 2.2 displays Theil coefficients for eight categories, which summarize the industries defined by BEA. We aggregate sixty BEA earnings sectors into eight summary categories in the table. At this level of detail, the state productivity method provided a more accurate estimate for all categories except Wholesale and Retail Trade. Wholesalers and Retailers would be assumed to have similar worker productivity among nearby parishes because the products being sold, the individual being employed, and the markets being served would be very similar. For both methods, the Theil coefficients indicate that estimates for the category of Wholesale and Retail Trade come very close to the observed values. Continuing with the previous point, the industries contained in this category would also have similar worker productivity across the state.

Table 2.3 presents pooled estimates for the same major categories as Table 2.2. Here, the state productivity method provides a much closer estimate for all categories than does the contiguous method. Again, the discrepancy between the magnitudes of the values is a result of the structuring of the method.

Table 2.2. Theil Coefficients by Major Category

Category	State Productivity Method	Contiguous Method
Agriculture, Forestry, Fishing, and Related Activities	0.362	0.373
Mining	0.153	0.257
Utilities and Construction	0.172	0.209
Manufacturing	0.126	0.294
Wholesale and Retail Trade	0.064	0.063
Transportation and Warehousing	0.301	0.552
Information, Finance, Insurance, Real Estate, Rental, and Leasing	0.272	0.357
Service Industries	0.141	0.732

Table 2.3. Pooled Estimates by Major Category

Category	State Productivity Method	Contiguous Method
Agriculture, Forestry, Fishing, and Related Activities	0.29%	18.26%
Mining	-0.43%	-5.52%
Utilities and Construction	0.39%	10.26%
Manufacturing	-0.49%	15.72%
Wholesale and Retail Trade	-0.55%	-1.67%
Transportation and Warehousing	1.54%	19.57%
Information, Finance, Insurance, Real Estate, Rental, and Leasing	-0.63%	18.83%
Service Industries	-1.30%	23.35%

Table 2.4 displays Theil coefficients for the two methods across time. Again, the state productivity method is shown to be the better estimator. These results indicate that the state productivity method has maintained its increased performance relative to the contiguous method throughout the evaluation time series.

Table 2.4. Theil Coefficients by Year

Year	State Productivity Method	Contiguous Method
2001	0.139	0.223
2002	0.137	0.287
2003	0.136	0.846
2004	0.139	0.205
2005	0.184	0.245
2006	0.158	0.204
2007	0.145	0.200

Parish-level Analysis Using the GDP Estimates

The GDP and employment data were then analyzed at parish-total levels and at parish-industry levels. The specific goals of this section of the research were to compare the growth

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rates of GDP and employment across all parishes and to determine which industries in a parish provided the greatest contribution to total GDP for their respective parishes.

We would assume that the GDP growth rate and the employment growth rate should increase or decrease at similar rates, since a booming economy would tend to increase both, and an economy in recession would tend to decrease both. Therefore, parishes that saw GDP growth and employment fall on opposite sides of the corresponding state averages are of interest. Greater than average GDP growth combined with lower than average employment growth for a parish could suggest that industries within that parish were moving toward a more capital-based operating structure. Therefore, productivity increased, but the owners of the firms (owners of the capital investment) primarily benefited. Lower than average GDP growth combined with higher than average employment growth in a parish, however, might indicate that the parish added jobs that paid below the state average salary in the previous year(s). Figure 2.1 displays how Louisiana's parishes were distributed in terms of the growth rates of GDP and employment.

Table 2.5 displays where each parish's GDP growth rate and employment growth rate was with respect to the state average for the years 2001-2004. The majority of the parishes (43) saw growth rates similar to what would be expected, where both metrics were either above the state averages or below them. Of those parishes, seventeen were metropolitan and twenty-six were non-metropolitan.

For the years 2004-2007, the dynamics of the parishes changed as displayed in Table 2.6. The largest category was the still those parishes in the top right quadrant, with above average GDP and above average employment; but the top left and bottom right categories switched places in order of size. Three parishes (Assumption, Beauregard, and East Carroll) went from the bottom right category to the top left category, which means that their economies switched to

having greater average employment growth and lower average GDP growth relative to statewide averages. While this might suggest that the labor force is gaining a greater percentage of GDP relative to owners of capital, it may also mean that these economies are creating a large number of low paying jobs in sectors that have low GDP to output ratios.
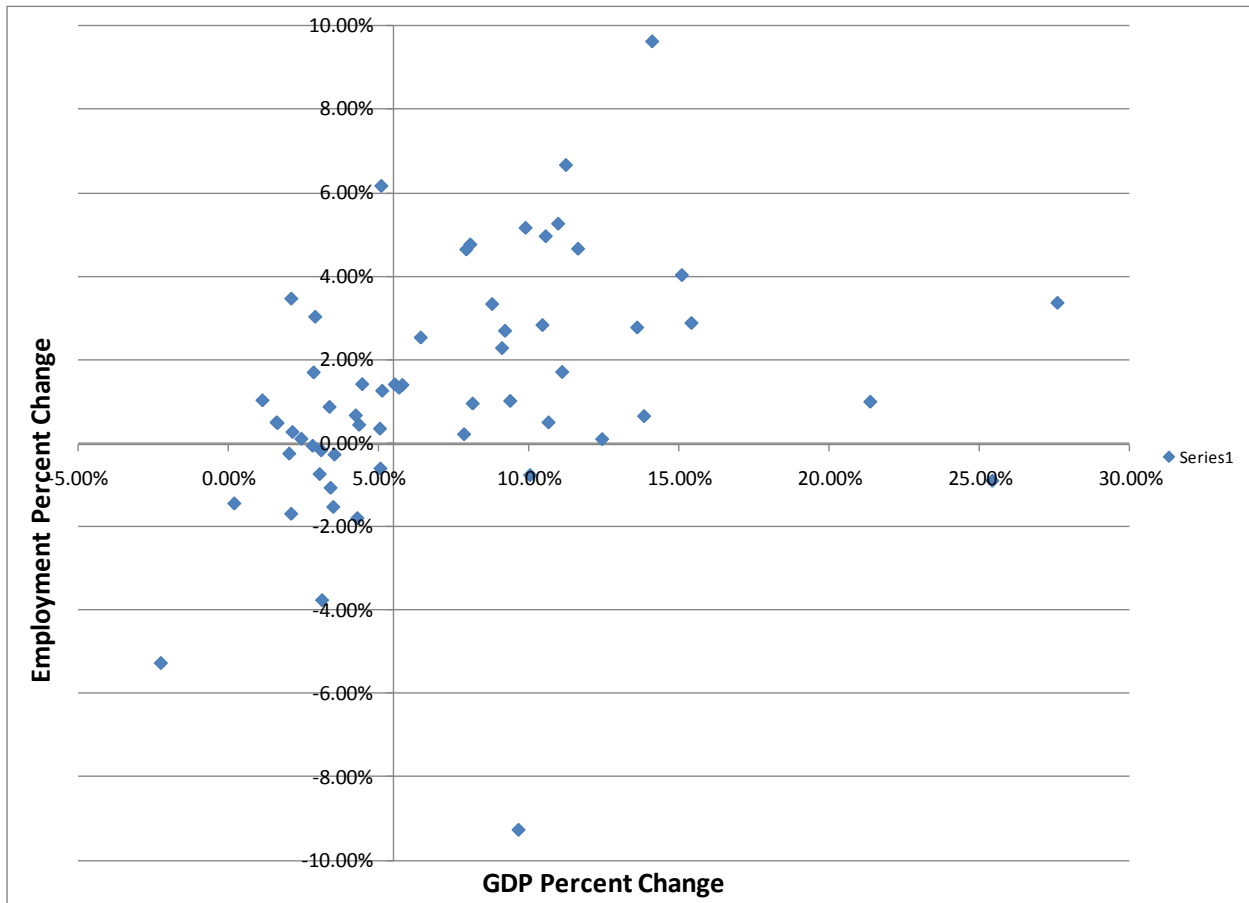
Figure 2.1. Distribution for GDP and Employment Growth Rates for Louisiana Parishes for Years 2001-2007

An industry-level analysis of parish GDP was also conducted to determine which sectors provided the greatest contribution to each parish's GDP. For this analysis, 61 BEA industry sectors were aggregated into eleven summary sectors. Details of this aggregation are provided in Appendix A. Table 2.7 displays the number of occurrences that a certain parish summary sector had the highest percent of total 2007 GDP for that parish or had the highest growth rate from 2001-2007 for that parish. The Chemical, Petroleum, and Coal Products Manufacturing sector

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and the Mining sector dominated both categories. Government represented the highest percent of total GDP for individual parishes but never represented the highest growth rate. The Food and Fiber System and Information and Other Services appeared in both categories. The All Other Manufacturing sector was often the highest grower, but was never the highest percent of the total.

Table 2.5. Parish GDP and Employment Growth Levels with respect to the State Averages for Years 2001-2004

	Below Average GDP	Above Average GDP
Above Average Employment	East Feliciana*, Lincoln, Ouachita*, Rapides*, Terrebonne*, Washington, West Feliciana*	Ascension*, Bossier*, Calcasieu*, Claiborne, Concordia, De Soto*, East Baton Rouge*, Evangeline, Grant*, Jefferson Davis, Lafourche*, Livingston*, Natchitoches, Red River, Sabine, St. Helena*, St. Landry, St, Tammany*, Tangipahoa, Union*, Vernon, Webster, Winn
Below Average Employment	Allen, Avoyelles, Caddo*, Caldwell, Cameron*, Catahoula, Franklin, Iberia, Jackson, Jefferson*, La Salle, Lafayette*, Madison, Morehouse, Orleans*, Pointe Coupee*, St. Mary, Tensas, Vermilion, West Carroll	Acadia, Assumption, Beauregard, Bienville, East Carroll, Iberville*, Plaquemines*, Richland, St. Bernard*, St. Charles*, St. James, St. John the Baptist*, St Martin*, West Baton Rouge*
* indicates a metropolitan parish		

Table 2.6, Parish GDP and Employment Growth Levels with respect to the State Average for Years 2004-2007

	Below Average GDP	Above Average GDP
Above Average Employment	Allen, Assumption, Beauregard, Caddo*, East Carroll, Grant*, Lafayette*, Lafourche*, Lincoln, Ouachita*, Rapides*, Richland, Vermilion, West Carroll, West Feliciana*	Acadia, Ascension*, Avoyelles, Bossier*, Concordia, East Baton Rouge*, Evangeline, Iberia, Jackson, Jefferson Davis, La Salle, Livingston*, Madison, Plaquemines*, Pointe Coupee*, St. Charles*, St. James, St. John the Baptist*, St. Landry, St. Mary, St. Tammany*, Tangipahoa, Terrebonne*, Webster, West Baton Rouge*
Below Average Employment	Caldwell, De Soto*, East Feliciana*, Franklin, Iberville*, Jefferson*, Morehouse, Orleans*, St. Bernard*, St. Helena*, St. Martin*, Tensas, Union*, Vernon, Washington, Winn	Bienville, Calcasieu*, Cameron*, Catahoula, Claiborne, Natchitoches, Red River
* indicates a metropolitan parish		

These results suggest that Louisiana continues to be dominated by primary (agriculture and mining sectors) and secondary (manufacturing) sectors with a strong public sector

(government) influence. However, these results also suggest that the government sector is not the dominating growth sector for Louisiana parishes in this decade but its traditional private sector primary and secondary industries. For a full ranking by size of the eleven parish industry summary categories for the year 2007, see Appendix B.

Table 2.7. Identification of Highest Contributing Sectors

Sector with Highest Percent of 2007 GDP for Each Parish	
Sector Name	Number of Times This Sector Was a Parish's Largest Sector
Mining	17
Government	16
Chemical, Petroleum, and Coal Products Manufacturing	11
Food and Fiber System	11
Wholesale and Retail Trade	4
Transportation and Utilities	2
Information and Other Services	2
Finance, Insurance, and Real Estate	1
Sector with Highest GDP Growth Rate from 2001 to 2007 for Each Parish	
Sector Name	Number of Times This Sector Had the Highest Growth Rate
Chemical, Petroleum, and Coal Products Manufacturing	28
Mining	20
All Other Manufacturing	6
Food and Fiber System	4
Education and Health Care Services	3
Information and Other Services	2
Construction	1

Conclusion

Generating GDP estimates was determined to be important to analyzing a local region because GDP was shown to be a more comprehensive economic activity metric than the other economic metrics applied in the past and because the estimates of GDP represent the value-added activity that has occurred in a region, as opposed to a summation of all activities.

Therefore, this research sought to develop a method for estimating parish GDP. When earnings data were disclosed, the preferred method of generating GDP estimates was used. This method was preferred because of the high correlation between state-level earnings and GDP data.

When earnings were not disclosed, this research sought to find a means to impute estimates for the missing data. Two methods were analyzed, a statewide labor productivity approach and a contiguous parish earnings approach. The statewide labor productivity approach was generally found to be more accurate. This result is attributed to the contiguous method being weighted by larger, more urban parishes, which were dissimilar in regional productivity to their rural parish counterparts in the same industry. Using Theil coefficients, where a value of 0 is a perfect forecast and a value of 1 is maximum inequality, the state productivity method had a value of 0.15 and the contiguous method had a value of 0.64 when both were compared to the disclosed earnings data. In addition, when all of the estimates were pooled (summed), the state productivity method underestimated the total by -0.62% compared to the contiguous method, which overestimated the total by 14.85%.

Limitations in the research are generally associated with a lack of data. First, it should be noted that the variation in the GDP estimates was driven a majority of the time by the statewide average industrial productivity (GDP per employee) for each industry. If industrial productivity for a given sector in a given parish varied greatly from the statewide average, this would reduce forecast accuracy. Second, for the rest of the parish sectors, the variation in GDP estimates was driven by the variation in the industrial earnings mix of the parish. If corporate earnings varied greatly from the statewide average, this would also reduce forecast accuracy. A third limitation was and will continue to be that the study requires very detailed data to be provided by the federal government (earnings) and the private sector (Wholedata employment estimates). Should

these data sources become unavailable (or less detailed) in the future, estimating county-level GDP using the methods contained here will be limited.

In conclusion, this research developed a method for estimating GDP at the county level. Given this methodology, there is a means of measuring the value-added activity in a county economy. This contribution is important for economic policy because it assists community planners and other stakeholders to identify sectors to focus upon, when they develop strategies to promote economic growth and diversification.

CHAPTER 3: EMPIRICAL ANALYSIS OF FINANCIAL HEALTH

Introduction

In recent years, Louisiana has been hit by several severe hurricanes, particularly hurricanes Katrina, Rita, Ike, and Gustav. These storms destroyed large portions of the Louisiana coastline and presented challenges for county governments (called parish governments in the state of Louisiana) in financing and managing cleanup efforts. As such, stakeholders (elected officials, concerned citizens, business leaders, etc.) inside and outside parish governments have realized the tremendous costs that accompany these events (Anderson, 2008; Colvin, 2008; Lundin, 2008).

Parish governmental leaders continue to develop an understanding of the issues related to preparing for and responding to natural disasters. For example, contracts have been made with entities, whether private or otherwise, for most post-disaster concerns, such as debris removal, search and rescue, medical aid, food and water relief, etc. Less attention, or rather less research, however, has gone toward the financial costs that these relief efforts carry and the strain that these costs place on local government.

Historically, local governments have been reimbursed for all or nearly all of the disaster relief costs by higher levels of government. For Hurricanes Katrina and Rita, the federal government reimbursed Louisiana parishes 100% of the disaster and recovery costs; for more recent hurricanes, however, this has changed. After Hurricane Gustav, the federal government initially informed parishes that reimbursement for expenses would be capped at 75%; however, it was eventually raised to 90% due to the chief administrative officer of the mayor of Baton Rouge, LA traveling to Washington D.C. to lobby federal officials to increase the federal match (Harper and Dyer, 2008). Yet, this reimbursement has not been immediate, and therefore, local

governments have been required to carry these costs until the time that reimbursement became available. The combination of these two factors has forced parish governments to consider increasing cash reserves or have other forms of liquid resources, which can be drawn upon to finance the recovery efforts in the short term. The occurrence of four storms of such a large magnitude over a three-year period has raised concerns over future possible storms and led decision makers to see a need for increased planning. Little research, however, has been done to determine the magnitude of these short-term financial burdens or the size of the liquid reserves that parish governments need to maintain. This provides the motive for the present research.

Literature Review

To know how financially "healthy" a parish government may be at any point in time, familiarity with the definitions of financial health and the methods used to measure it are needed. An entity can be determined to be fiscally healthy, according to a definition used by Honadle, Costa and Cigler (2004), based on the extent to which its financial resources exceed its spending obligations. If a region is fiscally healthy, it will need not only to have liquidity (sufficient resources to meet short-term financial obligations), but also to be solvent (able to meet future financial obligations when they come due).

<u>**Ratio Analysis**</u>

One method of measuring local government financial condition is to utilize financial ratios, which have been shown to be useful in evaluating entities in the public sector (Wang, Dennis, and Tu, 2007; Cohen, 2008). These ratios can provide a balanced representation of a parish government's overall financial situation. Four common types of ratios applied to financial health analysis are profitability, liquidity, capital structure, and performance ratios.

Profitability ratios measure an organization's ability to efficiently utilize resources to generate profits. Achieving a profit is not generally a top priority for governments. However, a government should be operating at a surplus if it is going to be able to complete long-term projects without using large amounts of debt. Therefore, the ratios can be considered indicators of a government's operating efficiency and capacity for effective growth management. A government does not necessarily have to generate a large amount of profit to be viewed as efficient, a small amount in excess of costs will do. But, if a government is operating at a substantial loss over an extended period of time, it could be viewed as financially unsound, and it should have difficulty in obtaining credit, leading to further problems (Wang, Dennis, and Tu, 2007; Cohen, 2008).

Liquidity ratios indicate an organization's ability to meet its short-term financial obligations with the financial resources that the organization keeps on hand. They can also be used to determine if the organization is not using its cash on hand efficiently. For example, if the liquid assets that the organization is maintaining could be used elsewhere to generate greater returns, the organization should reallocate these funds to these activities. An example of a liquidity ratio is the current ratio, which is defined as current assets divided by current liabilities. While a value around 2.0 is appropriate, an insufficiently low current ratio (less than 1.0) could foreshadow a financial crisis in the short term; and an excessively high ratio could indicate mismanagement in asset investing (Finkler, 2010).

Capital structure (or leverage) ratios point toward how much an organization uses debt to finance its activities. These ratios deal with the organization's ability to meet long-term obligations. Using debt financing can be an efficient and cost effective way of paying for large projects, but the organization must be careful not to take on too much risk. The debt to equity

ratio (or debt to net assets ratio in public finance) is an example of this type of ratio. This ratio measures the extent to which an organization obtains new assets using debt financing. Generally, this ratio should not exceed 1.0 for an organization to be considered healthy (Finkler, 2010).

Performance ratios relate revenues and expenses. One example of this type of ratio is the assets turnover ratio, defined as total revenues divided by total assets, which measures how efficiently an organization is using its assets. A high ratio is favorable and indicates that organization's existing assets are generating large revenues (Finkler, 2010; Cohen, 2008). Another example is the operating ratio, which is defined as total revenues divided by total expenses. A ratio of 1.0 or higher indicates budget solvency (Wang, Dennis, and Tu, 2007).

Comprehensive Measures of Financial Health

Several tools that are more comprehensive have been developed to gauge parish (or county) fiscal health; a few of these will be discussed here. These tools utilize and combine data from financial reports produced by local regions in order to provide a snapshot of the regions' current financial situation or to recognize trends in the regions' financial operation. These tools are used to analyze the revenues, expenditures, operating position, and debt structure of local governments (Honadle, Costa, and Cigler, 2004).

The first of these tools is the Ten-Point test of Fiscal Condition, developed by Kenneth W. Brown (1993). It uses ten financial ratios to examine the four areas of financial health mentioned prior, with each ratio corresponding to one of those areas. Some examples of the ratios used in Brown's test are revenue per capita, the operating expenditures to total expenditures ratio, the operating ratio, and long-term debt per capita. The benefits of this method are that it provides a comprehensive analysis with relatively minor data requirements and that it can be used to compare financial health across regions (Honadle, Costa, and Cigler, 2004).

To use this method, a researcher must gather data for local governments of similar size or geographic proximity to the local government of interest. Then, the researcher prepares a database for benchmarking, performed following a three-step process. First, the researcher computes all ten ratios for each local government that the researcher has data. Next, the ratios are sorted from low-to-high or high-to-low, depending on the value of each ratio that is preferred. Last, after the ratios have been sorted properly, each set of ratios is organized into quartiles, with the median value providing the breakpoint for the 50th percentile. Quartile 1 contains ratios that are in the bottom 25th percentile; quartile 2 contains ratios that fall between the 25th and 50th percentiles; quartile 3 has ratios that fall between the 50th and 75th percentiles; and quartile 4 contains the remaining ratios that have values that are the most preferred, falling above the 75 percentile (Brown, 1993).

The final phase of this method is to calculate the ratios for the local government being studied and to assign scores for the ratios. If a ratio falls in quartile 1, it is assigned a score of -1; if it falls in quartile 2, it is assigned a score of 0; if quartile 3, a score of +1; and if quartile 4, a score of +2. Once all scores have been calculated, they are summed to find the total composite score for the local government. Comparisons to the similar governments can be made at the total score level or at an individual ratio score level (Brown, 1993).

Another tool of financial analysis is Fiscal Capacity Analysis, which uses five-year trends to forecast revenues and expenditures (Honadle, Costa, and Cigler, 2004). This method was originally developed by Alter, McLaughlin and Melniker (1984). The first step is to take the historical revenue and expenditure data and to segregate it into categories that are small enough to allow a researcher to indentify the factors that influence each of the categories. The original authors recommended limiting the categories to five percent or less of total revenues as that level

of detail would be sufficient to recognize the patterns in the data. Once the individual categories have been identified, they can then be plotted across time to determine fiscal trends.

For the trend analysis to work correctly, though, any administrative changes and one-time events must be identified and adjusted for, if possible. For example, if the property tax rate for the area decreased, tax revenue could appear to have declined although the tax base actually grew. Therefore, the conclusions based on the trend analysis would be incorrect. To account for this type of change, the researcher should recalculate the tax revenue using a constant tax rate (Honadle, Costa, and Cigler, 2004).

This analysis tool can be very effective in analyzing and projecting fiscal trends, as opposed to the Ten-Point Test that only provides a fiscal snapshot. Since it is designed to be very detailed, it assists policy makers in pinpointing which specific areas are affecting broader categories of revenues and expenses and in knowing how to adjust policies in response (Honadle, Costa, and Cigler, 2004).

A third tool of financial analysis is the Financial Trend Monitoring System (Groves and Godsey-Valente, 1994). This tool can be considered a combination of the previous two tools in that it both covers revenues, expenditures, operating position, and debt structure like the Ten-Point Test and examines five-year trends as in Fiscal Capacity Analysis. When used effectively, this tool will display warning trends, but its use can be challenging because the data that it needs are not always readily available. Therefore, a researcher must choose which of the 36 possible indicators to use based on the data that are available and based on the needs of the local government being examined (Honadle, Costa, and Cigler, 2004).

Factors That Lead to Changes in Financial Health

The methods for analyzing local government fiscal health that have been used most commonly in the past (those discussed so far) have either examined the government's financial situation for a single point in time or examined how the financial situation changed over time. However, none of these studies has considered the factors that drive changes in financial health for local governments. Thus, local government policy makers have had access to tools, which allowed them to study the result of economic and demographic changes. A good companion to these tools would be research on how the marginal changes to economic and demographic factors, such as GDP, population, property values, and natural disasters, led the governments to the financial state in which they find themselves. Therefore, researchers have recently begun to investigate this area.

Since the subject of the factors that drive the changes in the financial health of local governments has only recently gained interest in both the academic and public policy communities, there is a lack of literature. Furthermore, there is no theoretical framework on which to base this type of research. Therefore, the review of literature in this area will focus on the empirical methods for doing such studies, as well as the results of these studies.

A team of researchers from the University of Central Florida conducted research for 49 U.S. states that measured the relationships that existed between different types of financial ratios and the relationship that existed between financial condition and socioeconomic variables (Wang, Dennis, and Tu, 2007). They found that significant relationships did exist between classes of ratios, such as between cash (short-run) liquidity and long-term solvency. They also generated a financial condition indicator variable by standardizing scores from the ratios. Their research found that a significant relationship existed between that indicator and certain

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socioeconomic variables, such as population. A strength of this study was that, along with the results, it generated benchmarks for several financial ratios at the state level. However, this study was limited to a single year of data, 2003.

In 2008, Sandra Cohen published an article on Greek municipalities that compared financial ratios to macroeconomic factors using regression methods (Cohen, 2008). This research did cross sectional analysis for the years 2002-2004 by taking each year as a separate data set. The macroeconomic factors that were used included GDP, population, real estate values, tourist development (a categorical variable), and a dummy variable for whether the municipality hosted the prefecture (the level of government directly above the municipality) capital. Using these methods, the research found that significant relationships existed between the ratios and the factors. A strength of this research was that it had a sizable data set (497 total observations), and a weakness was that a municipality being located in two of the most developed prefectures in Greece significantly affected the financial ratios (performance) of that municipality. The regression models did not account for this variation.

The research discussed in the following section seeks to apply similar methods to the parishes of Louisiana to provide guidance in determining their financial readiness for future disaster events. Neither of the studies so far has analyzed the effects of one-time events, such as hurricanes. Therefore, our research provides an opportunity to check the relative sensitivity of the various financial ratios to one-time events as opposed to the annual economic factors.

Data and Methods

Regional economic conditions can be expected to influence the region's financial health, and as a result, these ratios. The local government's tax revenues are a function of the spending occurring in the area. Since our research deals with Louisiana parishes, local governments will

henceforth be referred to as parish governments, as opposed to county governments. If the economy is prosperous, the government should have more funds to use. If, however, there is an economic downturn, not only will there be fewer funds available for economic enhancing activities (such as public infrastructure investment), there will also likely be an increased demand for public services (Johnson, Otto, and Deller, 2006). Consequently, it is expected that the net effect between the demand for public services (expenditures) and the financing arm for that demand (public revenue) will have an impact on the balance sheets of parish governments over time. If revenues exceed expenditures over time, then assets and net assets are likely to improve. However, given that parish governments are required to maintain balanced budgets, shortfalls in revenues can lead to the deterioration of a parish's balance sheet as fund reserves are drawn down to meet expenditure demands.

Therefore, it is assumed that a parish's financial health will be a function of certain regional socioeconomic characteristics and exogenous macroeconomic shocks, as described in the following conceptual equation:

(3.1)   *Financial Health = f(Regional Socioeconomic Characteristics, Exogenous Macroeconomic Shocks)*

This conceptual relationship is tested using linear regression methods, where each ratio is regressed against selected economic and demographic factors including local GDP, population, assessed valuation data (a proxy for property value/wealth), and damage estimates from recent cleanup and emergency operations of tropical natural disasters.

The first year for full compliance for Louisiana parishes with the new accounting standards set forth by the Governmental Accounting Standards Board (GASB) was 2004 (Mead, 2001). Therefore, the full data set of parish financial statements (and thereby the financial ratios)

exists for the period 2004-2007, with additional data coming from larger parishes that complied in earlier years. These data will be used to construct the dependent variables in the model. To be consistent with Cohen (2008) in using GDP as a regressor, a data set generated by Barreca and Fannin (2009) is utilized, which provides estimates of GDP for all Louisiana parishes. Population data is gathered from the U.S. Census Bureau website (U.S. Census Bureau, 2009). The assessed valuation data comes from the biannual report of the Louisiana Tax Commission (Louisiana Tax Commission, 2009). Lastly, damage estimates come from a data set created by the Louisiana Office of Homeland Security and Emergency Preparedness (Louisiana Public Assistance, 2009).

Following the method used by Cohen (2008), nine relevant financial ratios were selected for this analysis. Since information was often overlapping in individual ratios, care was taken in selecting which ones to use (Barnes, 1987). These ratios were selected to best portray the financial condition and financial performance of local government (Cohen, 2008). These ratios allow for the examination of four key areas of a parish government's financial health: profitability, liquidity, capital structure, and performance (refer to prior discussion of ratio categories). The selected ratios and the area of financial health that they provide information about, as well as their abbreviations and formulas, are listed in Table 3.1.

Table 3.2 provides descriptive statistics for each of the financial ratios and macroeconomic factors used in this analysis. Ratios that have a minimum of zero are a result of either the numerator or the denominator component of the ratio for a parish being equal to zero. Based on the profitability ratios, Louisiana parishes provided positive returns on average for the period (2004-2007). Based on the liquidity ratios (only the current ratio was used), parishes had too much short-term assets in relation to their short-term liabilities; but this is likely due to the

data set that was used not accounting for liquid assets that were restricted to certain projects. Based on the capital structure ratios, the parishes were not too leveraged when compared to accepted rules of thumb for these ratios. Based on the performance ratios, on average a parish "turned over" its assets 2.8 times a year, received 55% of its revenues from taxes, and had revenue that exceeded its expenses. All nine ratios for all parishes for the years 2004-2007 are listed in Appendices C through F.

Table 3.1. Ratio Formulas

Ratio Type	Ratio Name	Ratio Name Abbreviation	Ratio Calculation
Profitability Ratios	Return on Equity (Return on Net Assets)	ROE	$ROE = \dfrac{Net\ Suplus\ (Deficit)}{Net\ Assets}$
	Return on Assets	ROA	$ROA = \dfrac{Net\ Suplus\ (Deficit)}{Total\ Assets}$
	Profit Margin	PM	$PM = \dfrac{Net\ Suplus\ (Deficit)}{Total\ Re\ venues}$
Liquidity Ratios	Current Ratio	CR	$CR = \dfrac{Current\ Assets}{Current\ Libilities}$
Capital Structure Ratios	Debt to Equity	D/E	$D/E = \dfrac{Total\ Liabilities}{Equity}$
	Long-term Liabilities to Total Assets	LTL/TA	$LTL/TA = \dfrac{Long\ Term\ Liabilities}{Total\ Asstes}$
Performance Ratios	Assets Turnover	AT	$AT = \dfrac{Total\ Re\ venues}{Total\ Asstes}$
	Tax Revenues to Total Revenues	Tax/TR	$Tax/TR = \dfrac{Tax\ Re\ venues}{Total\ Re\ venues}$
	Operating Ratio	OR	$OR = \dfrac{Total\ Re\ venues}{Total\ Expenses}$

Continuing with Table 3.2, Plaquemines Parish had the highest GDP per capita for the year 2007. Plaquemines Parish also had the highest assessed valuation per capita for the year 2007. St. Bernard Parish had the largest amount of hurricane damage per capita (for the year 2005). Orleans Parish had the highest population for the year 2004.

Table 3.2. Descriptive Statistics for Financial Ratios and Macroeconomic Factors

	Mean	Std. Dev.	Max	Min
ROE	0.713	3.477	40.693	-1.789
ROA	0.397	1.904	24.511	-1.651
PM	0.130	0.166	0.818	-0.433
CR	9.462	7.522	58.808	0
D/E	0.568	1.785	24.182	0
LTL/TA	0.130	0.162	0.843	0
AT	2.807	11.159	151.236	0.000
Tax/TR	0.554	0.142	0.998	0.073
OR	1.205	0.364	5.498	0.698
GDP per Capita ($)	33,763.35	25,845.59	160,762.31	9,949.89
Assessed Valuation per Capita ($)	7,045.71	4,473.02	30,130.62	2,545.88
Hurricane Damage per Capita ($)	3,644.77	33,047.92	447,308.79	0
Population (in thousands)	68,752	93,196	461,600	5,828

This research used two methods to test the relationships between the financial ratios and the macroeconomic and demographic factors. The first method resembled that of Cohen (2008); it used the levels of the ratios (return on equity, current ratio, operating ratio, etc.) and the other factors (GDP per capita, assessed valuation per capita, and damage per capita). We also included lagged values and squared lags of the ratios as independent variables in this method. This was done under the assumption that a financial ratio encapsulated the previous years' performance of the parish government, and thereby it would provide an indication for the performance of following years. Adding these lagged variables, however, may have incorporated endogeneity between the regressors, leading to a bias in the model and an understating of the effect of the other variables.

Therefore, a second method was developed, which would include the initial values of the financial ratios, but would not suffer from the same endogeneity. This method utilized techniques similar to those used by Maher and Deller (2010) in that the variables were converted

from levels to changes. For each financial ratio, GDP per capita, and assessed valuation per capita, the 2007 value of each variable was subtracted from the 2004 value of that variable. This provided a single observation for each parameter for each parish. In addition, a variable representing the 2004 level of each ratio and a square of that variable were added to the model, according to the hypothesis that the initial value of the financial ratio represented the past financial performance of the parish government. Including this initial ratio value mitigated many of the endogeneity issues from the lagged ratio model, since the change model does not have a time series component.

Our first method, the one similar to that used by Cohen (2008), estimated the relationship between each of the financial ratios and the macroeconomic factors using the following regression model:

(3.2) $Log\ Financial\ Ratio = \beta_0 + \beta_1\ Log\ LAG + \beta_2\ Log\ LAGSQ + \beta_3\ Log\ GDP + \beta_4\ Log\ ASVN + \beta_5\ Log\ DMG + \varepsilon$

where *Log Financial Ratio* represented the logarithmic transformation of one of the ratios from Table 1; *Log LAG* represented the logarithmic transformation of a one-year lag of the ratio used as the dependent variable; *Log LAGSQ* represented the logarithmic transformations of the square of the lagged variable previously discussed; *Log GDP* represented the logarithmic transformation of the annual per capita value of each parish's gross domestic product (GDP); *Log ASVN* represented the logarithmic transformation of the annual per capita value of the assessed valuation of each parish, a proxy for real estate values; and *Log DMG* represented the logarithmic transformation of the annual per capita value of the parish damage expense resulting from the hurricanes of the time period of analysis.

Cohen (2008) used logarithmic transformations of the GDP, population, and real estate value variables due to the distributions of those variables being skewed. These transformations allowed the distributions of the data in that study to approach satisfactory levels of normality and symmetry. The corresponding variables in this study were also transformed using the double-log format. Our regressions were run as double-log random-effect panel data models (Greene, 2008), which allow the variable coefficients to be interpreted as elasticities. Random-effects models are run using generalized least squares (GLS).

Our second method was designed to avoid the possible endogeneity issues of the first method. This method, similar to that used by Maher and Deller (2010), estimated the relationship between the changes in each of the financial ratios and the changes in the macroeconomic factors using the following regression model:

(3.3) Δ *Financial Ratio* = β_0 + β_1 *INITIAL* + β_2 *INITIALSQ* + β_3 ΔGDP + β_4 $\Delta ASVN$ + β_5 ΔDMG + ε

where Δ *Financial Ratio* represented the difference between the 2004 value and the 2007 value of one of the ratios from Table 1; *INITIAL* represented the initial 2004 value of the ratio used as the dependent variable; *INITIALSQ* represented the square of the *INITIAL* variable previously discussed; ΔGDP represented the difference between the per capita GDP in 2004 and the per capita GDP in 2007 for each parish; $\Delta ASVN$ represented the difference between the per capita value of the assessed valuation in 2004 and per capita value of the assessed valuation in 2007 for each parish annual; and ΔDMG represented the per capita value of the parish damage expense resulting from the year 2005 tropical events (Katrina, Rita, and Cindy).

This model was run using ordinary least squares (OLS), using heteroskedasticity consistent (robust) errors. The model used only sixty-three observations, since one parish did not

report any equity for the year 2004, leading to divide-by-zero errors in several ratios for that parish.

Results

Table 3.3 displays the expected signs for the marginal effect of a change in one of the independent variables on the various financial ratios. The basic lagged variable and the squared lagged variable would generally be expected to have a positive effect on all ratios because a parish would not be able to change its financial state (ratio) drastically over the course of a single year. Having a high (low) ratio one year would likely mean a high (low) ratio in the next. The squared lagged variable could, however, have a negative effect if too high a value of a ratio has adverse effects on a parish's financial performance. For example, having a current ratio around 2.0 is desirable; but having a current ratio that exceeds 3.0 may not be acceptable. This is because the parish may not need to have that much excess cash on hand. That cash could be better used if it was invested in public infrastructure or other public sector investments that generated a greater return to the parish than simply sitting in the bank. Upon realizing that a region has too much current assets in relation to its current liabilities, a good financial manager may invest in longer-term assets, thereby reducing the current ratio for the following year.

Table 3.3. Expected Signs for Each Combination of Ratios and Independent Variables

		LAG	LAGSQ	GDP	ASVN	DMG
Profitability Ratios	ROE	+	+	+	-	-
	ROA	+	+	+	-	-
	PM	+	+	+	+	-
Liquidity Ratios	CR	+	-	+	+	-
Capital Structure Ratios	D/E	+	+	-	-	+
	LTL/TA	+	+	-	-	+
Performance Ratios	AT	+	+	+	-	-
	Tax/TR	+	+	+	+	-
	OR	+	+	+	+	-

An increase in GDP (or income) per capita would be expected to increase the values of all ratios except those where a high ratio is undesirable (debt to equity and long-term liabilities to

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total assets). An increase in income would improve the financial condition of a parish. An increase in assessed valuation means that net assets (equity) increased. Therefore, any ratio that had net assets or total assets in the denominator would be expected to decrease. Hurricane damage would increase expenses to a parish, destroy property, and would likely increase the parish's short-term and long-term liabilities. Consequently, it is expected to have a negative effect on all ratios except the capital structure (leverage) ratios.

The results of the first method, the GLS random effects panel data model, are presented in Table 3.4. While overall regressions were found to be significant, macroeconomic and demographic factors generally showed no statistical significance. Variables that were found to be significant at a 10%, 5%, or 1% level are denoted with one, two, or three asterisks, respectively.

The lagged financial ratio variable was found to be significant at 1% for all regressions. This is expected because there would be a high correlation between consecutive years for all ratios. Moreover, the lagged variable would be expected to encompass all of the previous economic performance of the parish, as well as the performance of the parish management. The squared lagged variable was found significant in six equations. It had a significantly positive effect on return on equity, return on assets, profit margin, and assets turnover. This is expected for these ratios because a parish that was operating efficiently and profitably in one year may tend to continue operating that way or perhaps improve its position further. The squared lagged variable had a negative effect on the current ratio and operating ratio. A parish that has too many current assets in relation to its current liabilities is inefficiently using liquid resources that could be used to generate more economic benefit to the parish. Hence, elected parish officials may be recognizing exceedingly large liquid reserves and putting them to use in the succeeding year. The squared lag had a negative effect on the operating ratio because a parish that experienced

high surplus revenues would tend to raise its expense budget for the following year, thereby

reducing the ratio.

Table 3.4. Random Effects Estimation of Financial Ratios Models

Log Financial Ratio = $\beta_0 + \beta_1$ Log LAG + β_2 Log LAGSQ + β_3 Log GDP + β_4 Log ASVN + β_5 Log DMG + ε									
	ROE	**ROA**	**PM**	**CR**	**D/E**	**LTL/TA**	**AT**	**Tax/TR**	**OR**
β0	0.496	-0.071	0.142	0.173	-0.303	0.052	0.315	-0.183	-1.199
p-value	[0.381]	[0.874]	[0.387]	[0.799]	[0.311]	[0.581]	[0.589]	[0.483]	[0.100]*
Log LAG	0.474***	0.371***	0.342***	2.332***	1.089***	0.884***	0.764***	1.168***	2.762***
p-value	[0.000]	[0.000]	[0.000]	[0.002]	[0.000]	[0.000]	[0.000]	[0.002]	[0.007]
Log LAGSQ	0.033***	0.029***	0.018***	-0.691**	-0.021	0.000	0.0295*	-0.066	-0.649**
p-value	[0.000]	[0.000]	[0.000]	[0.031]	[0.101]	[0.896]	[0.056]	[0.266]	[0.022]
Log GDP	0.089	0.028	-0.004	0.023	0.004	0.015	-0.008	0.009	0.008
p-value	[0.150]	[0.566]	[0.816]	[0.717]	[0.904]	[0.175]	[0.903]	[0.369]	[0.665]
Log ASVN	-0.014	0.007	0.009	-0.046	0.180	-0.022	-0.006	-0.008	-0.003
p-value	[0.859]	[0.905]	[0.707]	[0.580]	[0.647]	[0.113]	[0.935]	[0.569]	[0.883]
Log DMG	0.001	0.004	-0.004	0.042***	0.008*	-0.001	0.012	-0.005***	-0.006*
p-value	[0.381]	[0.617]	[0.165]	[0.000]	[0.063]	[0.289]	[0.238]	[0.007]	[0.071]
Wald chi2	193.330	143.540	87.670	258.630	591.350	549.800	703.150	200.840	42.140
p-value	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
R-square	0.518	0.437	0.320	0.583	0.810	0.847	0.791	0.519	0.185
N	189	191	192	191	190	144	192	192	192
Note: Observation counts of less than 192 were the result of either (1) the numerator or the denominator of the ratio having a value of zero or (2) the ratio having a negative value. Logarithmizing those ratios led to a null observation for that parish/year/ratio combination.									
* denotes significance at 10% ; ** denotes significance at 5% ; *** denotes significance at 1%									

The damage variable was found significant for the current ratio, the debt to equity ratio,

the tax revenues to total revenues ratios, and the operating ratio. A disaster event should be

expected to draw down liquid assets and increase liabilities, thereby lowering the current ratio.

However, in this case, the damage variable had a positive sign, possibly indicating that after the

disasters, governments increased their available liquid assets to meet the costs of recovery. Also,

there may be a short-term positive impact to local revenue such as sales tax collections due to households recovering from the natural disaster by rebuilding their homes and buying household items that were lost during the storms. For the remaining three ratios, the damage variable had the expected sign. In the case of the debt to equity ratio, a disaster would be expected to raise debt and reduce equity, raising the ratio. In the case of the tax revenues to total revenues ratio, a disaster would probably bring in additional intergovernmental transfers above historical levels, thereby weighing revenues toward sources other than taxes and reducing the ratio. Lastly, in the case of the operating ratio, a disaster would be expected to raise total expenses, reducing the ratio.

The GDP and assessed valuation variables were never found to be significant. There are possibly two reasons that GDP and assessed valuation were never significant. First, damage expenses from the hurricanes offset increases in income (GDP) and property values (assessed valuation), preventing those increases from appearing in the financial statements for many parishes. Second, any increases in parish government (tax) revenue resulting from the increases in GDP and property values may have resulted in parishes increasing their expense budgets to utilize this surplus.

The results of the second method, the OLS regression of the change in variables, are displayed in Table 3.5. Overall, the regressions were found to be significant, except for the debt to equity ratio model, which was not found to be significant. GDP and assessed valuation again were found not to be significant, but the variables representing the initial values of the ratios and the damage variable were found significant in several equations. Variables that were found to be significant at a 10%, 5%, or 1% level are denoted with one, two, or three asterisks, respectively.

Table 3.5. Estimation of Financial Ratios Models Using Changes

Δ Financial Ratio = β_0 + β_1 INITIAL + β_2 INITIALSQ + β_3 ΔGDP + β_4 ΔASVN + β_5 ΔDMG + ε									
	ROE	**ROA**	**PM**	**CR**	**D/E**	**LTL/TA**	**AT**	**Tax/TR**	**OR**
β0	-0.017	0.213**	0.132***	0.791	-0.271	0.039	-1.634	0.411**	2.795
p-value	[0.943]	[0.042]	[0.001]	[0.632]	[0.531]	[0.113]	[0.165]	[0.012]	[0.165]
ΔINITIAL	-0.056	-0.773***	-1.048***	0.571**	0.207	-0.422*	1.130**	-1.241**	-3.192
p-value	[0.925]	[0.000]	[0.000]	[0.041]	[0.848]	[0.094]	[0.062]	[0.048]	[0.225]
ΔINITIALSQ	-0.038	-0.015	0.780	-0.027***	0.183	0.251	-0.042***	0.831	0.716
p-value	[0.111]	[0.110]	[0.128]	[0.000]	[0.669]	[0.646]	[0.001]	[0.138]	[0.362]
ΔGDP	0.00002	-1.5E-06	2.1E-06	0.00008	-0.00001	3.7E-07	0.00005	6.5E-07	3.5E-06
p-value	[0.319]	[0.578]	[0.181]	[0.139]	[0.461]	[0.607]	[0.417]	[0.579]	[0.271]
ΔASVN	0.00005	1.4E-06	-0.00001	-0.005	0.0002	2.7E-06	0.0004	-9.0E-06	-0.00003
p-value	[0.487]	[0.960]	[0.554]	[0.232]	[0.312]	[0.671]	[0.234]	[0.377]	[0.537]
ΔDMG	-2.2E-06	-5.5E-07**	-5.5E-07***	-0.00002***	6.2E-06*	-1.6E-07***	-4.10E-06	4.6E-07***	-1.0E-07**
p-value	[0.160]	[0.045]	[0.007]	[0.003]	[0.069]	[0.010]	[0.441]	[0.000]	[0.038]
F	5825.84	18418.00	20.60	46.94	1.38	4.58	336.02	12.98	5.19
p-value	[0.000]	[0.000]	[0.000]	[0.000]	[0.245]	[0.001]	[0.000]	[0.000]	[0.001]
R-square	0.884	0.921	0.582	0.333	0.224	0.171	0.732	0.211	0.281
N	63	63	63	63	63	63	63	63	63
Note: Rapides Parish was excluded from these regressions because, the parish listed no equity (net assets) for the year 2004.									
* denotes significance at 10% ; ** denotes significance at 5% ; *** denotes significance at 1%									

The initial (2004) value of the financial ratio variable was found to be significant six times. The initial value variable was found to have a positive effect on the current ratio and the assets turnover ratio, and it was found to have a negative effect on return on assets, profit margin, the long-term liabilities to total assets ratio, and the tax revenues to total revenues ratio. We do see some differences in significance and sign between the two models on the lagged value of the ratio in the random effects model and the initial value of the ratio in the change model. Of the ratios that were significant in both models, except for the current ratio and the assets turnover, the remaining ratios went from being positive with the lagged ratio in the random effects model

to being negative in the change model. This may be due to the fact of the lag length. The initial value represents a four year lag on the change variable compared to the one year lag in the random effects model. Hence, we may be seeing that in the immediate short-run (one year), parish governments may be able to maintain high positive ratios, but in the longer term, it is more difficult to maintain these high values.

The squared initial ratio variable was found significant twice, having a negative effect on both the current ratio and the assets turnover ratio. Finally, the damage variable was found to be significant seven times. It had a positive effect on the debt to equity ratio and the tax revenues to total revenues ratio; and it had a negative effect on return on assets, profit margin, the current ratio, the long-term liabilities to total assets ratio, and the operating ratio. This equation was slightly more difficult to interpret regarding the individual coefficients because it measured the effect of a change in the difference between the 2004 and 2007 values of the independent variables upon the difference in the 2004 and 2007 values of the financial ratios. Nonetheless, the model did provide additional strength to our hypothesis that natural disasters do affect local government financial health.

Conclusion

Recent hurricane disaster events have created sizable financial burdens for many parish governments. Now that parish governments can no longer expect full reimbursement for cleanup and debris removal costs, and that they are likely to have to wait up to a year before receiving any reimbursement, local policy makers see a need to prepare themselves in case of additional future natural disaster events.

This research began by calculating nine financial ratios for all Louisiana parishes for the years 2004-2007. Using our first method, each ratio was regressed against GDP per capita,

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assessed valuation per capita, damage cost per capita, and one-year lags of itself. Based on the regression results, the lagged term of the financial ratio being examined was found to be positive and significant for nearly all regressions, as expected. The squared lagged term was found to be significant five times, positive four times and negative once, all as expected. Damage expense per capita was found significant twice, once with a negative sign, as expected, and the other time with a positive sign. Per capita GDP and assessed valuation were never found to be significant. Our second method served to avoid the endogeneity issues of the first method, while still providing additional validation to our hypothesis that natural disaster (hurricane) cleanup costs have a significant impact on a parish's financial health.

The limitations of this study were as follows. Since the first regression method used a lagged version of the dependent variable as an independent variable, there are likely endogeneity issues, which could lead to the results being biased and the effects of the other independent variables being understated. The second method overcame the endogeneity issues, but it was not as amenable to interpretation as the first method. A limitation to both methods was that data availability prevented the use of the 2008 hurricane damage data. Therefore, only data from the major hurricanes of 2005 (Katrina and Rita) and a few observations from lesser 2004 hurricanes could be utilized. This prevented a possible better understanding of the effects of hurricane damage on parish finances. A third limitation was that the statement of activities (income statement) data did not distinguish between current assets (or other asset types) that were committed to certain parish projects and other liquid assets that could be used at the discretion of parish policy makers. Therefore, the true amount of readily available assets was probably overstated.

There are several areas for further research and extension of this study. First, other regression methods and models should be explored. If a method could be found which would not be biased by endogeneity but would still be amenable to analysis, this research could be greatly improved. Additionally, as more years of data become available, particularly for the year 2008, confidence in the regression results will improve. Moreover, this would allow for the hurricane damage data from 2008 to be utilized. Lastly, acquiring statement of activities data from fund balances would address the issue of liquid assets that had been restricted to certain projects, addressing the final limitation discussed earlier.

In conclusion, this research measured the effects of macroeconomic factors on the financial health of Louisiana parish governments. We found that the costs of hurricane clean up and recovery had a significant negative effect on parish finances. Therefore, decision makers from coastal Louisiana parishes should examine their regions (possibly using the financial ratios presented in this study) and develop a strategy to finance disaster recovery efforts for the future. Our regression methods could even be used to test the sensitivity of the financial health of Louisiana parish governments to natural disaster events by adjusting the magnitude of the recovery costs in the model or by creating hypothetical natural disasters in future years.

CHAPTER 4: CONCLUSION

Restatement of Problem and Objectives

This research began by stating that Louisiana has been hit by several severe hurricanes in recent years, and these disaster events have placed a financial burden on parish budgets. As such, local governments have been compelled to bear various cleanup and recovery costs in the short and long term. The regions have needed to carry the full costs in the short term because it has taken up to a year for the state and federal government to provide reimbursement, and since the federal government has decided to provide reimbursement for only a majority of the costs, these regions have had to bear a greater share of the long-term costs as well.

The general research objective of this research was to use gross domestic product (GDP) and other economic indicators to evaluate the factors that drive the variation in the financial health of local governments in Louisiana. Two specific research objectives were then identified. First, we wanted to develop and test methods of estimating local area GDP, to determine which method was the most appropriate form of estimation. Second, we wanted to estimate the effect of selected economic indicators on the fiscal health of parish governments.

How Specific Objectives Were Accomplished

To accomplish the first specific objective, this research desired to find a comprehensive economic activity metric to analyze the financial health of parish governments. Several economic metrics were discussed, including employment, output, earnings, and GDP. GDP was selected because it was found to be a more comprehensive economic activity metric than the other economic metrics historically applied to measure the size and scope of a region. Furthermore, the estimates of GDP represented the value-added activity that had occurred in a region, as opposed to a summation of all activities.

Three methods for estimating GDP at the parish level were developed. The first method was based on the method of estimating metropolitan area GDP set forth by the Bureau of Economic Analysis (BEA), and it used a ratio of state GDP to state earnings by sector, multiplied by the sector earnings at the parish level. Since earnings data were a component of GDP data, the two measures of industry size tended to fluctuate together. The first method, however, could not be used comprehensively due to the earnings disclosure limitations for many sectors at the parish level and for a few sectors at the state level.

The second method, the state productivity method, used a ratio of state GDP to state employment by sector, multiplied by parish employment for that sector. This method provided estimates for every industry, but it assumed that worker productivity for each industry at the parish level exactly matched average productivity for that industry at the state level.

The third method was based on the concept that contiguous parishes (those parishes that are adjacent) would have similar earnings profiles. For each parish industry, the disclosed earnings of all of the contiguous parishes were summed, and then the corresponding industry employment for the contiguous parishes was likewise summed. The earnings total was then divided by the employment total to find the regional industry earnings to employment ratio that could then be applied to each parish. Finally, each of the regional industry earnings ratios was multiplied by the parish's industry employment to get an estimate of earnings for each sector in the parish.

A systematic approach was developed whereby the GDP estimates were generated using the best available method. Whenever earnings data were fully disclosed for a parish industry, the first (and best) method for GDP estimation was utilized. However, when earnings data were not disclosed, a choice had to be made regarding whether to use the second or third estimation

method as the substitute. Therefore, the two methods were compared using Theil coefficients, where a value of 0 was a perfect forecast and a value of 1 was maximum inequality. The state productivity method had a value of 0.15 and the contiguous method had a value of 0.64 when both were compared to the disclosed earnings data. In addition, when all of the estimates were pooled (summed), the state productivity method underestimated the total by -0.62% compared to the contiguous method, which overestimated the total by 14.85%. The state productivity method was therefore chosen to supplement the first (earnings) method.

The second specific objective was achieved by using the financial data from parish government statements of activities (public sector income statements) and statements of net assets (public sector balance sheets) to generate financial ratios. Nine financial ratios were selected from the ratio categories of profitability, liquidity, capital structure, and performance. Two methods were developed to regress these ratios against selected economic and demographic indicators, including GDP (from Chapter 2), assessed valuation, hurricane damage, and one-year lags (or initial values in the second method) of the ratio serving as the dependent variable. For our first method, each ratio was regressed against, GDP per capita, assessed valuation per capita, damage cost per capita, and one-year lags of itself. This regression was run as a double-log random effects model. Our second method was designed to avoid the possible endogeneity issues of the first method. This method estimated the relationship between the changes in each of the financial ratios and the changes in the macroeconomic factors. It also included a variable representing the initial 2004 value of the ratio being examined and a squared version of that initial value. The second model was run using ordinary least squares (OLS), using heteroskedasticity consistent (robust) errors.

In the first method's regression results, the lagged term of the financial ratio being examined was found to be positive and significant for nearly all regressions, as expected. The squared lagged term was found to be significant five times, positive four times and negative once, all as expected. Damage expense per capita was found significant twice, once with a negative sign, as expected, and the other time with a positive sign. Per capita GDP and assessed valuation were never found to be significant. The results of the second method were not conducive to interpretation, but they provided additional validation to our hypothesis that natural disaster (hurricane) cleanup costs have a significant impact on a parish's financial health.

Limitations of Methods Used

The research in the GDP chapter was limited by several items. First, the variation in the GDP estimates was driven a majority of the time by the statewide average industrial productivity (GDP per employee) for each industry. If industrial productivity for a given sector in a given parish varied greatly from the statewide average, this reduced forecast accuracy. Second, for the rest of the parish sectors, the variation in GDP estimates was driven by the variation in the industrial earnings mix of the parish. If corporate earnings varied greatly from the statewide average, this would also reduce forecast accuracy. A third limitation was and will continue to be that the study requires very detailed data to be provided by the federal government (earnings) and the private sector (Wholedata employment estimates). Should these data sources become unavailable (or less detailed) in the future, estimating county-level GDP using the methods contained here will not be as straightforward.

The regression chapter suffered from the following limitations. The first regression model was run with a lagged version of the dependent variable as an independent variable. Therefore, this lagged variable likely caused endogeneity issues, leading to the results being biased and the

effects of the other independent variables being understated. The second method overcame the endogeneity issues, but it was not as amenable to interpretation as the first method. A limitation to both methods was that data availability prevented the use of the 2008 hurricane damage data. Therefore, only data from the major hurricanes of 2005 (Katrina and Rita) and a few observations from lesser 2004 hurricanes could be utilized. This prevented a possible better understanding of the effects of hurricane damage on parish finances. A third limitation was that the Statement of Activities (income statement) data did not distinguish between current assets (or other asset types) that were committed to certain parish projects and other liquid assets that could be used at the discretion of parish policy makers. Therefore, the true amount of readily available assets was overstated.

Need for Further Research

The results from the regression chapter were not very robust. Therefore, there are several areas for further research and extension of that study. First, other regression methods and models should be explored. If a method could be found which would not be biased by endogeneity but would still be amenable to analysis, that research would be greatly improved. Additionally, as more years of data become available, particularly for the year 2008, confidence in the regression results would improve. Moreover, this would allow for the hurricane damage data from 2008 to be utilized. Lastly, acquiring statement of activities data from fund balances would address the issue of liquid assets, which had been restricted to certain projects, but were being counted as assets available for discretionary use.

Policy Implications of this Research

The implications of the GDP chapter research are regarding the growth analysis and the industry sector analysis contained at the end of the chapter. If a parish was experiencing above

average GDP growth and below average employment growth, or vice versa, the decision makers should examine the causes for this occurrence to determine if a policy change could provide increased growth where the parish was lacking. Another policy implication is regarding the highest contributing and highest growing industry sectors. Often mining or chemical, petroleum, and coal products manufacturing were the biggest sectors. Yet, petroleum is a non-renewable resource. If the parish is relying too heavily on petroleum related industries, it could face a crisis should the petroleum deposits run dry. Decision makers might want to explore other industries which show promise in their region or in nearby regions.

The implications of regression chapter research are the following. First, the hurricane damage variable was found to be significant for some of the financial ratio models in both of the regression methods. With improved regression methods and additional data, the damage variable could be found significant for even more of the financial ratio models. Therefore, hurricanes can be expected to affect a parish's financial health. If a parish is in a coastal region, the respective decision makers should examine their parish further (possibly using the financial ratios provided in the appendices) and prepare sufficient means of financing disaster recovery efforts for the future. Another implication of our research is related to the ratios themselves. Decision makers might want to use the ratios calculated in our research to compare their parish to similar parishes to determine if some restructuring of assets or policy changes should occur.

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APPENDIX A: BRIDGE TABLE BETWEEN THE ELEVEN INDUSTRY SUMMARY CATEGORIES AND THE SIXTY-ONE GDP SECTORS

Summary Categroy Code	Summary Category Name	GDP Code	GDP Sector Name
1	Food and Fiber System	4	Crop and animal production (Farms)
1	Food and Fiber System	5	Forestry, fishing, and related activities
1	Food and Fiber System	14	Wood product manufacturing
1	Food and Fiber System	26	Food product manufacturing
1	Food and Fiber System	27	Textile and textile product mills
1	Food and Fiber System	28	Apparel manufacturing
1	Food and Fiber System	29	Paper manufacturing
1	Food and Fiber System	76	Food services and drinking places
2	Mining	7	Oil and gas extraction
2	Mining	8	Mining, except oil and gas
2	Mining	9	Support activities for mining
3	Transportation and Utilities	10	Utilities
3	Transportation and Utilities	37	Air transportation
3	Transportation and Utilities	39	Water transportation
3	Transportation and Utilities	40	Truck transportation
3	Transportation and Utilities	41	Transit and ground passenger transportation
3	Transportation and Utilities	42	Pipeline transportation
3	Transportation and Utilities	43	Other transportation and support activities
3	Transportation and Utilities	44	Warehousing and storage
4	Construction	11	Construction
5	All Other Manufacturing	15	Nonmetallic mineral product manufacturing
5	All Other Manufacturing	16	Primary metal manufacturing
5	All Other Manufacturing	17	Fabricated metal product manufacturing
5	All Other Manufacturing	18	Machinery manufacturing
5	All Other Manufacturing	19	Computer and electronic product manufacturing
5	All Other Manufacturing	20	Electrical equipment and appliance manufacturing
5	All Other Manufacturing	21	Motor vehicle, body, trailer, and parts manufacturing
5	All Other Manufacturing	22	Other transportation equipment manufacturing
5	All Other Manufacturing	23	Furniture and related product manufacturing
5	All Other Manufacturing	24	Miscellaneous manufacturing
5	All Other Manufacturing	30	Printing and related support activities
5	All Other Manufacturing	33	Plastics and rubber products manufacturing
6	Chemical, Petroleum, and Coal Products Manufacturing	31	Petroleum and coal products manufacturing
6	Chemical, Petroleum, and Coal Products Manufacturing	32	Chemical manufacturing
7	Wholesale and Retail Trade	34	Wholesale trade
7	Wholesale and Retail Trade	35	Retail trade
8	Information and Other Services	46	Publishing including software
8	Information and Other Services	47	Motion picture and sound recording industries
8	Information and Other Services	48	Broadcasting and telecommunications
8	Information and Other Services	49	Information and data processing services
8	Information and Other Services	58	Professional and technical services
8	Information and Other Services	62	Management of companies and enterprises
8	Information and Other Services	64	Administrative and support services
8	Information and Other Services	65	Waste management and remediation services
8	Information and Other Services	72	Performing arts, museums, and related activities
8	Information and Other Services	73	Amusement, gambling, and recreation
8	Information and Other Services	75	Accommodation
8	Information and Other Services	77	Other services, except government
9	Finance, Insurance, and Real Estate	51	Federal Reserve banks, credit intermediation and related services
9	Finance, Insurance, and Real Estate	52	Securities, commodity contracts, investments
9	Finance, Insurance, and Real Estate	53	Insurance carriers and related activities
9	Finance, Insurance, and Real Estate	54	Funds, trusts, and other financial vehicles
9	Finance, Insurance, and Real Estate	56	Real estate
9	Finance, Insurance, and Real Estate	57	Rental and leasing services and lessors of intangible assets
10	Education and Health Care Services	66	Educational services
10	Education and Health Care Services	68	Ambulatory health care services
10	Education and Health Care Services	69	Hospitals and nursing and residential care facilities
10	Education and Health Care Services	70	Social assistance
11	Government	79	Federal civilian
11	Government	80	Federal military
11	Government	81	State and local

APPENDIX B: PARISH INDUSTRY RANKING BY SIZE FOR YEAR 2007

Parish Name	FIPS	Food and Fiber System	Mining	Transportation and Utilities	Construction	All Other Manufacturing	Chemical, Petroleum, and Coal Products Manufacturing	Wholesale and Retail Trade	Information and Other Services	Finance, Insurance, and Real Estate	Education and Health Care Services	Government
Acadia	22001	9	1	8	7	11	10	2	4	5	6	3
Allen	22003	4	9	8	5	10	11	3	2	7	6	1
Ascension	22005	10	6	8	5	11	1	4	3	2	9	7
Assumption	22007	1	2	3	9	5	11	6	8	10	7	4
Avoyelles	22009	2	10	8	7	9	11	3	4	5	6	1
Beauregard	22011	2	10	9	7	11	1	5	6	3	8	4
Bienville	22013	2	1	5	10	8	11	3	7	6	9	4
Bossier	22015	9	3	10	7	11	8	4	2	5	6	1
Caddo	22017	10	1	8	11	6	9	4	2	7	5	3
Calcasieu	22019	10	8	9	6	11	1	3	2	5	7	4
Caldwell	22021	4	9	7	8	10	11	2	3	6	5	1
Cameron	22023	11	1	4	6	10	2	3	7	8	9	5
Catahoula	22025	1	7	2	9	11	10	4	6	5	8	3
Claiborne	22027	3	1	4	8	11	10	5	7	9	6	2
Concordia	22029	1	3	5	10	11	9	4	6	8	7	2
De Soto	22031	2	1	5	8	10	11	4	6	7	9	3
East Baton Rouge	22033	9	11	8	6	10	2	5	1	4	7	3
East Carroll	22035	1	9	8	11	10	7	3	4	5	6	2
East Feliciana	22037	8	9	7	10	2	11	3	5	6	4	1
Evangeline	22039	9	8	5	11	10	7	4	3	6	2	1
Franklin	22041	1	11	6	8	10	9	3	7	5	4	2
Grant	22043	3	10	4	5	11	9	2	6	7	8	1
Iberia	22045	9	1	6	7	5	11	4	3	2	10	8
Iberville	22047	3	8	5	6	11	1	7	4	9	10	2
Jackson	22049	1	2	5	9	10	11	4	8	7	6	3
Jefferson	22051	10	4	8	9	6	11	1	3	2	5	7
Jefferson Davis	22053	9	4	8	10	6	11	1	2	5	7	3
Lafayette	22055	8	1	9	10	7	11	4	2	3	5	6
Lafourche	22057	10	3	2	9	8	11	6	4	1	7	5
La Salle	22059	6	1	7	8	10	11	3	4	5	9	2
Lincoln	22061	6	8	10	9	7	11	2	4	5	3	1
Livingston	22063	7	11	9	5	2	10	3	4	6	8	1
Madison	22065	3	11	8	10	9	1	4	5	7	6	2
Morehouse	22067	1	8	7	9	11	10	2	6	4	5	3
Natchitoches	22069	2	11	7	10	3	4	6	5	8	9	1
Orleans	22071	8	1	5	11	9	10	6	2	4	7	3
Ouachita	22073	6	11	8	9	7	10	2	1	3	5	4
Plaquemines	22075	9	1	3	8	10	2	5	7	6	11	4
Pointe Coupee	22077	4	9	1	8	10	11	3	6	5	7	2
Rapides	22079	7	11	10	9	8	6	4	2	5	3	1
Red River	22081	2	1	4	9	10	11	5	7	8	6	3
Richland	22083	4	11	8	9	3	10	1	7	6	5	2
Sabine	22085	1	7	6	10	9	11	3	4	5	8	2
St. Bernard	22087	10	3	6	2	11	1	4	5	8	9	7
St. Charles	22089	9	11	2	6	10	1	3	4	7	8	5
St. Helena	22091	2	11	4	10	6	3	9	5	7	8	1
St. James	22093	3	11	6	10	4	1	2	7	8	9	5
St. John the Baptist	22095	11	8	4	9	5	1	2	3	7	10	6
St. Landry	22097	8	9	4	10	11	1	3	7	5	6	2
St. Martin	22099	4	1	10	8	11	9	3	6	2	7	5
St. Mary	22101	10	1	7	8	2	9	6	5	3	11	4
St. Tammany	22103	9	6	8	7	10	11	1	2	3	5	4
Tangipahoa	22105	5	11	6	9	10	8	2	4	3	7	1
Tensas	22107	1	6	7	10	9	11	3	4	5	8	2
Terrebonne	22109	10	1	8	9	2	11	4	5	3	6	7
Union	22111	1	4	7	9	10	11	3	6	8	5	2
Vermilion	22113	5	1	8	7	10	11	2	6	3	9	4
Vernon	22115	6	10	8	7	9	11	3	2	4	5	1
Washington	22117	2	4	8	9	10	11	3	5	6	7	1
Webster	22119	5	1	11	8	4	7	2	9	3	10	6
West Baton Rouge	22121	9	3	2	5	6	1	4	8	10	11	7
West Carroll	22123	2	10	7	4	9	11	3	8	6	5	1
West Feliciana	22125	3	9	1	7	10	11	5	4	6	8	2
Winn	22127	1	2	9	10	11	7	4	3	8	6	5

APPENDIX C: PARISH FINANCIAL RATIOS FOR YEAR 2004

Parish Name	FIPS	Return on Equity (Return on Net Assets)	Return on Assets	Profit Margin	Current Ratio	Debt to Equity Ratio	Long-term Liabilities to Total Assets Ratio	Assets Turnover Ratio	Tax Revenues to Total Revenues Ratio	Operating Ratio
Acadia	22001	-0.018	-0.011	-0.047	7.144	0.553	0.215	0.245	0.821	0.955
Allen	22003	0.062	0.052	0.141	6.667	0.189	0.116	0.371	0.628	1.164
Ascension	22005	-0.025	-0.020	-0.088	10.659	0.249	0.155	0.229	0.772	0.919
Assumption	22007	0.136	0.128	0.308	16.855	0.065	0.031	0.414	0.478	1.445
Avoyelles	22009	0.134	0.125	0.103	9.553	0.075	0.000	1.214	0.757	1.114
Beauregard	22011	0.661	0.503	0.167	6.353	0.315	0.169	3.014	0.521	1.200
Bienville	22013	0.160	0.152	0.137	14.333	0.051	0.000	1.114	0.501	1.158
Bossier	22015	0.204	0.134	0.046	8.709	0.525	0.298	2.938	0.685	1.048
Caddo	22017	0.053	0.045	0.090	7.135	0.180	0.000	0.498	0.570	1.099
Calcasieu	22019	-0.003	-0.003	-0.085	7.422	0.053	0.000	0.031	0.495	0.921
Caldwell	22021	0.197	0.191	0.106	15.498	0.032	0.000	1.806	0.450	1.118
Cameron	22023	-0.003	-0.002	-0.141	4.677	0.305	0.130	0.016	0.627	0.877
Catahoula	22025	0.262	0.232	0.193	3.168	0.131	0.011	1.202	0.326	1.239
Claiborne	22027	0.336	0.299	0.012	9.762	0.122	0.000	24.722	0.635	1.012
Concordia	22029	-0.306	-0.290	-0.061	12.758	0.055	0.000	4.764	0.553	0.943
De Soto	22031	0.497	0.386	0.500	7.201	0.286	0.178	0.772	0.680	2.002
East Baton Rouge	22033	0.000	0.000	-0.315	4.536	0.450	0.221	0.001	0.526	0.761
East Carroll	22035	5.075	4.404	0.391	16.845	0.152	0.108	11.256	0.300	1.643
East Feliciana	22037	-0.350	-0.334	-0.075	11.784	0.049	0.000	4.432	0.581	0.930
Evangeline	22039	0.349	0.172	0.083	4.743	1.029	0.422	2.062	0.776	1.091
Franklin	22041	-0.060	-0.058	-0.071	9.276	0.026	0.000	0.819	0.663	0.934
Grant	22043	2.872	1.993	0.247	2.965	0.441	0.045	8.065	0.819	1.328
Iberia	22045	0.015	0.014	0.178	4.642	0.077	0.020	0.077	0.412	1.216
Iberville	22047	0.101	0.094	0.292	7.351	0.075	0.018	0.323	0.480	1.412
Jackson	22049	0.011	0.009	0.006	40.830	0.299	0.000	1.322	0.527	1.006
Jefferson	22051	25.183	15.679	0.308	2.820	0.606	0.231	50.875	0.657	1.445
Jefferson Davis	22053	0.496	0.422	0.171	4.770	0.175	0.071	2.469	0.634	1.206
Lafayette	22055	0.087	0.032	0.222	3.908	1.702	0.547	0.145	0.478	1.285
Lafourche	22057	0.012	0.005	0.018	5.341	1.266	0.432	0.313	0.714	1.018
La Salle	22059	0.865	0.726	0.290	7.299	0.191	0.000	2.504	0.575	1.409
Lincoln	22061	0.005	0.004	0.020	19.262	0.174	0.105	0.197	0.698	1.020
Livingston	22063	-0.004	-0.003	-0.011	4.503	0.322	0.152	0.255	0.558	0.989
Madison	22065	-0.205	-0.156	-0.117	3.307	0.307	0.075	1.333	0.601	0.895
Morehouse	22067	0.023	0.019	0.050	1.908	0.176	0.003	0.391	0.475	1.052
Natchitoches	22069	1.584	1.453	0.508	12.685	0.090	0.000	2.862	0.513	2.032
Orleans	22071	4.961	0.816	0.070	1.611	5.083	0.725	11.604	0.708	1.076
Ouachita	22073	0.028	0.026	0.445	10.281	0.077	0.026	0.058	0.355	1.800
Plaquemines	22075	-0.005	-0.004	-0.189	5.971	0.260	0.116	0.021	0.503	0.841
Pointe Coupee	22077	-0.017	-0.012	-0.038	4.115	0.450	0.238	0.308	0.402	0.963
Rapides	22079	0.000	0.009	0.101	0.000	0.000	0.094	0.089	0.678	1.112
Red River	22081	-1.789	-1.651	-0.366	5.917	0.084	0.000	4.507	0.473	0.732
Richland	22083	-0.088	-0.057	-0.065	1.501	0.528	0.037	0.876	0.461	0.939
Sabine	22085	0.017	0.017	0.109	19.213	0.019	0.008	0.156	0.683	1.122
St. Bernard	22087	-0.003	-0.002	-0.019	3.522	0.465	0.106	0.122	0.485	0.981
St. Charles	22089	0.000	0.000	0.008	2.280	0.709	0.267	0.027	0.401	1.008
St. Helena	22091	0.649	0.539	0.609	7.774	0.204	0.102	0.884	0.876	2.560
St. James	22093	-0.005	-0.004	-0.031	7.425	0.189	0.112	0.128	0.268	0.970
St. John the Baptist	22095	0.229	0.035	0.182	5.214	5.487	0.735	0.194	0.651	1.222
St. Landry	22097	-0.023	-0.019	-0.066	9.545	0.224	0.120	0.290	0.478	0.938
St. Martin	22099	-0.004	-0.002	-0.022	6.556	0.775	0.369	0.097	0.535	0.978
St. Mary	22101	0.064	0.027	0.118	4.499	1.401	0.000	0.225	0.393	1.134
St. Tammany	22103	0.031	0.023	0.122	5.979	0.320	0.178	0.190	0.585	1.139
Tangipahoa	22105	0.027	0.019	0.150	2.506	0.455	0.204	0.125	0.579	1.176
Tensas	22107	0.908	0.656	0.139	13.100	0.383	0.242	4.738	0.584	1.161
Terrebonne	22109	0.002	0.001	0.096	2.331	0.514	0.165	0.012	0.446	1.107
Union	22111	0.009	0.005	0.023	2.652	0.775	0.000	0.227	0.755	1.023
Vermilion	22113	0.002	0.002	0.045	19.119	0.120	0.000	0.047	0.661	1.047
Vernon	22115	0.030	0.026	0.233	7.529	0.142	0.076	0.113	0.687	1.304
Washington	22117	0.013	0.008	0.113	7.079	0.739	0.370	0.066	0.711	1.128
Webster	22119	-0.042	-0.035	-0.054	10.799	0.191	0.091	0.649	0.284	0.949
West Baton Rouge	22121	-0.011	-0.009	-0.056	3.976	0.207	0.081	0.159	0.494	0.947
West Carroll	22123	-0.079	-0.072	-0.353	2.751	0.099	0.000	0.203	0.607	0.739
West Feliciana	22125	0.067	0.055	0.148	7.483	0.215	0.102	0.373	0.822	1.173
Winn	22127	0.146	0.134	0.135	14.092	0.089	0.000	0.994	0.454	1.156

APPENDIX D: PARISH FINANCIAL RATIOS FOR YEAR 2005

Parish Name	FIPS	Return on Equity (Return on Net Assets)	Return on Assets	Profit Margin	Current Ratio	Debt to Equity Ratio	Long-term Liabilities to Total Assets Ratio	Assets Turnover Ratio	Tax Revenues to Total Revenues Ratio	Operating Ratio
Acadia	22001	0.028	0.018	0.059	5.157	0.506	0.195	0.313	0.707	1.062
Allen	22003	0.028	0.025	0.068	7.241	0.155	0.091	0.361	0.664	1.073
Ascension	22005	0.054	0.041	0.156	10.001	0.331	0.198	0.260	0.713	1.185
Assumption	22007	0.080	0.075	0.206	16.568	0.056	0.023	0.366	0.502	1.260
Avoyelles	22009	0.330	0.286	0.202	4.825	0.154	0.000	1.416	0.671	1.253
Beauregard	22011	0.861	0.701	0.213	5.877	0.228	0.119	3.295	0.469	1.270
Bienville	22013	0.608	0.576	0.326	14.105	0.055	0.000	1.767	0.303	1.484
Bossier	22015	0.501	0.351	0.121	6.309	0.426	0.258	2.910	0.642	1.137
Caddo	22017	0.074	0.061	0.120	5.960	0.219	0.000	0.507	0.530	1.136
Calcasieu	22019	0.001	0.001	0.019	7.215	0.056	0.000	0.035	0.472	1.020
Caldwell	22021	-0.013	-0.013	-0.008	14.782	0.027	0.000	1.584	0.454	0.992
Cameron	22023	-0.001	-0.001	-0.066	6.226	0.283	0.107	0.016	0.512	0.938
Catahoula	22025	0.120	0.106	0.095	4.047	0.134	0.007	1.110	0.351	1.105
Claiborne	22027	0.930	0.878	0.041	19.593	0.059	0.000	21.374	0.640	1.043
Concordia	22029	0.343	0.340	0.042	58.808	0.010	0.000	8.144	0.480	1.044
De Soto	22031	0.316	0.243	0.239	7.830	0.302	0.182	1.014	0.588	1.314
East Baton Rouge	22033	0.000	0.000	-0.106	4.996	0.411	0.199	0.001	0.423	0.904
East Carroll	22035	2.732	2.412	0.235	21.974	0.133	0.097	10.260	0.358	1.307
East Feliciana	22037	-0.660	-0.637	-0.161	17.793	0.036	0.000	3.960	0.547	0.861
Evangeline	22039	1.099	0.544	0.205	5.353	1.022	0.348	2.656	0.627	1.257
Franklin	22041	0.115	0.111	0.124	6.587	0.034	0.000	0.899	0.635	1.141
Grant	22043	4.178	2.933	0.426	3.029	0.424	0.098	6.878	0.761	1.744
Iberia	22045	0.005	0.005	0.063	4.265	0.078	0.019	0.080	0.414	1.068
Iberville	22047	0.072	0.060	0.196	3.342	0.199	0.063	0.304	0.471	1.245
Jackson	22049	0.044	0.036	0.032	42.447	0.226	0.000	1.114	0.585	1.033
Jefferson	22051	40.693	24.511	0.162	1.536	0.660	0.285	151.236	0.283	1.193
Jefferson Davis	22053	1.093	0.915	0.378	4.440	0.195	0.069	2.419	0.641	1.608
Lafayette	22055	0.097	0.035	0.235	4.367	1.795	0.549	0.147	0.510	1.307
Lafourche	22057	0.125	0.039	0.155	2.986	2.254	0.422	0.248	0.708	1.184
La Salle	22059	0.546	0.441	0.163	7.884	0.239	0.000	2.700	0.548	1.195
Lincoln	22061	0.029	0.025	0.033	26.359	0.145	0.101	0.773	0.210	1.034
Livingston	22063	0.025	0.019	0.074	3.213	0.376	0.186	0.249	0.521	1.080
Madison	22065	0.024	0.018	0.012	2.741	0.328	0.073	1.484	0.462	1.012
Morehouse	22067	0.018	0.015	0.038	1.608	0.194	0.002	0.399	0.607	1.039
Natchitoches	22069	1.778	1.628	0.490	10.432	0.093	0.000	3.324	0.465	1.959
Orleans	22071	6.020	0.793	0.062	2.161	6.588	0.765	12.840	0.668	1.066
Ouachita	22073	0.015	0.014	0.304	6.809	0.095	0.019	0.045	0.575	1.438
Plaquemines	22075	-0.001	-0.001	-0.058	4.701	0.297	0.110	0.017	0.593	0.946
Pointe Coupee	22077	0.038	0.023	0.048	1.115	0.698	0.000	0.472	0.399	1.050
Rapides	22079	0.001	0.001	0.016	4.333	0.145	0.046	0.047	0.654	1.016
Red River	22081	-0.481	-0.458	-0.106	9.621	0.051	0.000	4.329	0.409	0.904
Richland	22083	0.051	0.026	0.032	2.070	0.923	0.195	0.837	0.460	1.033
Sabine	22085	0.038	0.037	0.177	13.922	0.029	0.010	0.206	0.540	1.216
St. Bernard	22087	0.010	0.005	0.045	2.094	0.860	0.084	0.123	0.440	1.047
St. Charles	22089	0.009	0.010	0.166	8.578	0.575	0.426	0.061	0.359	1.199
St. Helena	22091	0.314	0.266	0.306	10.248	0.181	0.102	0.866	0.786	1.442
St. James	22093	-0.009	-0.007	-0.061	8.140	0.248	0.147	0.118	0.254	0.943
St. John the Baptist	22095	0.037	0.010	0.065	5.226	2.542	0.619	0.159	0.638	1.070
St. Landry	22097	0.053	0.045	0.128	7.189	0.198	0.086	0.347	0.394	1.147
St. Martin	22099	-0.017	-0.010	-0.110	7.386	0.751	0.369	0.090	0.560	0.901
St. Mary	22101	-0.204	-0.042	-0.062	1.639	3.888	0.445	0.677	0.365	0.942
St. Tammany	22103	0.017	0.011	0.074	1.980	0.542	0.113	0.150	0.580	1.079
Tangipahoa	22105	0.035	0.029	0.219	6.040	0.186	0.102	0.133	0.560	1.280
Tensas	22107	0.427	0.317	0.069	7.690	0.349	0.203	4.563	0.473	1.075
Terrebonne	22109	0.004	0.003	0.231	5.874	0.568	0.187	0.011	0.440	1.300
Union	22111	-0.029	-0.015	-0.071	7.062	0.898	0.000	0.218	0.809	0.934
Vermilion	22113	-0.005	-0.004	-0.080	10.306	0.130	0.057	0.051	0.635	0.926
Vernon	22115	0.038	0.035	0.368	5.349	0.098	0.038	0.095	0.489	1.583
Washington	22117	0.026	0.013	0.207	2.104	1.049	0.272	0.062	0.669	1.261
Webster	22119	0.000	-0.026	-0.040	11.651	0.000	0.082	0.652	0.296	0.962
West Baton Rouge	22121	0.005	0.004	0.024	3.220	0.231	0.068	0.162	0.585	1.024
West Carroll	22123	-0.057	-0.051	-0.239	2.579	0.112	0.000	0.214	0.566	0.807
West Feliciana	22125	0.139	0.121	0.343	5.493	0.145	0.047	0.353	0.796	1.522
Winn	22127	0.098	0.091	0.103	15.450	0.080	0.000	0.882	0.467	1.115

APPENDIX E: PARISH FINANCIAL RATIOS FOR YEAR 2006

Parish Name	FIPS	Return on Equity (Return on Net Assets)	Return on Assets	Profit Margin	Current Ratio	Debt to Equity Ratio	Long-term Liabilities to Total Assets Ratio	Assets Turnover Ratio	Tax Revenues to Total Revenues Ratio	Operating Ratio
Acadia	22001	0.073	0.045	0.151	5.487	0.639	0.243	0.295	0.812	1.178
Allen	22003	0.105	0.093	0.219	7.610	0.128	0.068	0.425	0.592	1.280
Ascension	22005	0.196	0.158	0.455	13.617	0.239	0.157	0.348	0.576	1.834
Assumption	22007	0.081	0.076	0.214	15.211	0.065	0.021	0.356	0.547	1.272
Avoyelles	22009	0.625	0.573	0.304	8.629	0.091	0.000	1.884	0.641	1.437
Beauregard	22011	1.252	1.080	0.311	9.536	0.159	0.096	3.473	0.499	1.452
Bienville	22013	0.675	0.645	0.403	24.738	0.046	0.000	1.602	0.269	1.674
Bossier	22015	0.703	0.531	0.205	8.227	0.322	0.215	2.598	0.693	1.257
Caddo	22017	0.005	0.005	0.170	11.769	0.064	0.034	0.027	0.623	1.205
Calcasieu	22019	-0.003	-0.003	-0.071	28.117	0.059	0.000	0.039	0.491	0.934
Caldwell	22021	0.390	0.373	0.211	25.706	0.047	0.000	1.765	0.498	1.268
Cameron	22023	0.003	0.002	0.181	5.704	0.421	0.115	0.011	0.620	1.222
Catahoula	22025	0.278	0.246	0.210	8.208	0.129	0.003	1.175	0.348	1.265
Claiborne	22027	3.803	3.597	0.167	14.409	0.058	0.000	21.519	0.635	1.201
Concordia	22029	2.039	1.130	0.264	16.189	0.805	0.418	4.285	0.535	1.358
De Soto	22031	0.391	0.316	0.277	8.895	0.239	0.146	1.139	0.532	1.383
East Baton Rouge	22033	0.000	0.000	-0.433	8.133	0.530	0.271	0.000	0.667	0.698
East Carroll	22035	3.045	2.735	0.217	31.050	0.113	0.085	12.603	0.296	1.277
East Feliciana	22037	2.438	2.119	0.274	11.295	0.150	0.000	7.727	0.240	1.378
Evangeline	22039	1.892	1.116	0.351	4.551	0.695	0.320	3.181	0.620	1.541
Franklin	22041	0.076	0.073	0.078	14.754	0.029	0.000	0.945	0.652	1.084
Grant	22043	0.977	0.710	0.107	3.706	0.377	0.059	6.644	0.765	1.120
Iberia	22045	0.010	0.009	0.104	7.035	0.067	0.019	0.087	0.433	1.116
Iberville	22047	0.100	0.082	0.284	2.790	0.221	0.042	0.288	0.515	1.396
Jackson	22049	0.208	0.178	0.165	16.223	0.168	0.110	1.081	0.557	1.197
Jefferson	22051	0.054	0.032	0.300	7.512	0.696	0.284	0.106	0.467	1.429
Jefferson Davis	22053	0.756	0.647	0.239	8.009	0.168	0.053	2.711	0.606	1.314
Lafayette	22055	0.092	0.038	0.236	4.320	1.461	0.510	0.159	0.527	1.309
Lafourche	22057	0.267	0.116	0.371	3.548	1.312	0.411	0.311	0.613	1.591
La Salle	22059	0.284	0.215	0.088	18.330	0.321	0.000	2.435	0.577	1.097
Lincoln	22061	0.083	0.075	0.068	33.943	0.110	0.081	1.104	0.157	1.073
Livingston	22063	0.023	0.017	0.267	8.327	0.368	0.237	0.063	0.575	1.365
Madison	22065	-0.131	-0.099	-0.093	2.055	0.331	0.047	1.060	0.571	0.915
Morehouse	22067	0.246	0.204	0.379	12.864	0.206	0.003	0.538	0.613	1.611
Natchitoches	22069	1.785	1.657	0.468	8.293	0.077	0.000	3.540	0.504	1.880
Orleans	22071	24.454	2.123	0.044	2.913	10.521	0.819	47.809	0.610	1.046
Ouachita	22073	0.015	0.014	0.330	14.951	0.059	0.015	0.042	0.629	1.492
Plaquemines	22075	0.000	0.000	0.015	7.079	0.290	0.122	0.020	0.513	1.015
Pointe Coupee	22077	0.107	0.070	0.152	6.808	0.533	0.264	0.460	0.386	1.179
Rapides	22079	0.017	0.016	0.204	7.137	0.121	0.052	0.076	0.659	1.257
Red River	22081	0.566	0.545	0.135	13.826	0.037	0.000	4.029	0.471	1.157
Richland	22083	0.111	0.066	0.088	8.571	0.691	0.163	0.750	0.499	1.096
Sabine	22085	-0.037	-0.036	-0.154	15.015	0.028	0.009	0.235	0.643	0.866
St. Bernard	22087	0.010	0.005	0.026	5.868	0.880	0.000	0.197	0.590	1.027
St. Charles	22089	0.004	0.003	0.079	9.030	0.461	0.181	0.033	0.327	1.086
St. Helena	22091	0.355	0.287	0.378	10.801	0.255	0.139	0.760	0.841	1.607
St. James	22093	-0.003	-0.002	-0.026	7.183	0.241	0.127	0.092	0.355	0.974
St. John the Baptist	22095	0.023	0.012	0.106	5.907	0.992	0.430	0.109	0.676	1.119
St. Landry	22097	0.078	0.068	0.175	9.490	0.143	0.059	0.390	0.349	1.212
St. Martin	22099	-0.002	-0.001	-0.016	11.244	0.837	0.394	0.080	0.557	0.984
St. Mary	22101	0.046	0.021	0.095	2.253	1.195	0.441	0.222	0.439	1.105
St. Tammany	22103	0.031	0.021	0.163	4.631	0.480	0.206	0.128	0.608	1.194
Tangipahoa	22105	0.037	0.031	0.259	5.880	0.185	0.092	0.121	0.604	1.350
Tensas	22107	0.255	0.209	0.060	10.351	0.221	0.143	3.458	0.530	1.064
Terrebonne	22109	0.002	0.001	0.167	6.979	0.348	0.127	0.008	0.642	1.200
Union	22111	0.089	0.047	0.175	8.925	0.907	0.000	0.266	0.791	1.212
Vermilion	22113	0.002	0.002	0.038	14.925	0.098	0.042	0.051	0.621	1.039
Vernon	22115	0.028	0.026	0.285	10.075	0.066	0.037	0.092	0.594	1.399
Washington	22117	0.062	0.036	0.429	3.380	0.697	0.278	0.085	0.546	1.750
Webster	22119	0.017	0.013	0.023	16.732	0.276	0.157	0.583	0.297	1.024
West Baton Rouge	22121	0.005	0.004	0.026	21.163	0.227	0.077	0.148	0.709	1.026
West Carroll	22123	0.026	0.024	0.107	3.309	0.099	0.000	0.224	0.592	1.120
West Feliciana	22125	0.115	0.107	0.299	6.876	0.075	0.013	0.357	0.794	1.427
Winn	22127	0.173	0.159	0.193	16.831	0.093	0.000	0.822	0.422	1.239

APPENDIX F: PARISH FINANCIAL RATIOS FOR YEAR 2007

Parish Name	FIPS	Return on Equity (Return on Net Assets)	Return on Assets	Profit Margin	Current Ratio	Debt to Equity Ratio	Long-term Liabilities to Total Assets Ratio	Assets Turnover Ratio	Tax Revenues to Total Revenues Ratio	Operating Ratio
Acadia	22001	0.091	0.059	0.196	4.484	0.553	0.205	0.299	0.775	1.243
Allen	22003	0.048	0.044	0.119	7.300	0.111	0.051	0.367	0.633	1.135
Ascension	22005	0.097	0.061	0.279	15.035	0.591	0.330	0.219	0.662	1.387
Assumption	22007	0.113	0.108	0.282	26.722	0.044	0.014	0.383	0.519	1.393
Avoyelles	22009	0.244	0.220	0.132	9.301	0.107	0.000	1.669	0.707	1.152
Beauregard	22011	0.436	0.402	0.178	8.919	0.084	0.049	2.255	0.529	1.217
Bienville	22013	0.716	0.690	0.445	21.138	0.037	0.000	1.549	0.274	1.803
Bossier	22015	0.347	0.279	0.119	9.330	0.243	0.165	2.338	0.631	1.136
Caddo	22017	0.007	0.007	0.215	13.629	0.087	0.053	0.030	0.687	1.274
Calcasieu	22019	0.003	0.003	0.079	32.754	0.061	0.000	0.035	0.538	1.086
Caldwell	22021	0.347	0.339	0.180	19.874	0.025	0.000	1.879	0.504	1.220
Cameron	22023	0.000	0.000	0.013	1.235	0.348	0.088	0.009	0.599	1.014
Catahoula	22025	0.704	0.666	0.326	13.165	0.058	0.000	2.043	0.479	1.484
Claiborne	22027	4.620	4.407	0.213	16.208	0.049	0.000	20.673	0.634	1.271
Concordia	22029	2.166	0.932	0.330	14.278	1.324	0.543	2.823	0.543	1.493
De Soto	22031	0.329	0.255	0.256	8.631	0.289	0.173	0.998	0.569	1.344
East Baton Rouge	22033	0.004	0.003	0.818	8.170	0.534	0.274	0.004	0.073	5.498
East Carroll	22035	1.366	1.236	0.107	33.343	0.105	0.079	11.599	0.338	1.119
East Feliciana	22037	-0.655	-0.491	-0.022	9.005	0.332	0.000	22.802	0.085	0.979
Evangeline	22039	1.161	0.753	0.261	5.776	0.542	0.258	2.883	0.674	1.353
Franklin	22041	0.057	0.055	0.057	16.022	0.026	0.000	0.967	0.670	1.061
Grant	22043	-0.342	-0.272	-0.052	3.284	0.260	0.027	5.272	0.998	0.951
Iberia	22045	0.011	0.010	0.101	8.454	0.075	0.018	0.098	0.415	1.112
Iberville	22047	0.069	0.054	0.308	3.944	0.263	0.132	0.177	0.519	1.445
Jackson	22049	-0.005	-0.004	-0.004	16.455	0.127	0.083	0.916	0.620	0.996
Jefferson	22051	0.038	0.021	0.315	4.325	0.793	0.305	0.068	0.610	1.459
Jefferson Davis	22053	0.442	0.225	0.197	11.029	0.961	0.407	1.140	0.653	1.246
Lafayette	22055	0.096	0.042	0.255	4.453	1.288	0.482	0.164	0.501	1.342
Lafourche	22057	0.156	0.088	0.290	4.907	0.772	0.348	0.304	0.584	1.408
La Salle	22059	0.105	0.094	0.034	16.438	0.112	0.000	2.750	0.571	1.036
Lincoln	22061	-0.011	-0.010	-0.039	22.954	0.110	0.073	0.263	0.628	0.963
Livingston	22063	0.019	0.014	0.201	3.133	0.368	0.235	0.070	0.573	1.252
Madison	22065	0.130	0.103	0.102	2.330	0.265	0.023	1.011	0.507	1.113
Morehouse	22067	0.337	0.266	0.417	10.004	0.268	0.002	0.637	0.631	1.715
Natchitoches	22069	1.378	1.268	0.386	7.513	0.087	0.000	3.285	0.521	1.628
Orleans	22071	10.231	0.406	0.009	3.048	24.182	0.843	43.938	0.648	1.009
Ouachita	22073	0.009	0.008	0.221	14.729	0.056	0.010	0.037	0.591	1.284
Plaquemines	22075	0.001	0.001	0.064	6.491	0.258	0.105	0.014	0.622	1.068
Pointe Coupee	22077	0.071	0.048	0.114	4.197	0.468	0.220	0.422	0.410	1.129
Rapides	22079	0.010	0.009	0.129	6.284	0.134	0.052	0.067	0.814	1.148
Red River	22081	0.716	0.653	0.197	6.550	0.097	0.000	3.307	0.484	1.246
Richland	22083	0.045	0.029	0.054	7.584	0.553	0.107	0.537	0.560	1.057
Sabine	22085	-0.042	-0.041	-0.173	15.579	0.025	0.006	0.238	0.680	0.853
St. Bernard	22087	-0.034	-0.006	-0.131	1.194	4.642	0.041	0.047	0.702	0.884
St. Charles	22089	0.002	0.001	0.063	10.491	0.404	0.155	0.021	0.540	1.067
St. Helena	22091	0.262	0.200	0.327	6.751	0.306	0.167	0.613	0.814	1.486
St. James	22093	0.013	0.011	0.106	10.253	0.235	0.136	0.102	0.349	1.119
St. John the Baptist	22095	0.049	0.025	0.193	3.216	0.977	0.381	0.127	0.710	1.239
St. Landry	22097	0.129	0.114	0.282	8.744	0.131	0.042	0.404	0.392	1.394
St. Martin	22099	-0.006	-0.004	-0.052	11.774	0.677	0.358	0.075	0.599	0.951
St. Mary	22101	0.007	0.005	0.048	3.362	0.289	0.190	0.115	0.379	1.050
St. Tammany	22103	0.042	0.030	0.228	7.883	0.388	0.210	0.133	0.580	1.296
Tangipahoa	22105	0.013	0.012	0.163	5.795	0.089	0.057	0.072	0.570	1.194
Tensas	22107	0.215	0.190	0.058	23.189	0.131	0.098	3.267	0.578	1.062
Terrebonne	22109	0.004	0.003	0.314	7.451	0.353	0.127	0.009	0.473	1.457
Union	22111	0.097	0.051	0.143	10.271	0.922	0.000	0.354	0.725	1.166
Vermilion	22113	-0.007	-0.006	-0.121	16.152	0.120	0.061	0.050	0.557	0.892
Vernon	22115	0.034	0.032	0.298	12.045	0.057	0.032	0.108	0.563	1.424
Washington	22117	0.025	0.015	0.204	3.390	0.643	0.277	0.076	0.667	1.256
Webster	22119	0.018	0.014	0.026	15.051	0.257	0.136	0.538	0.344	1.027
West Baton Rouge	22121	0.007	0.006	0.038	10.769	0.253	0.065	0.155	0.664	1.039
West Carroll	22123	0.007	0.006	0.028	3.847	0.112	0.012	0.218	0.560	1.029
West Feliciana	22125	0.073	0.067	0.220	9.069	0.084	0.003	0.306	0.732	1.282
Winn	22127	0.146	0.135	0.119	15.150	0.080	0.000	1.130	0.394	1.136

VITA

John David Barreca was born in October 1984, in New Orleans, Louisiana. As a child, he spent two years in Russia and seven years in China. In 2002, after finishing his twelfth year of homeschooling, he attended a Chinese language program at Northwest University, Xi'an, China, where he perfected his Chinese language ability. In January 2004, he returned to the United States to begin his college career. He graduated from Louisiana State University and Agricultural and Mechanical College, Baton Rouge, Louisiana, in May 2008, with a Bachelor of Science degree in agricultural business. In June 2008, he entered the master's program in the Department of Agricultural Economics and Agribusiness at Louisiana State University and Agricultural and Mechanical College. He is currently a candidate for the degree of Master of Science in agricultural economics.