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Drinking Water Affordability in Georgia. Are Water Rates Affordable in Georgia and is Infrastructure Investment Influencing Rates?

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Dedication

To my wife, Debby, whose support has known no boundaries and whose friendship has been the one constant in my life for 40 years. You have walked with me through a life-time of personal and professional milestones, continual self-discovery, professional and academic achievement and have never wavered in your support of our family or of my goals. This degree would never have been completed without your support and encouragement and your little motivational speeches. I am forever blessed by your friendship, your loyalty, and your undying dedication to our family.

To My daughter, Dr. Kali Boyle, who encouraged me to pursue this degree. Kali reminded me, through her own personal academic achievements, what perseverance could achieve.

To My son, Hunter Boyle, a free-spirted, thoughtful, creative lad, who continually reminded me to have a little fun along the way.

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Abstract

This research project starts with a review of the literature that addresses the challenges facing public drinking water utilities and the impact these challenges are having on rate affordability. The degree and frequency at which water infrastructure is failing has escalated over the past few decades. These infrastructure failures along with the increased costs of operating a water utility have put enormous upward pressures on water rates charged by utilities for service.

In the state of Georgia, a large percentage of the population is living at or below the federal poverty level and many of the poorest are minorities. Increasing water rates puts more and more economic pressure on these already marginalized groups who are least equipped to afford higher rates.

The first research question examined if water rates were currently affordable in the State of Georgia. The hypothesis was that rates would be found to be unaffordable for much of the population of Georgia. The hypothesis was not supported. The analysis revealed that while rates were escalating in Georgia, they were still affordable for most of the population.

A second research question examined if infrastructure investment was having an effect on water rates increasing in Georgia Counties'. This hypothesis was only partially supported by the data. While some county water rates were clearly escalating, there was no clear indication that it was being driven exclusively by infrastructure spending.

Table of Contents

List of Tables

Chapter One: Introduction

Overview

The great COVID-19 pandemic of 2020 and 2021 has once again helped bring the topic of water rate affordability back into the public consciousness in the United States. In February 2020, public health officials began recommending that to create a barrier of defense against COVID-19, citizens must have access to clean running water to combat the disease (Aker, 2020).

Many communities in the United States did not anticipate the impact that this recommendation would have on the hundreds of thousands of people in the United States that had no running water due to affordability challenges. Water affordability issues in the United States are not a new subject area of concern. Over the past decade, water rates have been steadily increasing in many communities. In 2014, thousands of customers in Detroit and Flint Michigan had their services disconnected due to non-payment of their water bills (Bliss, 2016). This event indicated that there may be an affordability challenge for the community residents long before COVID-19 was a part of our collective consciousness. Non-payment water disconnects were more often thought of as an individual consumer issue and not a community issue (Lindwall, 2020). However, now the thought of widespread public health concerns stemming from non-payment disconnects has put the issue of water rate affordability on the front page of many news reports due to this pandemic. The shut-offs in Michigan reached an extreme level of notoriety due to the number of families affected and the demographics of those affected by the shut-offs (Walton, 2021). In Detroit alone, more than 50,000 households had their water service turned off between 2014 and 2018 because these citizens could not pay their

water bills. Even in Flint, a city in crisis from lead poisoning, during 2018, 8,000 people were having their water service terminated due to their inability to pay (Frostenson, 2018).

In a first of its kind study in 2016, Food and Water Watch conducted research that surveyed the two largest water systems in each state and found an astonishing fifteen million U.S. residents had their water shut off during 2016 for non-payment. These shutoffs included delinquency of their monthly water bills or for past due balances that were outstanding. The study conducted by Food and Water Watch also noted that the geographic location of the utility often played into how aggressive a utility acted with non-pay action against a customer. This study indicated that among the thousands of decentralized water systems in the United States, disconnect decisions where often similar to other utilities in the same geographic region of the country. In other words, many water systems behaved similarly with non-payment action depending on the region of the country they were located. Food and Water Watch research indicated that there was a slight regional patterning of similarity for business action in delinquent accounts among some utilities depending on the geographic location of the utility. The study found that utilities located in the southern United States tended to act more swiftly with disconnecting customers for non-payment. Utilities in the northeast regions of the country acted much more slowly as a group, to issue a disconnect work order for a non-pay customer. While the study did not find perfect correlation between the regional utilities, Food and Water Watch found enough data to suggest further research would be beneficial to determine if there may be a possible influencing relationship.

There was limited research literature found that would help explain this regional patterned response to how utilities handled non-pay disconnects prior to the pandemic. Owing to the lack of research literature on the topic, the cause of the differences may be influenced by

several variables. The differences may be due to political positions that exist between regional areas such as the northeast and southern areas of the country. Regional water commissions may also be playing a part in the differences (Shaver, 2021). Another variable may be the more extreme seasonal weather patterns that exist in the northeast. Weather may be an influencer in preferences by utilities on how they address non-pay disconnects with customers, at least during certain times of the year. The regional influence by powerful regional commissions, which often regulate investor owned water utilities, may also play a pivotal role. The states with the highest cutoff rates due to non-payment are located in the southern states (Rakestraw, 2018). It is clear however that since February 2020, due to the pandemic, and in response to a real concern for maintaining affordability for customers, disconnect activity among many water utilities has decreased amid political pressures. In many areas, disconnects have been eliminated altogether during the pandemic. The focus on equitability and access to water services has increased significantly. The reporting on Flint Michigan is a reminder that access to clean, safe, water is a basic human right, (Lindwall, 2020).

In Albany Georgia, an area of extreme poverty in the state of Georgia, where forty percent of the residents live below the federal poverty level and 43.6 percent of the population live in neighborhoods where four out of ten residents live in poverty, (Center Square, 2019), elected officials placed a moratorium on water disconnections. A strategy put in place by many water utilities during 2020, to address affordability issues, Albany has curtailed water shutoffs due to an inability to pay. These moratoriums on shutoffs are temporary and even though communities are learning to deal with pandemic living, water systems are still facing the dauting task of keeping water affordable. Major leak repairs, line replacement and ongoing maintenance needs that are continuing to make water less and less affordable for millions of Americans

continue to challenge the industry (Berahzer, 2020). To address affordability challenges for customers involving drinking water, this political posturing is playing out all over the country. A report by the Congressional Research Service noted in a detailed review in June 2020 that most state, county, and city electric utilities were under political directives or increasing pressure by state government for discontinuing, until given further notice, any electric disconnections due to a customer's ability to pay. Campbell reminds us that utilities providing water services are as important as electric utilities and water is considered to be critical for survival and quality of life, (Campbell, 2020).

Research on the impact to urban areas also provided comparisons for impact on lower-income urban areas that had higher rates of unemployment and poverty. The impact tended to affect minorities at a far greater level than non-minority customers (Food and Water Watch, 2016).

In Albany Georgia, for example, Black citizens comprise nearly 75% of the population and a report by Forbes ranked Albany as the fourth most impoverished city in the nation (Team WALBN, 2014). If rising water rates in a city like Albany are having a disproportionate impact on the poor and minority residents, understanding this reality may help to ameliorate future economic hardships and help with the development of programs to assist with affordability. Limiting access to affordable drinking water in the United States is a public health issue in normal, non-pandemic times, but during a pandemic, the risk to community health is even greater (Goger, 2020).

The access to affordable water for low income minorities as well as millions of low-income elder adults who lack access to healthy food and adequate daily nutritional requirements is equally important. The lack of access and affordability puts individual personal health as well

as overall community health in serious jeopardy. Goger notes in her advocation for low-income seniors that "although social distancing is necessary to help limit the spread of the virus, anything that deters people from accessing group meals at senior centers or food banks puts low-income seniors in danger of malnutrition and hunger" and this eventuality includes access to affordable drinking water (Goger, 2020). While drinking water affordability has been of some concern in certain areas of the United States for years, the current situation centering around the pandemic, has increased awareness by the public of additional risks to health and community stability. When citizens lose access to clean, affordable water, especially due to affordability concerns, it impacts the health of the entire community. When this impact affects the most disenfranchised and underserved groups of the population, it is even more worrisome.

Aging Infrastructure

Much of the infrastructure that moves water to millions of households in the United States, every day, has reached the end of its useful life. Infrastructure that may now be well over a hundred years old in many communities in the United States, is also many decades past its useful life. This issue is putting pressure on water utilities to raise water rates much faster than the rate of inflation to pay for these repairs (Policylink, 2020). Water infrastructure is in dire need of rehabilitation or replacement and the repair and replacement costs are factored into rates and paid for by the rate payer. Nearly a decade ago, the U.S. Government Accountability Office warned of supply concerns related to freshwater availability, which included costs of infrastructure replacement that may lead to an increase in affordability pressures for millions of Americans (US Government Accountability Office, 2014). In another study conducted by the American Society of Civil Engineers, American drinking water infrastructure received a D+ grade due to the number of water main breaks and failures occurring daily across the United

States, (Holly, 2014). This same study noted that grading for bridges was better than the grading for drinking water infrastructure. However, bridge disrepair was getting more of the press headlines. The public was more aware of the challenges facing civil engineering projects related to bridges than they were about drinking water systems.

One of the costs to water rate payers in the United States is measured in the number of main breaks and gallons of water wasted annually due to these types of breaks. In 2019, the American Society of Civil Engineers, (ASCE), estimated, based on input from water utilities, that there were nearly two hundred fifty thousand main breaks in US systems that led to over two trillion gallons of treated water to leak out every year. The American Society of Civil Engineers also put an estimate on repair costs associated with fixing, repairing, and replacing this aged and failing infrastructure. The estimate, supported by the American Water Works Association, (American Water Works Association, 2019) estimated to be more than $1,000,000,000,000 (one – trillion) dollars over the next twenty five years. These estimates of cost to repair and replace will significantly add to the affordability crisis facing many Americans. Water affordability will affect more and more Americans in the future (American Society of Civil Engineers, 2011). Many of these citizens will be members of minority groups, the elderly, the poor, and the working poor.

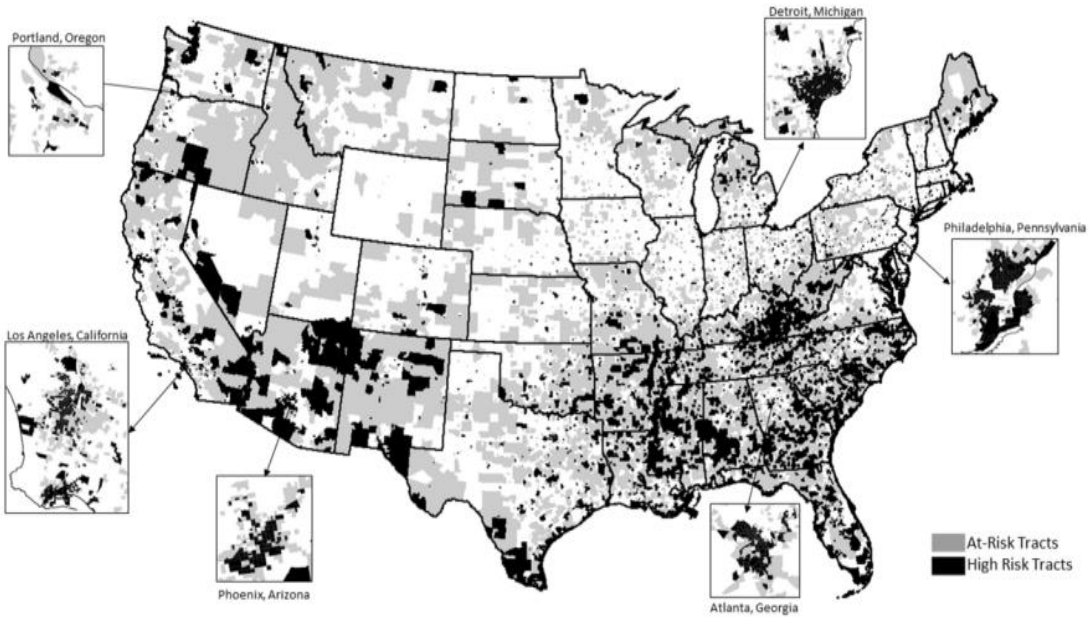
Water rate affordability has been and will continue to affect millions of citizens as water rates continue to rise much faster than the annual rate of inflation. Many water systems will continue to raise annual consumer rates that are many times the annual inflation rate. In many cases these rate adjustments will not be equitable due to different local governance policies (Walton, 2021). Many utilities may need to increase rates to continue to generate the revenues required to pay for capital infrastructure that has deteriorated over many decades.

Water rate affordability is a national issue and has become a threat to human rights especially for poor Americans (Taylor, 2013). This issue has helped turn water rate discussions into a national crisis discussion. This discussion is focused on citizens that are disproportionally impacted and already living in poverty. Discussions are focused on minorities and the poor who are affected at a much higher rate than whites and those living above the poverty level. The crisis has escalated to the point that the volume of homes losing water service due to missed bill payments is now a relevant public policy issue, (Walton, 2019).

This research paper has arisen from a personal desire by the researcher to understand if there is a negative impact to residents in the State of Georgia created by water rate increases. Additionally, is there a diminishing line of affordability for drinking water, based on capital infrastructure spending by a community, and is it impacting Georgia residents.

State of Georgia as the Area of Research Focus

The following map is a view of the areas of the country that are at High-Risk and At-Risk of losing affordable drinking water. The risk is at its highest in areas that have historically had high minority populations, suffered high unemployment, have a lower economic standing or are low on the political power end of community politics. The area of the deep south, commonly referred to as the black belt, where there is a high population of African Americans with low economic standing and a long history of unequal civil rights, is of concern. Recent studies focused on black communities in several major cities confirmed that there was a clear connection between racial residential segregation practices, and the access to affordable water that blacks had to public water (Montag, 2019). In Arizona, New Mexico, and Nevada where a large population of Latino and Native Americans live, are other high risk areas. These groups also have a long history of having their civil rights trampled (Mack, 2017).



Map provided by Drinking Water Alliance

The State of Georgia ranks fourth in the total number of black residents nationally, only slightly less than Texas, Florida, and New York. These three states have more than double the total population of Georgia so proportionally Georgia's black population is larger. Georgia also ranks 3rd out of fifty states in percentage of total population who are black, behind only Mississippi and Louisiana. Georgia's Population ranks in the top ten out of fifty states that have the highest percentage of residents living in poverty. In 2019 the City of Atlanta ranked as the fourth fastest growing city in the United States (Sams, 2020). Much of Georgia's geography is comprised of small to medium sized rural towns and counties with modest growth rates (Bureau US, 2019). The State ranks number two in the number of individual home-rule counties, 159, second only to the state of Texas. The State of Georgia is the research area for this paper and for furthering an understanding of the impact of water rate increases. The impact that capital investment on infrastructure may be having on water rates and on a large state population with

diverse economic and ethnic demographics is discussed throughout this paper. The goal of this study is to determine if infrastructure investment is impacting rising water rates and if rates are affecting water affordability on county populations. The research interest in the State of Georgia is influenced by the reporting and research that suggests that water rates are rising much faster than inflation in many communities around the country. How those rising rates are influenced by infrastructure investment by individual counties in the state of Georgia, as well as the ability of utilities to finance capital investment may help further planning for the future (US Water Alliance, 2017). The interest by this researcher is based on previous research of the impact to human rights challenges, impact to disenfranchised population groups and public health overall (Amadeo, 2021). The researcher also lives and works in Georgia, so the impact of water rate increases is of personal and professional interest.

Definitions and Terms

The terms, definitions and acronyms used in this research paper are widely used in the water utility industry and have been defined for the reader in this section.

ASCE: American Society of Civil Engineers – a professional body founded in 1852 to represent civil engineers worldwide.

AWWA: American Water Works Association – an international non-profit, scientific and educational association founded to improve water quality and supply; founded in 1881 and currently with 50,000 members.

Capital Investment: Spending by local Georgia county governments on infrastructure within a county. Depreciable assets that exclude capital work in process and land investment.

Consumer Price Index (CPI): The consumer price index is a measure of inflation, a measurement of the average change in price over a period that US consumers pay for goods and services.

EPA: The Environmental Protection Agency of the United States Federal Government. The agency tasked with monitoring and holding water utilities accountable for following federal regulations regarding the clean water act and other federal regulations regarding the natural environment of the United States including waters of the United States.

EPD: The Environmental Protection Department of the State of Georgia. A state agency with similar regulatory oversight as the EPA but limited to state enforcement and oversight for many environmental regulations related to the Federal Clean Water Act of 1972.

GAWP: Georgia Association of Water Professionals – Georgia State Association comprised of hundreds of Georgia water professionals and member utilities primarily, but not limited to, the geographic region of Georgia.

Infrastructure: Means of drinking water production including treatment plants, reservoirs, elevated and ground tanks, and distribution pipes and infrastructure.

NACWA: National Association of Clean Water Agencies – a national association of publicly owned utilities that act in the interests of member utilities and the public.

Net Position: In governmental accounting represents the difference between assets of the government and liabilities of the government.

Rate Payer: a customer of a water utility that pays for water services based on a fixed and/or variable rate per gallon of water.

Research Question and Hypothesis

This research project investigated and is aimed at answering the following two research questions. The hypothesis that proposes the explanation for each research question follows the research question.

Research Question #1: Are Water Rates in the State of Georgia currently considered affordable?

Hypothesis: Water Utility Rates in the State of Georgia are currently not affordable.

Research Question #2: Are Water Utility Rates being affected by the amount of Capital Infrastructure Investment made by Local County Governments?

Hypothesis: The more capital spending done by a local County Government in Georgia will influence how fast water rates increase within that specific County.

Research Paper Layout

The pages that follow this introductory section will start with a comprehensive review and analysis of literature that addresses the water affordability challenges facing a growing number of consumers in the United States. The review will include a literature discussion on water affordability and causes of water affordability challenges that are facing consumers of public drinking water utilities. Included in this discussion will be a review of the impact from COVID-19 and heightened awareness of affordability attributed to the pandemic. While the researcher hopes that the pandemic is an event of a finite time duration, the pandemic cannot be ignored in this research because of the impact it has had on public awareness regarding water affordability. The literature review provided an opportunity for the researcher to utilize national scholarly literature to guide the analysis of water affordability within the State of Georgia.

The Data & Methods section follows the literature review and provides the reader with quantitative analysis of data that was used for the research and reasoning for decisions the researcher reached regarding the data collected.

Expected Results

The literature review is expected to support findings that are consistent with the hypothesis for both research questions. This includes determining that water rates in the State of Georgia are currently unaffordable. Secondly, it is expected that infrastructure investment by county governments is an influencing factor on how fast county water rates are increasing. Results are also expected to be mixed and possibly even inconclusive at the individual county level due to differences in county demographics. These anticipated county level rate differences may require more extensive research that is beyond the scope of this paper.

Chapter Two: Literature Review

Introduction

There has been a great deal of research work and study conducted over the past ten to fifteen years on drinking water rate affordability in the United States. Water rate affordability challenges in the United States has been an ongoing topic of discussion for over a decade in water industry professional groups and organizations. These industry professional associations, along with both state and federal regulatory agencies, have tried to raise awareness within the utility industry, as well as outside of the industry for years. Awareness has increased over the past ten years that affordability concerns will continue to increase in severity for millions of Americans over the coming decades.

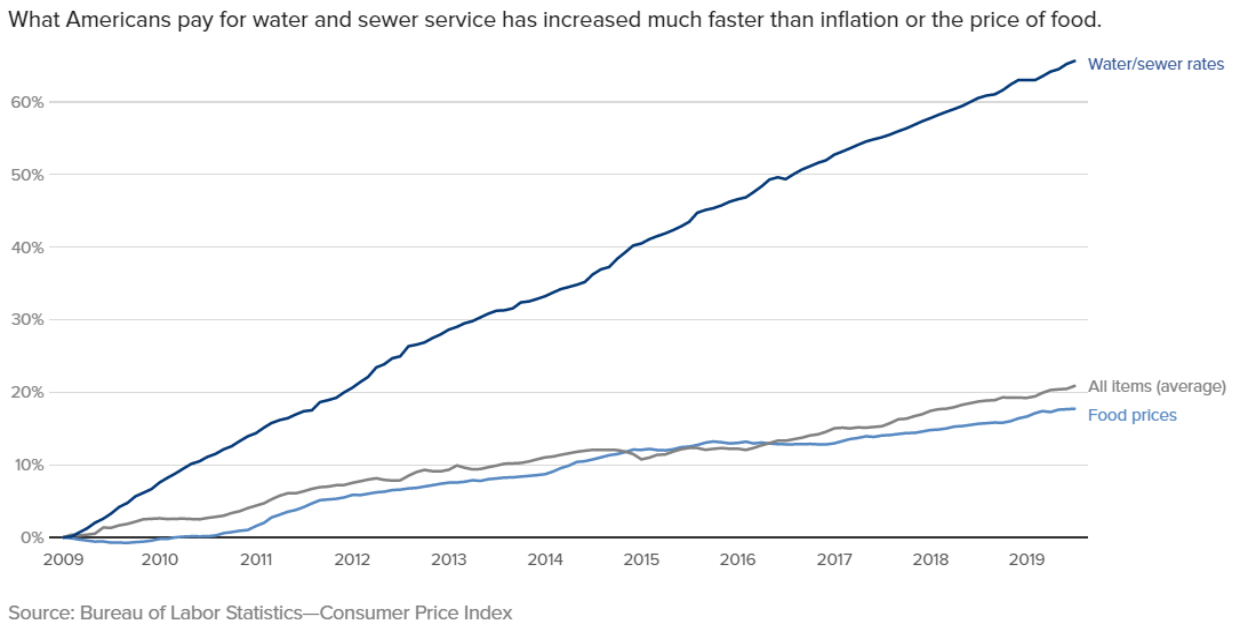
Organizations such as the American Water Works Association, a member organization comprised of thousands of water utilities across the United States, has studied, researched, and written about the concerns of water rate increases especially on the more economically vulnerable segments of our society. The National Association of Clean Water Agencies co-published a report in 2019 titled, Developing a New Framework for Household Affordability (Raucher, 2019), that addressed water affordability challenges facing an ever increasing number of water customers. State organizations such as the Georgia Association of Water Professionals have held annual educational conferences on rising water rates in the state of Georgia and the impacts those rate adjustments may have on utility customers. The Georgia Environmental Finance Authority provides funding for annual rate studies through the University of North Carolina Environmental Finance Center. These organizations have offered recommendations to member utilities on how to confront the challenges faced by many of their customers. Federal and state regulatory agencies such as the Environmental Protection Agency and the

Environmental Protection Department in specific states, such as Georgia, have produced guidance on what affordability factors to focus on for a typical consumer when addressing water affordability.

Analysis of US city after US city shows that millions of Americans cannot afford basic water services due to large rate increases in cost over the past decade, (Lakhani, 2020). Financial implications for many public water systems mean annual rate increases will be required that are often at a percentage much higher than the annual inflationary level. These rate increases will continue to negatively affect more and more residents of cities and towns throughout the United States. In a report released in 2019 by CBS News (Layne, 2019), the study noted that the average water bill in a sampling of fifty cities across the United Stated jumped some 3.6% in a single year. This research also pointed out that this response was the eighth year in a row of higher than annual inflationary increases for both water and sewer bills for many consumers. Over this eight year span of time, a typical water bill had increased over 31% (US Municipal Water, 2019) as reported by Bluefield Research. The national inflation rate during this same period was 13.37% (US Bureau of Labor Statistics, 2020). This issue means that typical water rates had increased more than 125% over the level of inflation between 2012 and 2020 in the geographic areas included in the study. To make matters even worse, for a consumer dependent on public water services, water rates had increased even faster than overall wage rates during this same period. Bluefield research also reported that on an annual basis, water bills increased at a steady pace of 5.7% between 2015 and 2019. The annual inflation rate over this same period was 1.9%. Water rates had increased an incredible 200% over actual inflationary rates for all goods and services reported under the consumer price index for all urban consumers during this period (United States Inflation Rate, 2021). The outpacing of increases

in water rates, vis-a-vis inflationary levels, are very troublesome for service providers who deliver water that people need to conduct everyday life. Water may be the most important service for maintaining and improving community health. Water is also a staple of everyday life that is a requirement for economic growth and quality of life improvements in any given community. Water rates not only outpaced inflation but also significantly outpaced the annual average income growth of 5% experienced over this same period (US Municipal Water, 2019).

These economic indicators reflect the reality that water pricing is accounting for more and more of a consumers' monthly spending than ever before and putting more and more families at financial risk. When taking average annual wage adjustments into consideration, water is taking more and more of a wage earners' income year after year. The impact is occurring in places as diverse from each other as Flint Michigan and Albany Georgia. The number of poor residents and changing centers of population is driving concerns in both large and small communities. The affordability crisis has exposed a greater number of citizens over a greater geographic area in the past decade. In Martin County Kentucky, an area considered part of the Appalachian foothills' community, citizens were exposed for years to unsafe contaminants in their water. Incompetent public administrators that were running the water system made matters worse. In the words of the Appalachian Citizen Law Center, the water system has run in a constant state of emergency and reactive operations for years (Cromer, 2018). The following graph from the Bureau of Labor Statistics reflects the impact that water rate increases have had on the American consumer vis-a-vis all items accounted for in the consumer price index (CPI), over the past ten years.



There seems to be little disagreement among researchers that the topic of drinking water affordability and rate increases is becoming more and more of a concern for many Americans. In communities where public water systems are challenged by unsafe or aging infrastructure as well as regulatory compliance concerns, water replacement costs also add to the overall cost of water for residents (Christian-Smith, 2013). While water replacement costs are not part of this research it is important to note that they do add additional costs to many household budgets. Water replacement can be considered those costs that increase due to the lack of clean or trusted public water sources. The need to purchase bottled water is a prime example of costs that are added to a family budget that may not otherwise be considered necessary if public water could be trusted. This variable is not considered in this overall research but in many communities' water replacement costs may be adding significant costs to family budgets. Much of the research on the topic of water affordability, or more accurately the increase in water unaffordability, is centered on national data or sampling of specific regions or clusters of states. In one study, rates, and affordability challenges for twelve diverse cities were studied. The study found that between

2010 and 2018 prices in these cities jumped on average by 80% (Guardian, 2020). This study noted that due to these large average increases in rates, it left a large subset of residents in these communities with water bills that were no longer considered affordable. In one community included in the study, the percentage of residents left with affordability challenges represented more than 40% of the overall community population. The ability of water utilities to keep rates at or below the Environmental Protection Agency guideline of 4.5% of household income, continues to be a huge challenge. The EPA affordability index, for combined water and sewer services in the United States for residential customers, has been strained more and more due to incorrect water pricing, infrastructure failures and lack of financing sources (Mack, 2017).

The idea of water rate affordability for household economics depends on each households' economic standing in their community. Affordability for one family may mean going with less of some other good or service to ensure that water bills are paid and the household has access to water. Affordability for another family may mean that paying a water bill on time is no longer an option if other necessities such as food and electricity are to be paid on time. Water utilities are facing a perfect storm across the United States when it comes to paying for infrastructure, governmental regulations, skilled workers, and technology without monumental rate increases that make water unaffordable (Environmental Protection Agency, 2016).

The challenges facing public water utilities in the United States include water scarcity, water infrastructure that is failing at an alarming rate, climate change that is impacting potable water sources, conservation efforts, unfunded mandates and maintaining affordable access to water. These areas must all be addressed while planning decades in advance for the financing sources that must be available to stay ahead of the challenges (American Water Works, 2019).

Public water systems must act in the interest of public health and maintain safe and reliable water systems. Utilities should also be striving to deliver safe water while delivering it affordably to all consumers. Water affordability challenges for low-income households did not materialize overnight, the challenges are longstanding (Bipartisan Policy Center, 2017). Affordability challenges have become such a concern that in 2018, a bipartisan sponsored bill, The Low Income Water Customer Assistance Programs Act, was introduced into Congress (Bipartisan Policy Center, 2017). Low income homes spend a disproportionately larger share of their household income on utilities, including electric, heating, and water. These customers are the least able to absorb additional rate increases (Frankhauser, 2007).

What Constitutes Affordable Water

To be meaningful, affordability of water rates versus the non-affordability of rates must be quantified in terms of a percentage of total household income. While this paper specifically speaks to water rate affordability, it is important to note that in most communities throughout the United States, drinking water service and demand by the consumer, also influences the sanitary sewer services that are priced and billed to the same consumer. It is important to note that households that are supplied with water from public water systems are not always supplied with public sewer, especially if those residents live in more rural areas where sanitary sewer infrastructure is not in place and septic systems are more the norm. While the focus of this paper is on water rate affordability factors, rate affordability is often stated in terms of a combination of both water and sewer rates.

The Environmental Protection Agency has recommended that no more than 4.5% of household income should go toward paying for the combined monthly or annual billings for water and sewer (Mack, 2017). The American Water Works Association cites individual

percentages of no more than 2% for water and 2% for sewer as an annual percentage of household income spending (American Water Works, 2019). Both the Environmental Protection Agency and the American Water Works Association report that when water billing increases above these recommended levels as a percentage of total household income, the rates are producing economically unaffordable annual billings for many residential customers. Further rate escalations may not be sustainable for many of these residents. When water affordability is not sustainable, consumers often are faced with economic decisions that may affect their quality of life as well as their health. The loss of water service in an industrialized country like the United States, due to an inability to pay, has both societal and economic implications for the future.

An annual rate study conducted by the University of North Carolina Environmental Finance Center in 2019 on behalf of the Georgia Environmental Finance Authority (UNC Environmental, 2019), studied data from four hundred and sixty-eight water and sewer utility respondents in the state of Georgia. The utilities in the study accounted for water services provided to over 97% of the population of Georgia who were supplied by public water systems. Three hundred and forty-one water utilities that represent 72.8% of the surveyed population were utilities that supplied both water and sewer services to their customers. Twenty-Six percent of the survey respondents provided only water services. This study reviewed the water rate structures, rates, and affordability factors for residents in the State of Georgia. One of the focus areas of these types of surveys in Georgia is to gage the timing, and the magnitude of water rate increases on populations served.

Current State of Affairs – COVID-19

The subject of water rate affordability for Americans and more specifically for the residents of the State of Georgia, cannot be discussed without mentioning the current situation brought about due to the COVID-19 pandemic. The pandemic has and will continue to impact both water rates and utility finances, which may last years and has affected future planning. While water rate affordability has been a topic of water industry focus for a number of years, the pandemic of 2020 and 2021 has raised awareness posed by these challenges to an ever greater level of visibility, both inside and outside of the water utility industry.

The COVID-19 pandemic has raised awareness of water rate challenges and affordability on two fronts. First from the perspective of the water utility, water revenues may be significantly impacted for a prolonged period due to the pandemic. The water utility industry is forecast to lose more than twenty-seven billion dollars in revenue due to the COVID-19 pandemic (Raftelis, 2020). Many water utilities are not prepared nor are they in a financial position to take revenue loses of this magnitude without serious implications to their business model. This includes capital project planning, timing of infrastructure replacement, and the potential for future rate adjustments. According to a recent article in Water Environmental Engineering, reprioritization of budget needs by water utilities may impact operating budgets for years to come. This issue was unforeseeable and unplanned less than a year ago, prior to COVID-19 impacting operations.

The impact that COVID-19 is having on water utility planning, which includes setting water rates that will pay for infrastructure, maintenance, operations, and debt service, is forcing water utility management to restructure operating budgets to accommodate this new operating reality. This reshuffling of operating needs is occurring while many utilities are trying to implement remote management options and implement safety practices that will keep these

essential front line water workers safe. COVID-19 has added another item for water professionals to have to balance in the pursuit of delivering clean water.

The pandemic is a reality that the water utility industry must manage through as the industry struggles with maintaining affordable rates for customers. According to the National League of Cities, (Anthony, 2020), a June 2020 survey found that more than 700 of 1,100 Cities across the United States have put plans on hold to upgrade water systems and other critical infrastructure. This change is due entirely to the operating environment the utility is faced with during this pandemic. A deferment of capital projects to replace and rehabilitate aging infrastructure may increase the costs of completing the projects later and may put additional financial pressures on rates. Ultimately the citizens who depend on affordable rates for their water service will shoulder the economic burden. In many cases, these deferments include discretionary projects as well as projects that have been governmentally mandated. Mandates due to consent decrees and legal action to address water system failures that have affected the environment may be putting public health at risk. The impact that federal mandates alone were having on water pricing before the outbreak were magnified over the past year. In fact, unfunded mandates have become such a challenge for water utilities nationwide that the United States Conference of Mayors, and the American Water Works Association conducted an in-depth study on the subject as early as 2013 (US Conference of Mayors, 2013).

The impact that COVID-19 has had or will have on water utility finances and community customers will depend on the economics and demographics of the community in which the utility operates. Collectively however, we see that water utilities are facing additional economic constraints brought on by the pandemic. This is according to the literature. The literature also suggests that these additional financial constraints will alter how a water utility may need to

address budgetary constraints over the next several years thereby impacting rate affordability for their customers.

In the State of Georgia water utilities are facing new political mandates for how they address late payments from customers, utility turn-off justification and rate adjustments due to the pandemic. In June 2020, Southface Institute reported that sixty different organizations from across the state of Georgia petitioned Georgia Governor Brian Kemp to intervene and mandate, by taking immediate political action, to ensure that essential utility services, including water, remain uninterrupted during the pandemic (Southface, 2020). Uninterrupted service to all customers regardless of an ability to pay for the service was at the forefront of many discussions around maintaining community health as it related to the pandemic. While this request was made to elicit an executive action that would compel utilities, both regulated and unregulated, to comply and maintain uninterrupted services, it brought to life the impact water and electric disconnects were having on a great many Georgians who were struggling economically. In the face of a pandemic affecting Georgia citizens, going without water posed enormous community health risks. The personal risks to those members of the Georgian society unable to pay for their water services was also being magnified. Many water utilities in the State of Georgia have volunteered to suspend non-pay disconnects, curtail late fees, and reconnect fees. These self-imposed actions by water utilities have been almost all voluntary, and well received by many. However, not all water utilities in Georgia have participated throughout 2020 and 2021. Voluntary actions by water utility Boards and water utility management in Georgia are unenforceable by the state and subject to change (Southface, 2020).

While customers are faced with affordability concerns, water utilities are faced with financial challenges from a drop in cash flow, an increasing level of bad debt, decreasing

revenues from loss of commercial business and residential use that may not be offsetting lost commercial revenues. The utility is also expected to cover fixed costs that represent 80% - 90% of a water utility operating budget (Beecher, 2017). The pandemic requires that water utilities participate in ensuring that essential services are maintained to all members of a community so that the community complies with directives and recommendations from the health community. Recommendations that people stay home when sick, engage in frequent hand washing, maintaining services for those required to work from home, for remote schooling and to help monitor the condition of members of society who are the most vulnerable during the pandemic, requires water as an essential service.

The pandemic has raised awareness nationally and more specifically for the State of Georgia, on the impact of not maintaining affordable water for an ever increasing number of customers. In Columbus Georgia, the State's third most populated city, home to almost 200,000 residents, Columbus Water Works has postponed a 3.75% annual rate increase in water rates during 2021 (Associated Press, 2020). The utility specifically noted that in the districts that the utility serves, there are still a lot of people struggling financially. The proposed increase represented $1.29 per month in additional costs for the typical customer so even modest dollar increases were shown to have economically devastating impacts to some large segments of the population in Columbus Georgia. This utility cited a need to generate additional revenues to pay for aging infrastructure as the reason for a large year over year rate increase to its customers.

In Atlanta Georgia, a city of 500,000 residents where 52% of the population is black and 22% of the population live in poverty, water rates are the highest in the nation (Mack, 2017). The cause of high water bills in the City of Atlanta is a result of several issues including a failed privatization of the water utility, failure to invest in infrastructure, and population changes that

have occurred over the past decade. The reality that is facing all residents of Atlanta is that a typical monthly water charge for a family living in Atlanta may be as high as $325.52 per month (Mack, 2017). A city like Atlanta that is home to both a high percentage of black residents as well as a significant percentage of poor residents has seen water rates take a disproportionately high percentage of low wage earner income. In a city where monthly water rates may be over 7% of the median household income of $53,805, the reality is that water rates are neither affordable nor sustainable for 22% or more of the population of Atlanta. These additional challenges for local water systems are occurring at the same time that the current administration in Washington has cut back fiscal year 2021 budget spending for water system upgrades, infrastructure repairs and environmental issues that directly impact a water systems ability to price water more affordability for consumers (Grinberg, 2020).

Public Administrative Leadership in Public Water

The importance that safe, reliable drinking water plays in all aspects of American life and the role that the public administrator plays in making sure that water systems function and run efficiently and effectively for the people that they serve are intertwined. In the United States there are both private and publicly owned and managed water systems. Although there are some immaterial differences in exact population counts that are served by public water systems (Kopaskie, 2016), much of the population of the United States, some 88%-92% are served by publicly owned and operated water utilities. In the state of Georgia, those statistics are comparable in the overall percentage of total population served by public systems in the 90%+ range (Environmental Protection Agency, 2016). Hence, public administration and public administrators directly affect 88%-92% of the United States population in how they manage and plan water rate affordability decisions. Water system infrastructure is expensive to maintain, to

replace and to rehabilitate. In most communities where public administration is responsible for operating the water system, the water utility operates as a public monopoly. In the State of Georgia, most public water monopolies are governed and regulated by elected and appointed Governance Boards. These Boards are tasked with hiring competent administrators to run the day to day operations of the utility. Public administrators are not only tasked with running the day to day operations of the utility but they are accountable for ensuring that these public systems are following all mandates issued by state and federal agencies including the Environmental Protection Agency and the Environmental Protection Department at the state level.

The role that public administration and public administrators play in the public utility sector in Georgia requires that utilities maintain a high degree of transparency and accountability to the public that they serve. According to Stein (2019), accountability and transparency are two crucial aspects of government oversight. These attributes are extremely important to follow when a public service, like water, that affects personal and public health is being managed for the citizens that are served. These characteristics of public administrative leadership in the water sector in Georgia help to ensure that the public is kept well informed and that water utility leadership maintains a high degree of transparency and acts ethically. Transparency means that citizens should know the truth about public issues, in this case public water issues, and it is the role of the administrator to help ensure that leadership is transparent. This idea includes transparency about not only water safety and regulatory issues but how water rate structures are calculated, how revenues are used for operating costs and capital spending and how rates may affect utility customers financially (Stein, 2019).

Water rate structures should be communicated effectively by utility leadership and easy to understand by water utility customers. If rate structures are not easily understood by the public, then transparency, in its purest form has failed the public, (Shay, 2018). Water utilities that simply provide rate tables and rate structures to the public in complex mathematical equations or hard to understand jargon, that is not easily understood by the average consumer, has failed to provide good public administrative leadership. Information that is not clear and concise, is not providing the transparent public service or best practices that are expected of public administrators (Shay, 2018). Communicating an understanding of how and why water is valued, is important to understanding the affordability challenges that may exist in a community. In a time when water rate affordability is being challenged more and more by the public and where affordability is affecting more and more Americans, the role of the public administrator to provide transparent reporting to customers is more important than ever before.

Factors Affecting Affordability

The number of federal and state unfunded mandates required of public water utilities has contributed to the affordability crisis facing many parts of the United States. Environmental Protection Agency reporting by local water utilities required to present annual clean water reports, production treatment reports and discharge reporting to the public are intended to be transparent. These environmental reports ensure that the local utilities are accountable to the public they serve as well as to other organizations that act as watch-dogs for the public. These watch dog agencies include the media and local River Keepers (Altamaha River Keeper, 2019). But like most unfunded mandates, these requirements come with a financial cost that is shouldered by the rate paying public (US Conference of Mayors, 2013).

Public water utilities have for years, lacked consistency across the decentralized water utility sector on how utilities report all forms of financial and informational disclosures. Reporting may include operational metrics, capital planning, forecasts and best practices and may differ greatly from one utility to the next. In the state of Georgia, a state that has over 1,700 community water utilities serving over 9.5 million people (Environmental Working Group, 2017), there is a lack of consistency of information sharing of costs associated with capital investments. There is also a lack of consistency with how mandates are accounted for in budgeting, conservation restrictions, contaminant mitigation and operations that lead to water rates in a given water utility. In the University of North Carolina's Environmental Finance Departments 2019, (UNC Environmental Finance Center, 2019), Georgia water utility rate study, the rate tables of nearly 500 water utilities were analyzed. While the types of rate structures chosen by a utility in Georgia are consistent, the rates set by a utility were often dependent on the communities they served. In Georgia, the water rates were as diverse across the state as the number of counties, towns and city populations that exist.

In a research paper prepared for Brookings on Comparable Financial metrics in water, (Kane, 2016), this lack of consistency and best practices makes it challenging for cities and counties to benchmark their financial and economic standing against other markets. Public water systems, according to Kane (2016), may also classify budgets differently and be impacted differently by the often changing mix of public regulatory functions, environmental oversight, and customer demands. Many of these demands are county or city specific.

In any given region of the State of Georgia, there may be dozens of unique, independent public water utilities that make the collection of similar metrics and timely analysis of data in which to build a case for long range planning, difficult, if not impossible to achieve. In addition

to the fractured structure of water systems leading to difficulty in collecting and analyzing quantitative data, the collection of qualitative data may be just as difficult to collect and analyze. The Brookings report by Kane (2016) addresses the difficulty with qualifying factors in the water utility industry because of both the decentralized structures, and the varying differences in culture by individual utilities. This inability to collect, compare and analyze data often leads to uncertainty and an uneven investment picture for water infrastructure investment, which in turn leads to misapplied rates and rate structures. If misapplied rate structures for a given utility is too low for too long a period, the results can be devastating to the public that the utility serves in terms of affordability.

A Natural Resource That Has Been Mis-Priced

The rates charged by public water utilities up until the past few decades were for the most part considered affordable for most. Affordability challenges to water utility fairness and rate structures were not all that common. Several things changed over the past several decades that has led to water utility rate increases in the United States. These rate increases have averaged twice the rate of inflation in many parts of the country. These rate adjustments have even given birth to a new civil rights movement, one based on affordable access to water for the poor (Walton, 2016).

The challenges of water affordability were not necessarily seen as an industry or societal focus until the 1990's. Water had often been considered an inexpensive resource, readily available in the United States to almost anyone who wanted or needed access where public water systems were involved. That has all changed in the past decade or two and water affordability has reached a crisis level in some areas due to infrastructure replacement costs, (Frostenson 2017). Data collected by the US Department of Energy (2017), on the escalation of water rates

also bears out rising costs at a level that is affecting tens of millions of Americans. According to a review by Worstall (2016) on water pricing, the challenge facing the subject of water affordability now, has been the incorrect pricing of water through the years. Ineffective pricing measures in the past due to incorrectly pricing water services, has led to pricing in the present day that continues to put economic pressures on communities. This pricing has disproportionally affected the poorest customers including large segments of minority communities. The use of full cost accounting practices, or lack thereof, by water utilities were also studied by Renzetti in 2004. The approach by Renzetti was more holistically North American in nature. The Renzetti work provided case studies that water utilities in the United States might use to change their accounting practices that were affecting water pricing (Renzetti, 2004).

Historically speaking, municipal water has not priced water correctly for many decades in many utilities across the country. Pricing for water, generally, has been as though demand would never outstrip available supply. In addition, water has not been priced to account for all costs of production and delivery. Worstall (2016) provides several examples where economic pricing over many years for any good or service must be in equilibrium with demand. This idea is true if producers expect to stay in business and run efficiently and if demand is not expected to outstrip supply.

Water has been priced through the years in most areas of the United States as though there would always be an abundant supply vis-a-vis demand. In many places, water was priced as an inexpensive commodity. Lipton (2016) echoed these same sentiments when he made the case that mispriced water creates current and future economic hardship for households. If water professionals and politicians cannot get the price charged for water correct, it creates a misallocation of water today as well as a misallocation in the future.

Lipton and Worstall make the same case that mispricing today creates misallocation of the water resource today that impacts agricultural productivity, sanitation, public health, and safety concerns and malnourishment in the present and future environs. Incorrect pricing today also causes misallocation in the future due to the lack of full replacement cost accounting. Failure to price the product correctly results in lack of funding and proper investment in infrastructure, technology, maintenance, and water security (Hanak, 2014).

The Environmental Protection Agency as recently as 2019 has stated that the pricing of water and of municipal water services should accurately reflect the true costs of providing the service. According to the Environmental Protection Agency (2019), the only way to maintain high-quality water service for consumers is to maintain and reinvest in the water systems on a regular basis. Failure to price water correctly or to impose a type of price fixing through political pressure is both irresponsible and economically debilitating to a community over the long run. Water affordability has become a challenge for small communities and communities with large numbers of the population living at or below the poverty line. The Environmental Protection Agency (2019) and the American Water Works Association have put out white papers, research, and authored manuals on how to strategically price water to help with the challenge. The manual, Setting Small Drinking Water System Rates for a Sustainable Future, not only addresses the long-term economic impact to communities from mispricing of water, but offers up a road map on how to correct years of malfeasance (Environmental Protection Agency, 2006).

Affordability is Customer and Community Specific

Affordability of water is a moving target and dependent on the customer as well as the community that is being served. What is considered affordable for a professional earning $100,000 a year and living in the affluent community of Buckhead Georgia is quite different

from the reality of affordability used by a single mother of two working for $12.00 an hour and living in Albany Georgia. There is also a complexity in any community, even affluent ones, where there may be groups of working poor or minority groups who are living in poverty. The challenge of identifying affordability risk and identification of affordability factors within a community adds complexity to the issue. Raucher and Rothstein's (2019) study on developing a framework for household affordability in the water sector addressed some of the challenges of rate affordability across different communities. Another study, commissioned by the American Water Works Association and contributed to by Saunders (1998), took a detailed approach to understanding, evaluating, and presenting impending affordability issues nearly twenty years ago. A new approach and framework to modeling out affordability approaches for water rates was included in the Raucher and Rothstein (2019) research.

The Pacific Institute (2012) commissioned research showed that not only were individual households and local communities impacted differently by the affordability of water issues but entire regions were often impacted negatively. This study found that water rates in the United States are not understood as a human rights issue and that water utility bills are often a huge burden for low income households. The California Department of Community Services (Pierce, 2020) as well as the Arizona Department of Environmental Quality (2011) in research works, both cite water affordability for the region as being any number that occupies more than three percent of household income. The reduction in federal funding available to water systems is referenced as a major cause for waters' non-affordability in the 21st century (Pomranz, 2020).

The number of customers that are at risk of moving into a personal economic void dealing with water rate affordability is growing. In their research, Mack and Wrase (2017) noted that the degree at which water rates are rising and the degree that rates are projected to continue

to rise, is troubling. The number of households that are no longer able to afford to pay for basic water service will grow from 11.9% to 35.6% in the next five years. This is a staggering statistic for a service that is an absolute necessity for human life, human health, and economic prosperity.

The poverty and demographic segments that currently exist within the State of Georgia may suggest that an affordability crisis with water availability may already be occurring within the State. If water rates in Georgia are escalating at levels significantly above annual inflation, then large segments of the population may be at future risk of losing access to clean, safe water.

Change Management in the Water Industry

Affordability challenges face many of the communities in the United States. How best to maintain water rates so that everyone has access to clean, reliable public water while properly reinvesting in the public water system, has gained traction in the water utility sector. Writing on behalf of Water Finance &Management, Grigg (2017) noted that responsible public water leadership requires an understanding that affordability affects people first and the community second. Financially healthy communities may already have many individual households that are already struggling to pay the water bill. There are several options that should be considered by responsible utilities for mitigating affordability issues for customers.

Affordability programs should be a strategic option for the utility to use to assist customers. These types of programs should be part of long range planning for every utility. The American Water Works Association (2014) and the Environmental Protection Agency (2019) in recent studies are all consistent in addressing possible programs that might assist customers with affordability. Some of these programs may include implementing billing changes, late fee abatements and finding revenue resources to rate based income streams. Grigg (2017) research

also offered several alternative solutions to the affordability crisis in terms of discounts, flexible terms, and lifelines.

The methods or strategies that utilities use to try to address the affordability issue may be different or unique to a region or local community but the challenge facing water utilities involving affordability is real. It will continue to be an impacting economic variable for the public utility and for the serviced community at large for the foreseeable future.

Maintaining affordability for citizens has now entered the mix of economic variables to consider in long range planning for water utilities. Due to incorrect pricing of water rates that have been present in many communities for years, the economic reality is now forcing utilities to rethink their business models. Affordability across every economic stratum of the rate paying community is measured differently by each household and there is not a one size fits all model. In the economy of the 21st century and faced with the need to generate billions of dollars to fund capital improvements through double and triple digit rate adjustments, affordability consideration has become both a short and long term planning item. Public utilities must ask themselves, during annual planning, what we are doing to help ensure that rates remain affordable for all rate paying groups and that delivery of service remains accessible.

Utilities are facing a perfect storm in the United States when it comes to investing in infrastructure, governmental regulations, skilled workers and technology, Environmental Protection Agency (2019). Rates must now take affordability into consideration while working to fund all the necessary costs of providing water. The leaders that run America's water systems are entrusted with helping to maintain public health, improving economic sustainability of their community, and doing so with an equitable and fair distribution of water services.

Customer assistance programs are becoming a major tool in water and sewer utility tool kits to aid in maintaining affordability. Utilities are utilizing innovative programs to maintain affordable rates while delivering the capital infusion required to re-invest in failing infrastructure. In Georgia, focus on these challenges are becoming more the norm than the exception for most water utilities.

Factors that have Contributed to Water Becoming Less Affordable

A leading utility analyst, Roger Colton, in a commissioned report for the Guardian (2020) said that more Americans are in trouble than ever before and the very poorest of the poor are in big trouble. The study went on to say that the data shows that there is an ever widening gap in the affordability problem in a great many cities nationwide. This gap did not exist a decade or even two or three years ago in many cities. This study along with similar studies by the Environmental Protection Agency suggests that as many as 13.8 million U.S. households, or 11.9% of all households currently find water bills unaffordable (Mack, 2017).

As of 1995, most water systems in the United States were owned by the public through municipal governments, local counties, authorities, or governmental districts (Wolff, 2003). Since most water systems in the United States have been publicly owned and operated during much of the twentieth century, the use of full cost accounting, in many cases, was not properly utilized to account for the depreciation of assets over long periods of time. Infrastructure has a useful life, whether it is a truck, with a useful life of five years, or a water pipe, with a useful life of seventy-five years. Underpricing of water over many years has contributed to the current state and pricing has often not included the cost of depreciation and replacement.

The infrastructure that goes into maintaining public water systems and supplying nearly 92% of the US population with water, has been funded primarily through a rate-based system.

However, as infrastructure has reached the end of its useful life this rate based system has proven to be inadequate for several decades (American Society of Civil, 2019).

A full cost accounting system allocates replacement cost, based on annual depreciation, that should be included as part of annual budgeting and long range planning and be included in product pricing. Past pricing structures should have taken future needs to replace infrastructure into consideration. Had full cost accounting been used consistently by public water systems in the past, this would have occurred. This idea may have led to more appropriately funded and well established capital reserve funds that were set aside to fund future replacement costs. These capital inclusions would have been more accurately priced into the current rate structures of water over time. In one regional study that looked at 1998 financial metrics in water utilities, the researchers estimated that annual costs that were unaccounted for were 15%-54% less than the actual operating budgets of the water utilities (Renzetti, 2004). This research suggested for this region, the true cost of water treatment and distribution to residents and businesses in the service areas had been undervalued by 15%-54%, Renzetti (2004). Full cost accounting in this case represented future rate adjustments that would be necessary to fund future costs that were not properly valued in the current operating periods or by current demand according to Renzetti.

Water utilities have often priced their services, and their product based on current operating and maintenance costs of running the system. Many utilities have been unable or simply unwilling to properly price their product at a price point that would have included the cost to replace, rehabilitate and refurbish the water treatment plants and water distribution systems. The reasoning was often that those replacement costs were many years in the future and pricing today could not or should not reflect those future costs. The rates that were charged were significantly lower and therefore more affordable to customers. Water utilities simply did not

properly price or even acknowledge that the full cost of providing water to their customers was not being covered.

In their 2019 State of the Water Industry report, the American Water Works Association emphasized that the cost of full pricing water rates is in the public's best interest and helps ensure that water utilities are self-sustaining enterprises. To remain self-sustaining, a water utility must be financed adequately by rates that are based on solid financial and accounting principles, good engineering study and follow sound economic policy (American Water Works Association, 2019).

Water utility revenues should enable the utility to provide for the full cost of providing the water service including annual operations, maintenance, capital costs, servicing debt, establishing capital reserves and for funding replacements to their infrastructure in the future. In other words, accounting for the depreciable lives of long lived assets is in the best interest of the community served over a long period of time. The literature suggests that this strategy had not been adhered to by many utilities over may decades leading to debilitating rate increases in the present day and contributing to the affordability crisis.

The American Water Works Association went further in their 2019 report by explicitly stating that many utilities have previously kept their rates artificially low simply by ignoring the replacement costs of their infrastructure. As infrastructure has started to fail at an alarming but not an unexpected rate, due to age, the customers, and communities that are served, are having to bear painful rate increases to fund the failures. Rate challenges related to equity and affordability must be considered as rates are adjusted in the future (American Water Works Association, 2019). Every water utility has a set of unique community rate setting challenges that must be addressed to maintain affordability amid the funding required to deliver water

services to their customers. Full cost pricing is usually a utility specific issue that should provide guidance for budgeting rates and setting costs on an annual basis. Additional suggestions were provided to the EPA over the past five years that might guide independent water utilities if these suggestions were accepted and championed by the EPA. The EPA affordability guidelines are two decades old and panel discussions during 2017 with industry insiders, community activists and governmental officials recommended changes to the EPA that may assist utilities with better planning guidelines (Walton, 2017).

A second catalyst contributing to an affordability crisis in water is related to how many water utilities are operationally structured. In many publicly owned water systems, the water systems are part of a larger local government. These utilities are often part of a department or division within a larger local government and often, as in the case of Columbus Water Works, have had at least a portion of their revenues and cash stripped from the water department to fund other general government services. There are many cases, most unfortunate, where the local water utility has been treated as a money machine that has propped up a poorly run local government (Berahzer, 2013). A water utility that increases rates may cause additional controversy when community perception is that rates are generating revenue's that are going toward funding the local government and not the utility itself. Water utilities that are enterprise funds on the books of local government, are often viewed as cash cows by local government leaders.

The Florida Rural Water Association reported in 2017 that separate funds related to a governmental enterprise constitute a public trust and the government is accountable for doing everything to protect the public's trust (Carroll, 2017). Cash transfers from a water utility enterprise to a general fund should pose a problem of accountability for the elected officials put

in those positions of trust by the public. The Association went on to formally recommend that Florida Cities and Towns not use water utility enterprise funds to balance local government budgets, something that has been normal practice by many cities in the past.

A third area that has affected water rates and affordability in the water industry is tied to federal funding of enforcement, and water infrastructure funding levels. One of the most recent examples of federal funding cutbacks or at least proposals for cutbacks was the Trump administrations 2021 budget ax to both the Environmental Protection Agency's budget funding and water infrastructure funding. The 2021 federal budget proposal reflected a twenty-seven percent cut in the EPA budget which amounted to the elimination of $2.4 billion in funds for water specific projects. This level of cuts would reduce the EPA budget to a level not seen in over thirty years and set the EPA back decades (Grinberg, 2020). The mandates required of water utilities nationally as well as those required of utilities in the state of Georgia, would not be eliminated, but federal aid from the EPA would be reduced. The budget cuts inflicted on the EPA would eliminate or reduce federal funding to assist with managing and enforcing of clean water requirements and put additional financial pressures on local water utilities and on utility water rates.

In addition to the cuts directed to the EPA, a staggering $780 million in additional cuts to federal grants and flow through funds to state clean water funding mechanisms for large water infrastructure projects would be cut. This low interest means of funding local water infrastructure projects would also put additional pressure on water rates affecting affordability for many rate payers (Grinberg, 2020).

From the 1960's through the 1980's federal funding for local water infrastructure projects contributed at a much greater percentage than what had been experienced starting in the 1990's.

Beginning in the early 1990's, spending on water infrastructure and capital projects specifically related to water systems has been increasingly provided by local and state governments (Eskaf, 2015). During the 1960's through the 1980's, federal spending was accounting for 50%-60% of local water project funding. By the early 2010's local and state governments accounted for approximately 90% of all capital funding for water projects (Eskaf, 2015). Local water rates have had to take into consideration this new funding reality. In many utilities, water rates have had to be dramatically altered to fund a higher percentage of capital. Over the past twenty years, these increasing rates have moved upward to accommodate the reduction in federal spending. Over the same time period many water systems are beginning to fail at a time when capital infusion is needed most.

In addition to local utilities and local governments funding a much greater portion of capital water projects with rates, the increases in water rates, which are politically sanctioned, often take years to increase to a level that makes capital funding of projects viable. The drop in federal funding, the failure of aging infrastructure and the increase in rates to pay for that funding shortfall, have all contributed to rate affordability challenges in the water industry.

Federal clean water funds are available to many water utilities in the State of Georgia, but the demand for federal dollars is far outpacing the supply of funds available (Walton, 2019). As infrastructure continues to fail and operational costs continue to increase, local water rate structures will be footing much of the financial shortfall. These rates are paid by customers whose own personal economic situation is making affordability issues more challenging by the day for millions.

The Eskaf study commissioned by the University of North Carolina Environmental Finance Center in 2015, referred to not only the staggering increase in capital expenditures that

had taken place between 1986 and 2014 in water utilities, but also noted that normal operations and maintenance costs had grown at 126% during this same period. While capital investment grew at 22% during this period, normal operations grew almost six times faster. The study also noted that capital investment decreased 21% between 2009 and 2014. While there was no mention of the cause of the drop in capital spending, rate pressures during the economic recession, and the recovery years may have played a part in limiting rate hikes in many water utilities throughout the country.

The reality of water production and delivery is that normal operating costs and maintenance are continuing to increase while capital needs are increasing and federal funding has decreased significantly. Water rate increases are needed to fund both current and future water system operations if water is to be kept flowing to customers. Financial sources continue to be limited at a time when these resources are needed most. This is contributing to the affordability dilemmas facing many water utilities.

A fourth variable is comprised of two drivers. The two drivers have affected rates and thus may be impacting affordability. These drivers are the focus on the conservation movement and climate change. The Bi-Partisan Policy Center in a report on safeguarding water affordability in 2017, noted that climate change and a changing customer base in many cities were two of the four areas putting pressure on water pricing for many Americans. The Policy Center specifically commented that while water conservation efforts are environmentally commendable and necessary in many parts of the country, conservation efforts put enormous pressures on water rates. Conservation can jeopardize the stability of a water utility by compromising the revenue stream. Rate adjustments are often the only mechanism to offset revenue shortfalls due to conservation efforts, at least in the short term.

Conservation measures are often very successful in cutting water use and water wastage, however, these efforts can impact the financial position of the utility in a negative manner. The focus on conservation is often implemented due to prolonged water shortages or a permanent drop in supply due to growing populations. Conservation and climate change often go hand in hand since climate change may be affecting water supplies. Climate change is also offsetting how many utilities will need to plan for mitigation of risks to water sources. Saltwater infiltration is just one of many climate change challenges facing the water industry. In Georgia, where there is a sizable coastal population, coastal water utilities will be taking measures to protect their water sources. These new measures will add costs and additional rate pressures. Climate change and the requirements of water utilities to address climate change impact is expected to add nearly $40 billion in costs over the next thirty years (US Water Alliance, 2019). These costs were not much anticipated less than a decade ago.

The literature points to a need for publicly owned and operated, community water utilities to adapt and modify their business models to ensure that water remains affordable to all sectors of the rate paying community regardless of economic or social standing. To further understand what may be influencing the affordability of water in the state of Georgia, and among Georgian society, the two research questions previously identified will use this body of literature as a resource to help determine if rates in Georgia are currently unaffordable. The body of literature will also help guide the research on identifying the impact that large capital investments may be having on water rates in the 159 counties in Georgia and if those rates may be showing signs of becoming less affordable over time to entire segments of the population.

Chapter Three: Data and Methods

Introduction

The objective of this research paper was to assess the influence of several variables on the affordability of water rates on the general population in the State of Georgia. The research is structured in a manner that assists in making these assessments and is based on both water rate increases over a five year period and the level of capital infrastructure spending by local Georgia county governments. Assessing the impact that capital investment is having on water rate affordability across Georgia Counties' is also being analyzed in the research.

Water rates are increasing across the United States due to the amount of funding water utilities are spending to replace aging water infrastructure and other capital investments. Every state is experiencing the need to invest in infrastructure, and Georgia is no exception. In Georgia, water treatment plants and water infrastructure in general is requiring immediate investment increases to meet the service needs of Georgia citizens. Georgia is spending 10.9% of total state spending on infrastructure and yet these amounts are not enough to improve infrastructure to the standard that it needs to be, and this includes water infrastructure (McNichol, 2019). The spending for capital infrastructure improvements that have been required of local county governments over the past few decades, has been influenced by both the age of water infrastructure and the degree to which federal funding has been reduced over the past two to three decades (Eskaf, 2015). The literature noted that water rates are increasing at levels across the United States that are well beyond the rate of general inflation. In some cases, increases have been more than twice the general rate of inflation over the past fifteen years. More and more water ratepayers are struggling to keep their water on due to cost (Osann, 2016).

The literature review for this research was focused heavily on water affordability and national trends in the United States. Much of the literature that was reviewed discussed water rate affordability as a growing national area of concern due to several variables. While literature on topics such as water rate studies were available for the state of Georgia, much of the subject matter was discussed in terms of a national challenge to personal rate payer affordability. While the focus is on Georgia water ratepayers, the literature often delt with a much broader scope. This research builds on the national literature but the research questions target the impact to the State of Georgia. The literature review has suggested that water rate affordability is becoming more of a challenge for the typical residential rate payer and the researcher wanted to try to determine if national concerns were translatable to the State of Georgia. Water rate affordability as discussed in the literature review is a growing national issue based on several variables that are described in this paper. This research takes this growing national crisis and using a variety of quantitative sources, examines if impact to water rate affordability is occurring in the State of Georgia based on similar variables discussed in the literature.

The professional experience of this researcher, who works in the Georgia water industry, provided the basis of interest in furthering an understanding of affordability issues in Georgia. More specifically, citizens of Georgia who rely on public water systems may be being impacted by water rate affordability given that poverty levels in Georgia are significant. The degree of water rate affordability on Georgia's high poverty levels and large minority population is of personal interest to the researcher. The researchers own personal experience in the State of Georgia has not always aligned with the national literature on affordability and so it became a subject of both professional and personal interest to learn more on the topic.

Methods

This paper focused on quantitative data that could be used to help answer two research questions about water rates and water rate affordability in the State of Georgia. The data, while quantitative in nature, is presented using a descriptive research method. The research is focused on the population of Georgia and the impact that water rate increases may be having on affordability for the overall population. Research is focused on answering the how, what, and when to assist in answering the two research questions. Hence, a descriptive research method that relied on secondary quantitative data that was available from several research institutions is used to arrive at conclusions for the questions.

The goal of the research was to determine how Georgians might be affected by water rate increases. It was important that all 159 counties in the State be included in the data that was analyzed and based on the same criteria. This strategy included gathering data and reporting that data by identical means for each county. The quantitative data that was gathered for this research consisted primarily of existing secondary data that was gathered and documented for unrelated research. These sources included data on water rates charged by hundreds of water utilities in every county in the State of Georgia. Water rates were collected by the University of North Carolina Environmental Finance Department on behalf of the Georgia Environmental Finance Authority over the course of five calendar years. The data was originally gathered using a fixed question survey that had been sent to potential water utility respondents across the State of Georgia. The survey results were gathered annually and then published by the University of North Carolina as a Georgia Water Rate publication index.

Research for this paper also required collecting and analyzing data on local government capital investment levels across all 159 counties in Georgia for the same five-year period. This

data was reported by local county governments in their annually prepared Comprehensive Annual Financial Report or through other means such as the Georgia Department of State or the Georgia Department of Revenue. The Comprehensive Annual Financial Report is consistent for all counties regardless of the size or location of the county and provided a reputable source for the collection of this financial information. The annual reports were also independently audited by outside auditors hired by each county and thus provided an added level of consistent and reliable information across all counties for which data was available.

Comprehensive financial data for Georgia Counties was very diverse. The analysis included data on very small simple county governments with small populations of several thousand residents and small budgets. It also captured data on very complex county organizations with large populations of hundreds of thousands of residents and budgets in the billions of dollars. In collecting capital investment spending for each county, the research data included only governmental and business type capital investments for county level government. Investment made in work-in-process capital projects that had not been finalized were not included in the mix of data nor were land purchases. This kept the capital investment data collected consistent across all counties. The governmental fund types from financial reports were also used to mine data for all 159 counties. Capital investment was analyzed on both a county level total and analyzed on a spending level per county resident. County, and state level data in the state of Georgia was also analyzed.

The research required that data on poverty levels by county be collected and analyzed. Poverty levels and population were gathered from governmental agencies that included the United States Census Bureau and the United States Department of Commerce.

Research Questions

The research focused primarily on the question: Is the level of capital infrastructure investment by local county governments having an influence on water affordability of county residents who depend on public water systems. This study follows the lead of academic literature to further answer the following research questions and support the hypothesis for each question. While the primary research question is focused on water rate affordability in Georgia and possible cause and effects that stem from capital investments, the research question that aims to answer how fast water rates are increasing, vis-a-vis inflationary rates is also important. The study aims to answer the following questions and support the following hypothesis.

Research Question #1: Are Water Rates in the State of Georgia currently considered affordable?

Hypothesis: Water Utility Rates in the State of Georgia are currently not affordable.

Research Question #2: Are Water Utility Rates affected by the amount of Capital Infrastructure Investment made by Local County Governments.

Hypothesis: The more capital spending undertaken by a local county Government in Georgia influences how fast water rates will increase in that specific county.

Fixed & Time Element Variables

The data that was gathered and analyzed included both fixed time variables and variables that required looking at data over a specific number of years. In the case of the variables that delt with population and poverty levels, populations tend to expand and contract over time. Depending on geographic location and economic activity, shifts may be significant or subtle (Bureau US, 2019). Economic conditions also change over time which may impact poverty levels in a given community over short or long periods of time. In the state of Georgia, some counties have remained more stable with little to no growth over many years. In other cases, a county such as Fulton, where Atlanta is located, may have experienced significant growth over the past ten years. However, this research was limited to a five year period and the researcher had to decide on when to use static data and when to use data that changed over the period researched.

In the case of population and poverty levels by county, static variables are used for both research variables. Data that changed over a number of years is used for capital investments made by local government. Water rates charged by water utilities are also analyzed over a five year period. Neither of the two latter variables would have been meaningful, using static data, so both variables were tracked over a five year period.

The researcher felt that the use of static variables for both population and poverty levels was justified due to both reliability and availability of documented and validated secondary data taken from the United States Census Bureau archives. The US Census data for the year 2010 was both readily available, documented, and verifiable from a widely accepted source, the US Census Bureau. Data for the year 2020 had not been validated or governmentally reported as of the writing of this paper. Estimates would have had to have been used to support this variable

in the research. To further support the decision to use static data for these two variables, the population growth for the state of Georgia was reviewed and documented between 2010 actuals and 2019 estimates. According to the US Census Bureau, the year 2010 population of the State of Georgia was 9,687,000. The estimated population for 2019 from the same source was 10,617,423, a change of about 9.6% or 930,423 people. This growth may have been large enough to warrant not using a static variable without additional analysis of where the growth was estimated to have occurred. Therefore, a three county area of Atlanta was segmented and the researcher looked to see if this area might account for a significant portion of the overall growth of the state. This three county area accounted for 1.8% of the total county count in the state but comprised the largest metro area in the state of Georgia. This area had a population of 4,544,000 in the census of 2010, (US Census, 2010). The population of this area was estimated to have grown to 5,803,000 by 2019, an increase of 1.26 million people between 2010 and 2019, (US Census, 2020). Based on this additional analysis, it was reasonable to assume that two to three counties out of a total of 159 counties accounted for virtually all of the state net population growth over the ten year period. This additional data and research supported the researcher's decision to use static data for both population and poverty levels by county from the US Census Bureau of 2019 estimates.

The research variables that looked at capital investment, water rates and county savings rates, analyzed data that changed each year over a five year period. County budgets and investment in capital infrastructure change over time, and analysis over five years of data gave a better indication of spending. The Governmental Finance Officers Association (2021), a member association of over 19,000 local and state governments in the United States and Canada, recommends that local governments adopt multi-year capital plans to manage capital

spending and capital assets more effectively. The Association recommends plans that are between three and five years and apply a rolling planning format. This recommendation supported the decision by the researcher to look at time lapse data over five years for both capital investment and net position increases or decreases by county. In some Georgia Counties' the changes may be significant year over year while in other Georgia Counties', the changes year over year may be very subtle.

Means of Collecting Data

The main means of collecting data to support the research was using secondary data that had been collected, compiled, and reported by academic research institutions, local government agencies and state government as well as external audit. The data that is gathered for this research is compiled and sorted using excel spreadsheets for further analysis in SPSS. The data collected required that the researcher use many different portals for analyzing and collecting pertinent financial data on 159 Georgia Counties in the study.

Research Variables

The research variables that were used to provide a basis for this project:

- County populations for 159 Georgia Counties'
- County poverty levels for 159 Georgia Counties'
- County Median Household Income for 159 Counties
- County Median Family Income for 159 Counties
- County Per Capita Income for 159 Counties
- Capital spending by local County Governments in Georgia between 2015 & 2019.
- National Inflation Rates between 2015 and 2019
- County Net Position Increases/Decreases for 159 Georgia Counties between 2015 & 2019
- Water Rate Changes for Georgia Water Utilities between 2015 & 2019. Rate summaries used were for 7,000 gallons of monthly use.

Reliability, Design Weakness and Validity of Data

There may be possible threats to the reliability or validity of certain data as reported for the research. The capital investment by local Georgia Counties was collected from previously reported secondary data provided by each county. This data was part of their annual reporting to the state of Georgia. The researcher does not believe that the validity of this data is a weakness or a threat to the accuracy of the research. This is due to the manner in which the data was reported and the consistency in reporting across counties. In fact, the financial reports were audited by independent 3rd party audit firms and therefore the validity of data is assumed to be of a high quality. However, reliability may pose a threat to the research because the secondary data is being collected and compiled for research that the data was not originally intended.

The data collected for capital investment included only governmental and business type activities of the local county and may, in certain cases, exclude investments made by an independent water utility within a county, especially if that utility is not consolidated with the local county government. This may pose some challenges for reliability of the data based on capital investment. Infrastructure investment was analyzed to determine if there is an influence on water rate affordability factors within the county.

The design of the research may have a weakness or pose a possible threat to the final conclusions that the research aims to achieve. The researcher made the decision to utilize secondary data to help answer the research questions posed for this research paper. In doing so the design of the research may have relied too heavily on secondary data. In the case of water rate increases over several years, the data was acquired through unrelated research completed by the University of North Carolina Environmental Finance Department. This paper utilized those industry data sets to answer research questions posed, in the hope the data would support the hypothesis of this paper. While this potential threat is unsubstantiated by any negative evidence, it is being pointed out as a possible risk to the research results.

The design of the research also required that some of the quantitative data be acquired using a static data set while other data was acquired over a period of years. This decision by the researcher was supported and acknowledged but there are two possible risks to the outcome produced in the research. The first is that non-static data may have more effectively achieved a more meaningful result had the data been collected over a period of years and not at a specific point in time. It is possible that while static data was chosen, it may not have been the best alternative but the researcher stands behind his decision. The second risk is that data that was collected over several years, was not collected over a long enough period to provide the very

best results. This is especially important for capital investments by local governments that spanned five years when better results may have been achieved if data for a longer period had been collected. The nature of this paper, timelines, and costs associated with this paper made a shorter period for the data set review most practical.

The design of the research aimed to include data collection on 100% of the counties in Georgia and the results were significant. The sample size was significant for the state of Georgia, even after considering the number of counties that may not have reported all the required data for all years under analysis. The number of counties under study in Georgia and the resulting final population size that was used for SPSS and Excel analysis may have mitigated some of the risks noted above.

The decision to use secondary data that was independently collected from multiple sources was also due to cost consideration as well as timeliness for collecting the amount of data required for this study. The number of county governments in Georgia that were included in the study made costs and data collection efforts more practical using secondary data. The data that was utilized for this research required hundreds of hours by the researcher to collect, review, compile and arrange for SPSS and Excel analysis but additional funding costs were minimal.

Chapter Four: Results and Analysis

Introduction

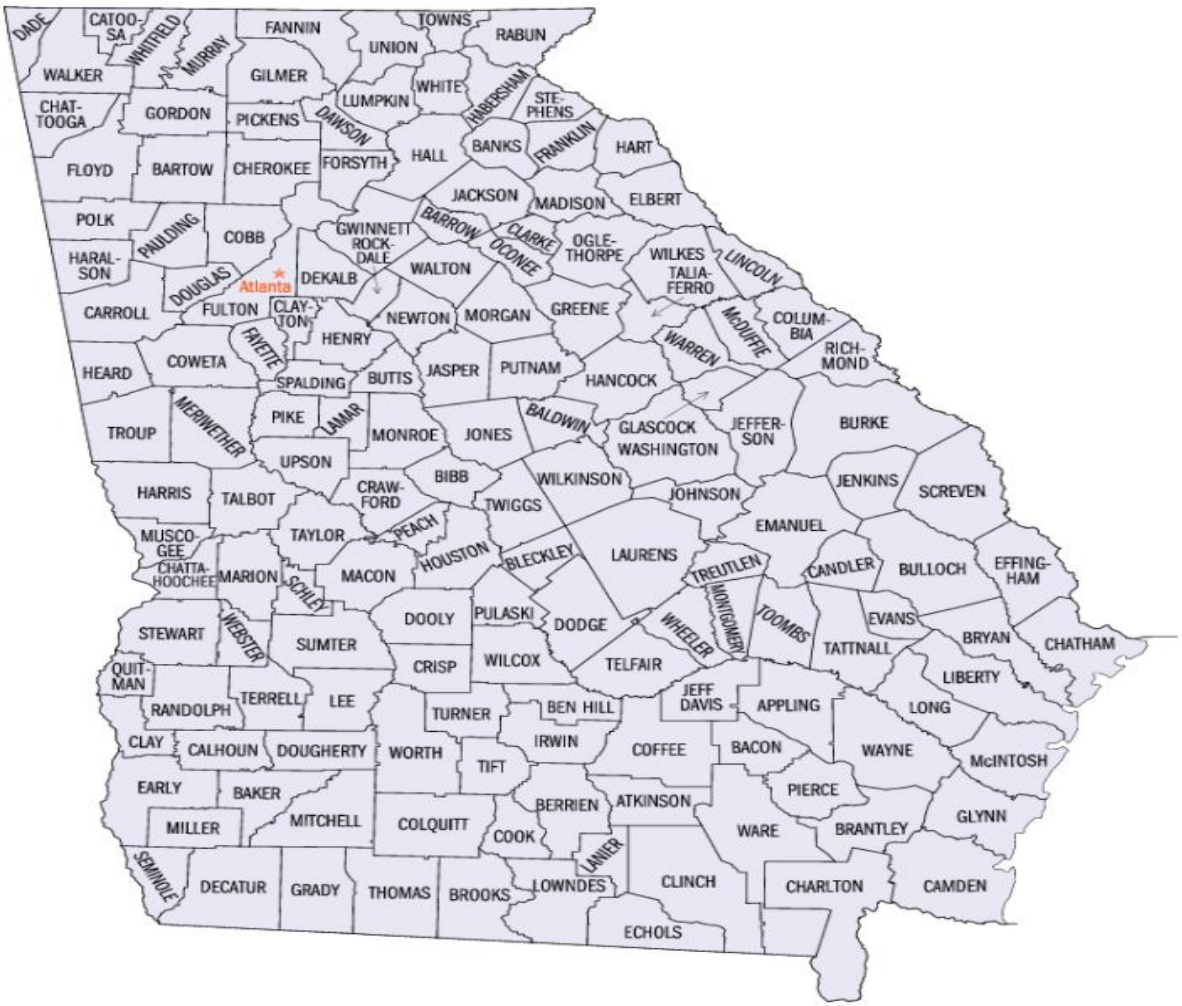
The data collected and analyzed in this paper was compiled based on a geographic mapping of all local counties within the state of Georgia. The demographic and quantitative data that was collected for this paper was pulled from all 159 local county governments and while the data categories are identical the data and level of participation by each county was unique to each county. The demographics and research data categories will be discussed first followed by a focus on each of the two research questions.

The first research question to be addressed: Are water utility rates in the State of Georgia currently considered affordable? The Hypothesis was that water rates in the State of Georgia are currently not affordable. An analysis using SPSS software was used to provide a basis for determination of outcome. This study was based on the use of interval level variables and so this first research question was derived primarily using descriptive analysis.

The second research question aims to answer if waster rates in the state of Georgia were being affected by the amount of capital infrastructure investment made by local county governments over the years analyzed. An alternative hypothesis was presented that aimed to show some relation between the more capital spending a county government was investing the faster or more aggressive water rates would be increasing within any given county. The second research question was also supplemented with a case study of four counties by the researcher.

Data – Demographics

There are 159 county governments within the state of Georgia that were included in this study. The researcher was able to collect data on all 159 counties at some interval level. The state of Georgia is fractured into 159 home rule, local county governments and so participation and access to data was crucial to achieving success in answering the research questions. The following is a county map of the state of Georgia, of which all but a small percentage of counties participated in the study through collection of data.



The researcher chose to use authenticated and documented secondary data sources due to the volume of counties involved and the amount of data that was required to arrive at meaningful results. Time constraints and costs were also a consideration in determining the best means of gathering data for this research.

The completeness of data by county for every variable that was included in the study differed greatly between county governments. There was 100% participation with the collection of data in the case of the variables regarding poverty levels. The poverty levels by county included both the percentage of population and count of population within each county that were at or below the federal poverty levels. This variable was treated as static for this study based on the researcher's judgement that using a single, very recent, reporting year of 2019 would provide a stationary metric in which to compare water rates against those that were taken from multiple years included in the study. This data was available through several 3rd party governmental reporting sources and the researcher was able to quantify citizen counts through both direct reporting methods and alternative means of calculating expected poverty levels within a county based on reported poverty percentages. This area of data collection resulted in 100% participation of data regarding poverty levels within the studied counties and therefore within the whole of Georgia.

The data that was analyzed to assist in answering research question number one also included various income metrics from the 159 Georgia Counties in the study. In order to answer or support the hypothesis of research question number one, the research analyzed the per capita income, the median household income, and the median family income levels for all the county segments included in the study. These three metrics were analyzed independently of each other. The poverty levels within each county were also analyzed as part of the support for

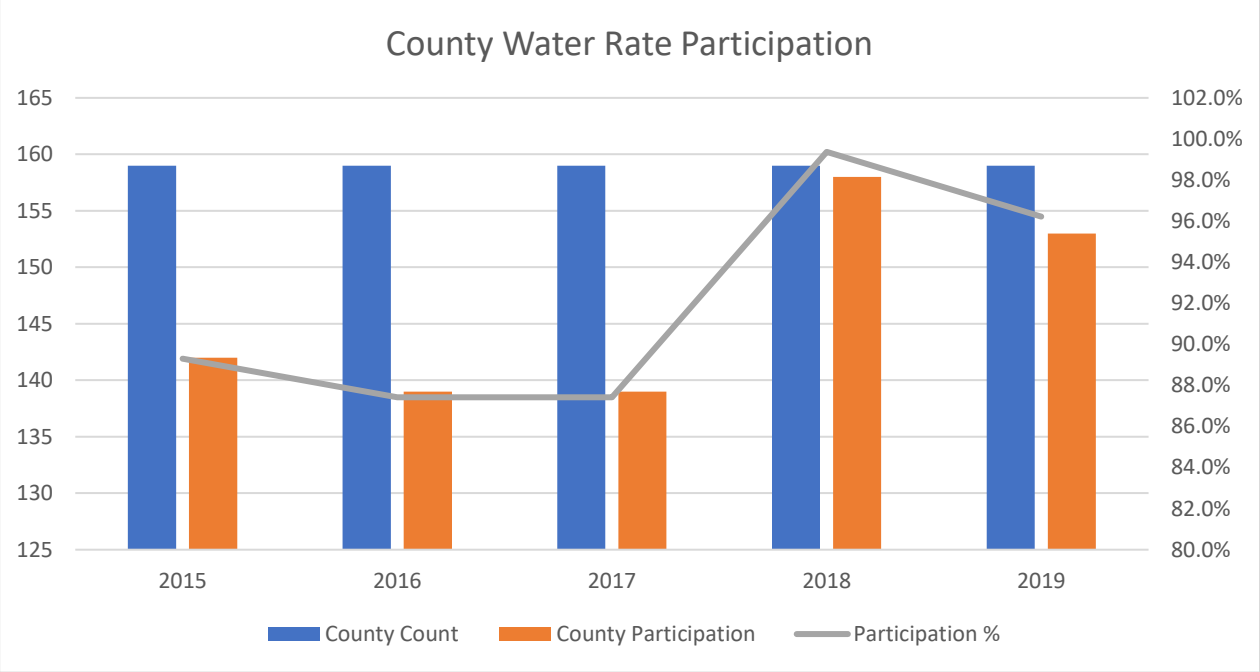
research question number one. The data for per capita income, median household income and median family income levels were supplied by 3rd party data from the 2015 United States Census Bureau and the 2006-2010 American Community Survey Five Year Estimates (United States Census, 2020).

Participation by county government and water utilities located within these geographic areas of Georgia was greatly dependent upon self-reporting by each local county or water utility. The self-reporting was to 3rd party government agencies and research organizations for other data variables included in this study. County self-reporting included the availability of data from various state of Georgia departments including the department of revenue as well as research organizations such as the University of North Carolina Environmental Finance Center. The consistency of local governments and utilities in reporting to both state level government offices or participating in meaningful academic research studies influenced the level of participation for each county and for each variable used in this study.

In the case of water rates charged to residential customers within a specific county, the researcher used a consistent volume of 7,000 gallons per month as a basis to calculate rates across all available county segments where rate information was available. Rate information was derived from secondary data research from the University of North Carolina Environmental Finance Center as well as direct data collected from individual utility and county websites by the researcher. The basis of 7,000 gallons per month per residential customer was consistent with averages used in previous studies by the University of North Carolina Environmental Research Center for rate study comparisons and were attributed to a residential family size of two to four people (Macon Water Authority, 2018). For the five years included in this study, which included rate data from 2015 through 2019, participation, or availability of

data, was between 87.4% and 99.4% for the 159 counties in Georgia. The researcher considered this a very high level of participation by counties in terms of water rate availability and collection for use in this study. Figure 1 shows participation levels.

Figure 1

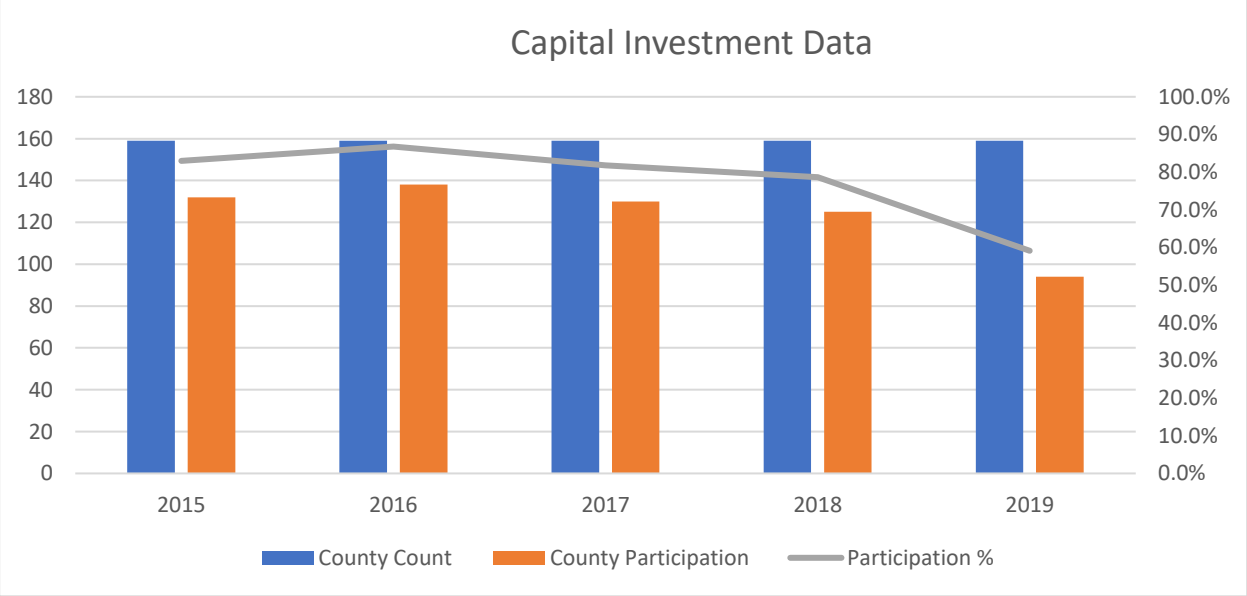


The data collected to assess levels of capital investment by each county was collected for a period of years that included 2015 through 2019 for each county. Collection methods used for this data also included the use of secondary data collected from 3rd party sources. These sources included the state of Georgia Department of Revenue and the University of Georgia Carl Vincent Institute of Government. In addition to these secondary sources for data collection, the researcher used direct collection methods from individual counties using county websites and financial reporting portals. While the data was consistent from year to year for each county, a financial year may have been defined slightly differently

between counties. While all yearly financial information for capital investment was consistently reported by each county based on each county's fiscal year, fiscal years may have differed across the 159 Georgia Counties'. One county may follow a fiscal year reporting close period of September 30th, while another county may follow a fiscal year reporting year end of June 30th. There may be some inconsistency in the calendar for fiscal year reporting between county operations, but this should not have introduced any significant risk into the research. Figure 2 graphs the data participation levels for capital investment for the 159 Georgia Counties'.

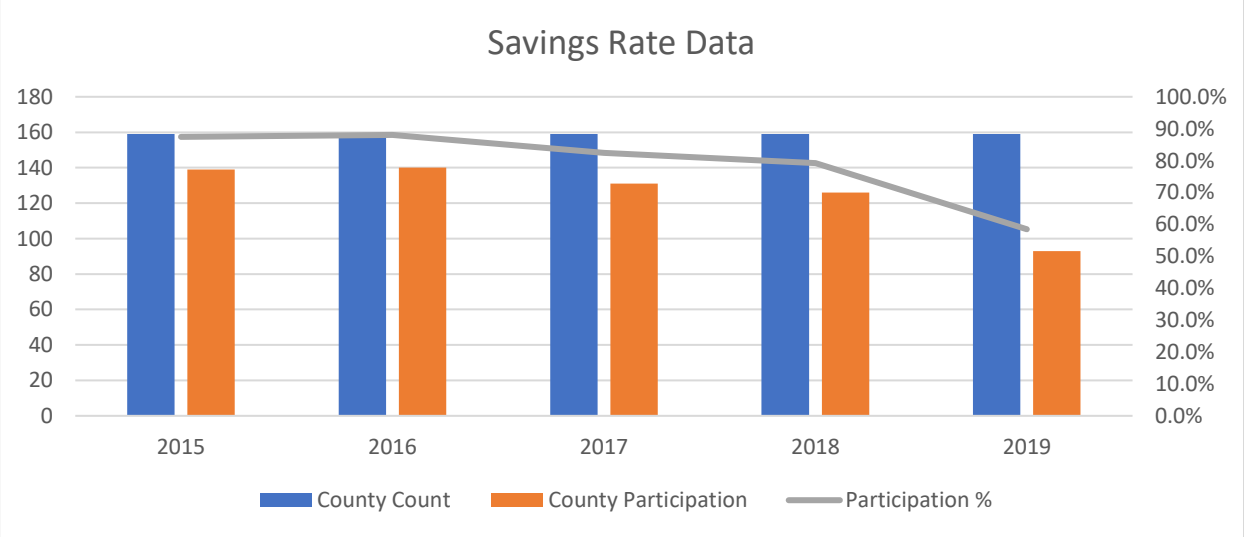
The data related to capital investment detail also returned a high level of participating results that ranged between 59.1% and 86.8%. It is being noted that the oldest years of data collection had the highest percentage of available data, while the two most recent years, 2018 and 2019, had the lowest percentage of reported data. The researcher can only surmise that the two most recent years of financial results were lagging in reporting by various counties.

Figure 2



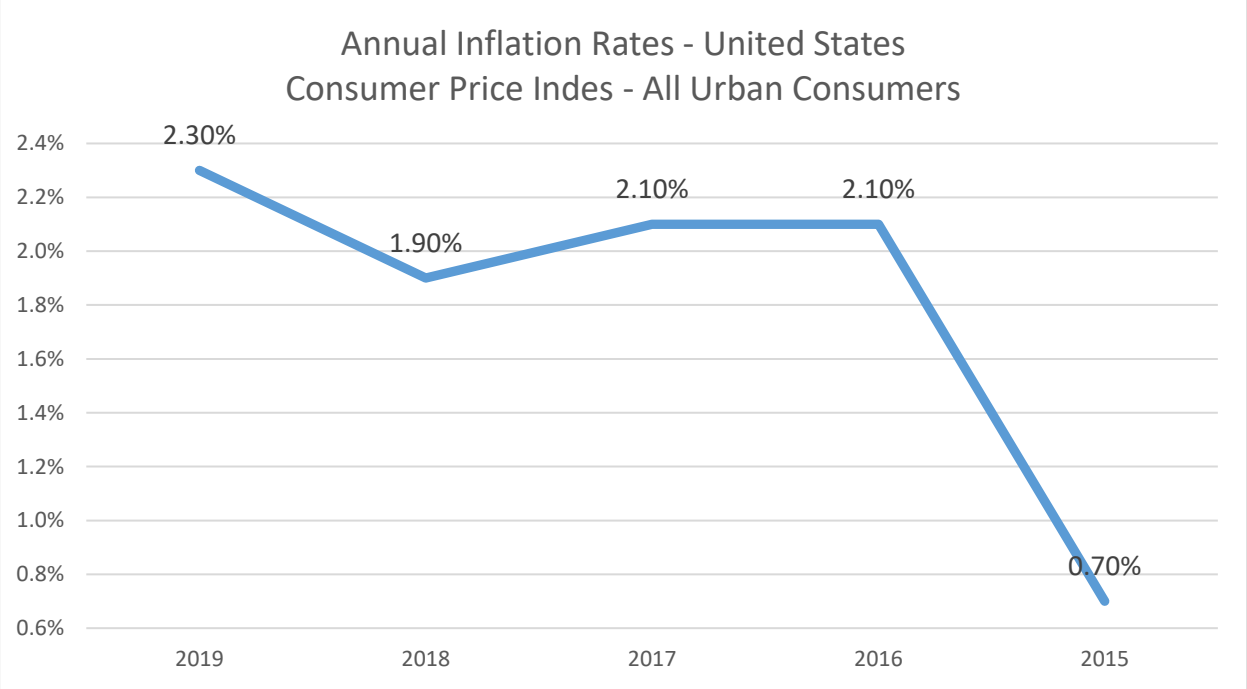
The next data area collected was the saving rate that each county experienced over the years that were included in the study. The savings rates were determined by collection and analysis of net increases or decreases, by year, of the county's net position. The net position was taken from each fiscal years' financial report. Increases from year to year or decreases from year to year provided an indication of balance sheet improvements or a weaking of the balance sheet. The net position in public finance provides a view of county assets plus deferred outflows of resources less liabilities plus deferred inflows of resources. This change in net position, year over year, provides some indication of improving or weaking financial strength of the government. For the sake of this paper this equated to improvement or a weaking position of balance sheet savings. The assets increasing over liabilities or vice versa, liabilities increasing over assets. Data availability and collection was also high for counties who reported net position by year in the 58.5% to 88.1% range depending on year collected. Figure 3 graphs the participation levels of the counties.

Figure 3



To determine if water rates were increasing faster than annual inflationary rates in Georgia Counties', the consumer price index for all urban consumers (CPI-U) was used to compare rate increases to overall inflation levels. The CPI-U used for 2015 through 2019 is shown in figure 4, (US Inflation Calculator, 2021).

Figure 4

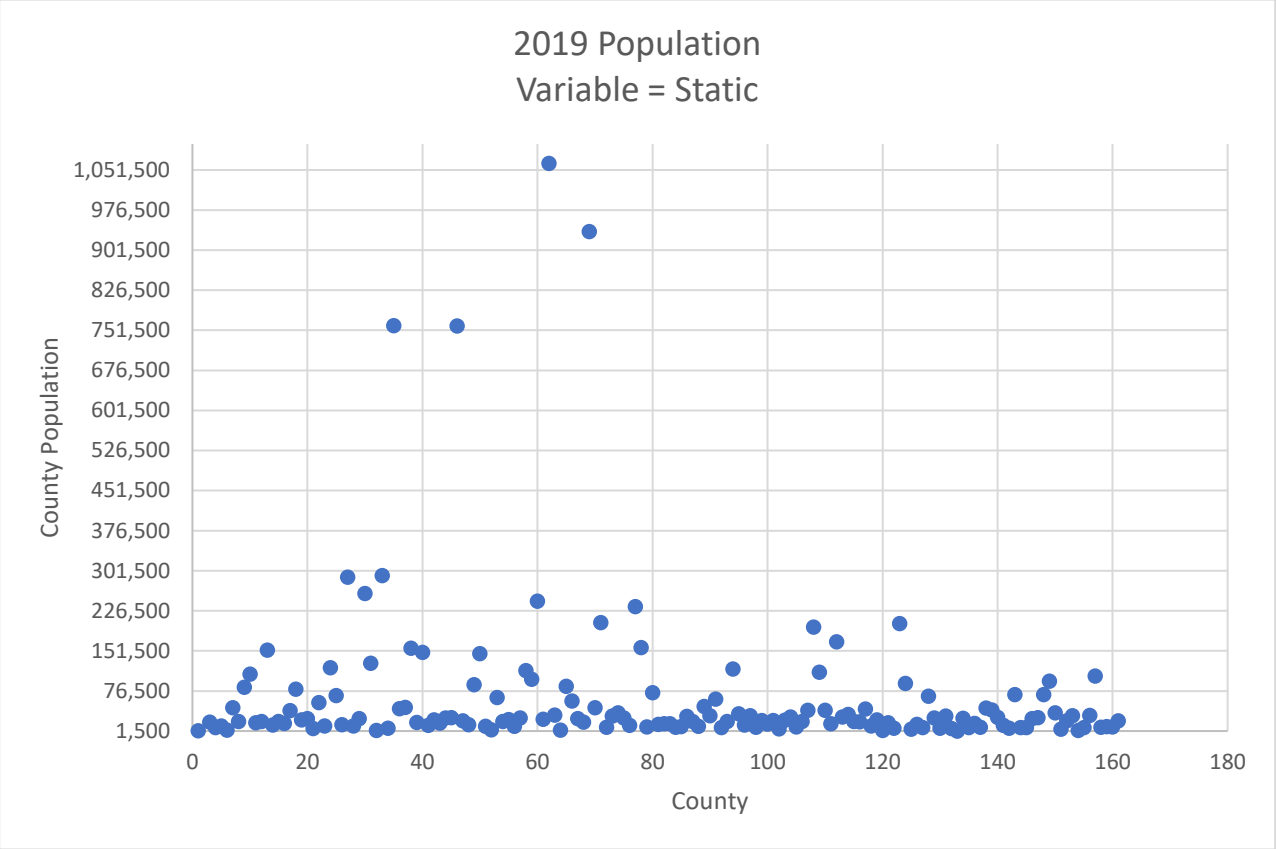


The inflationary metrics that were reviewed in this paper were analyzed to determine if inflation was outrunning water rate increases or if water rate increases were outrunning inflation levels. This was just one of five metrics reviewed and analyzed to determine if water rates were currently considered affordable in the State of Georgia based on both the American Water Works Association and Environmental Protection Agency guidance. If it was found that water rates were increasing faster than inflation, then this may provide additional considerations in which to support or not support the current affordability question. While the national literature points to affordability concerns in many areas of the United States due to a number of factors

facing water utilizes, the researcher believes the research will show that not enough time has elapsed to have made water unaffordable to any great extent for most Georgia residents.

The final demographic used in this paper was the population for each Georgia county. Georgia has a lot of population diversity within the 159 local county government units. Most counties within Georgia are rural with populations well below 60,000 people. The cluster (figure 5) diagram reflects the dispersion of population between the 159 counties. While a few larger counties, primarily Fulton and DeKalb (Atlanta) and the counties surrounding Atlanta comprise a large portion of the total state population, the makeup of Georgia Counties tend to be rural with low population densities and in many cases high poverty and significant minority populations.

Figure 5


2019 Population
Variable = Static
County Population
1,051,500
976,500
901,500
826,500
751,500
676,500
601,500
526,500
451,500
376,500
301,500
226,500
151,500
76,500
1,500
0
20
40
60
80
100
120
140
160
180
County

Research Question #1: Are water rates in the state of Georgia currently considered affordable?

The first research question aimed to answer if local county water utility rates were currently affordable in the State of Georgia. The Hypothesis that was predicted was that water rates in Georgia were currently not affordable. This hypothesis was based in part on the predictions found in much of the literature review that suggested that due to increasing capital asset failures, infrastructure repair costs as well as operating cost increases, that water utilities were increasing rates on customers thereby increasing the risk of water becoming less affordable for millions of people.

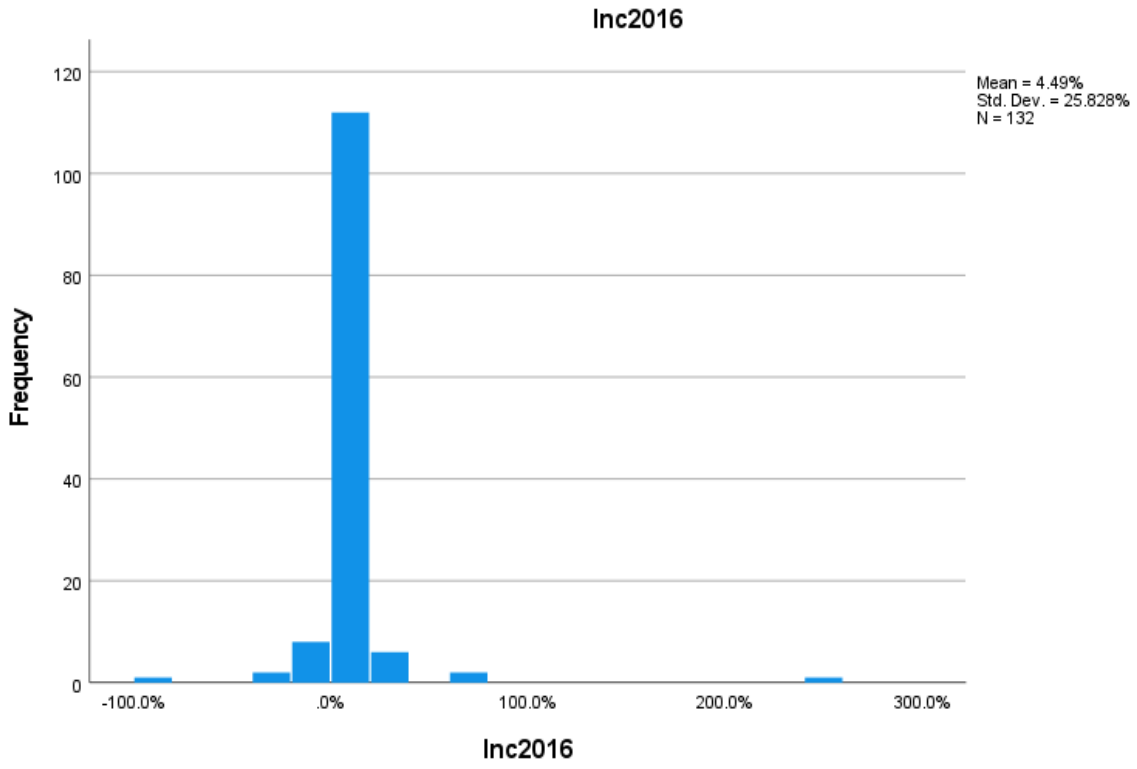
The first year that was analyzed included rate increases that took effect between 2015 and 2016. Out of the 159 counties in the study there were 132 respondents, or 83.02% of the total county count; N=132, where data was available for this year. The annual inflation, or CPI-U, for 2016 was 2.10%. Based on the analysis of N=132, the mean for reporting counties was 4.494%. This would seem to indicate that the average increase in water rates for the 132 counties where data was available was more than twice the annual inflation rate for 2016. However, the analysis also showed a high standard deviation of 25.8283% from the mean which required further analysis due to the dispersion of data from the mean. Table A shows the statistics for the data set. Table B reflects the dispersion of the data for the rate increases in 2016.

TABLE A

Statistics

		Inflation 2016	Inc. 2016
N	Valid	159	132
	Missing	0	27
Mean		2.100%	4.494%
Median		2.100%	0.000%
Mode		2.1%	0.0%
Standard Deviation		0.0000%	25.8283%
Standard Error of Skewness		0.192	0.211
Skewness			6.375

TABLE B



Further analysis of the 132 counties that reported data for 2016 and 2015, showed that 39 counties, or 29.5%, reported rates that were greater than the inflation rate of 2.10% for that year, while 53.8% reported no increase in year over year rates. In addition, 11 counties reported rates that were greater than 0% but less than 2.10% inflation and the remaining 11 counties reported negative rate increases. Negative rate increases indicated either a year over year reduction in rates or may have been due to reporting irregularities or errors introduced into the data. It has been an exceptionally rare occurrence for a water utility to reduce rates year over year.

Similar analysis was run for year over year rate increases by county for 2017, 2018 and 2019. The frequency analysis of the increases in rates by county in 2016, 2017 and 2019 all reflected means or average increases that were well above the annual inflation rate for each respective year. The following comparison for each year of increases is reflected in the frequency table C that follows.

TABLE C

Frequencies **Statistics**

		2016	2017	2018	2019
N	Valid	132	134	151	152
	Missing	27	25	8	7
Mean		4.494%	4.136%	83.300%	4.110%
Median		0.000%	0.000%	0.000%	0.000%
Mode		0.0%	0.0%	0.0%	0.0%
Standard Deviation		25.8283%	20.3902%	7.7840%	20.3599%
Variance		667.101	415.758	60.591	414.524

The initial frequency analysis of all four years of rate changes resulted in means in each year that were greater than 4%, except for rate year 2018. The change in rates between 2017 and 2018 showed very little average rate change relative to the other years included in the study. In addition the standard deviations for all years were signficantly large indicating that the values in the data sets were further away from the mean for every year that data was run through analysis.

In an effort to obtain the 95 percent confidence interval of each years average rate change, a one sample t-test was run for each year of rate data. The one sample t-test was used to try to better understand the upper and lower boundries of the 95% confidence interval for each mean. As it turns out the lower and upper boundries for all years were wide ranging in terms of rate increases each year. The one sample t-tests for 2016 through 2019, shown below in Table D1 through D4, for the 95% confidence interval, reflect just how wide the upper and lower boundries of this confidence interval is. Trying to determine if rates are increasing by more than the annual rate of inflation was inconclusive for making a determination for all counties collectively. In the following one sample t-tests that were run for 2016 through 2019 the size of the difference relative to sample means are significant is each year.

TABLE D1

Rate Increase Year 2016

T-Test Analysis

	N	Mean	Standard Deviation	Standard Error Mean
Rate Increase 2016	132	4.494%	25.828%	2.248%

Rate Increase Year 2016

One - Sample Test Test Value = 0

	t	df	Significance (2-tailed)	Mean Difference	95% Confidence Lower	95% Confidence Upper
Rate Increase 2016	1.999	131	0.048	4.494%	0.046%	8.941%

TABLE D2

Rate Increase Year 2017

T-Test Analysis

	N	Mean	Standard Deviation	Standard Error Mean
Rate Increase 2017	134	4.136%	20.390%	1.761%

Rate Increase Year 2017

One - Sample Test Test Value = 0

	t	df	Significance (2-tailed)	Mean Difference	95% Confidence Lower	95% Confidence Upper
Rate Increase 2017	2.348	133	..020	4.136%	0.652%	7.620%

TABLE D3

Rate Increase Year 2018

T-Test Analysis

	N	Mean	Standard Deviation	Standard Error Mean
Rate Increase 2018	151	0.833%	7.784%	0.634%

Rate Increase Year 2018

One - Sample Test Test Value = 0

	t	df	Significance (2-tailed)	Mean Difference	95% Confidence Lower	95% Confidence Upper
Rate Increase 2018	1.315	150	0.191	0.833%	-0.419%	2.084%

TABLE D4

Rate Increase Year 2019

T-Test Analysis

	N	Mean	Standard Deviation	Standard Error Mean
Rate Increase 2019	152	4.110%	20.360%	1.651%

Rate Increase Year 2019

One - Sample Test Test Value = 0

	t	df	Significance (2-tailed)	Mean Difference	95% Confidence Lower	95% Confidence Upper
Rate Increase 2019	2.489	151	0.014	4.110%	0.847%	7.372%

The increase in water rates were further broken down by year, as well as by rate increase. The ranges were used to try to determine if the number of counties that were reflecting rate increases greater than the annual inflation rate included more than 25% of the total county count in Georgia. For the rate increases in 2016, forty counties, or 28.8% of the 139 participating counties, increased rates greater than the 2.10% inflation rate for that year. The mean rate increase for this group was 20.5%. This was over ten times the inflation rate for 2016 for this group. Repeating the grouping for 2017 showed that 44 counties, or 31.6% of the 139 participants increased rates an average of 14%, nearly seven times the inflation rate for 2017. While 2018 was not as dramatic as 2016 and 2017 in terms of rate increase percentage for this group, the year still reflected that 22% of the 158 counties had increased their water rates faster than the 1.90% inflation rate for 2018. The counties in this group increased rates in 2018 an average of 9%. Although the year was not as aggressive as the previous two years, the rates still showed that there were counties whose water utility rates were increasing faster than annual inflation. The increase by nearly a quarter of the counties showed significant adjustments in price that were 4.7 times greater than the inflation rate.

The final year included in the review was 2019. For 2019, 96% of the 159 counties reported water rate data. Of this group, 25.5% reported increases in rates greater than the national inflation rate for 2019 of 2.30%. The average for this quarter of Georgia Counties also showed the greatest single year average increase of 21.4% of all years tested. The year over year rate increase between 2019 and 2018 was nine times the inflation rate for 25.5% of the counties in Georgia.

The researcher had predicted that Georgia water rates were increasing at a slightly faster rate than the national inflation rate over the years tested. While the analysis does support this prediction for some of the counties, a far greater number of county data did not support this prediction. In the years included in the study, a significant percentage of the total population of counties who reported data were in fact escalating rates faster than the rate of inflation, but not a majority of the counties were doing so. Between the years 2015 and 2019 between 22.2% and 31.7% of the reporting counties fell into the rate hike category that was significantly higher than the national inflation rate. While significant, in terms of the total numbers of county data reviewed, the data also showed that a much higher percentage of counties had not increased rates at all or were under the inflation rate for any given year. In fact, 59% to 67% of all counties had not increased rates in any given year or were under the inflation rate for the year reviewed if they had increased rates at all.

The research also uncovered some information regarding the impact of rate adjustments in the top eleven largest counties in Georgia in terms of population. The eleven largest counties, which contained 49.4% of the total state population, Table E, were not actively increasing rates greater than inflation. In 2019 five of the eleven largest counties raised rates more than inflation. In 2018 only four of the eleven largest counties raised rates more than

inflation. While rate increases in these large population based counties may have impacted up to 23.8% of the state's population in 2018 and up to 22.9% of the population in 2019, there was not a single county in

TABLE E

Eleven Largest Counties	**Population**	**% of State Population**
Richmond	202,518	1.91%
Hall	204,441	1.93%
Henry	234,561	2.21%
Forsyth	244,252	2.30%
Cherokee	258,773	2.44%
Chatham	289,430	2.73%
Clayton	292,256	2.75%
DeKalb	759,297	7.15%
Cobb	760,141	7.16%
Gwinnet	936,250	8.82%
Fulton	1,063,937	10.02%
Total	5,245,856	49.41%
State Population	10,617,423	

the large county grouping that chose to raise rates greater than inflation during 2017. In 2016 only one county, Richmond, chose to raise rates greater than the inflation rate.

This additional information may indicate that the smaller, less populated counties may have been more active or more aggressive with water rate increases over the five years of data in the study. Table F reflects the compilation of data by year and by percentages of counties who reported rates that were greater than the national inflation rate. The tables also reflect those counties reporting rate hikes that were less than the national inflation rate.

TABLE F

Rate Year	***2016***	***2017***	***2018***	***2019***
# of Counties Reporting	139	139	158	153
National Inflation	2.10%	2.10%	1.90%	2.30%
Mean (Rate Increase %)	20.50%	14.00%	9.00%	21.40%
# of Counties Rate Increase > National Inflation	40	44	35	39
% as a Total Reporting Counties	28.8%	31.7%	22.2%	25.5%
Counties Reporting rate Increase .50% -2.10%	10	12	3	8
Mean	1.54%	1.47%	1.20%	13.33%
% of Counties Reporting	7.19%	8.63%	1.90%	5.23%
Counties Reporting rate Increases 0%-.50%	73	70	98	95
% of Counties Reporting	52.5%	50.4%	62.0%	62.1%

The prediction that water rates in Georgia are increasing faster than inflation rates is true. However, it appears to only be true if we view all individual Georgia Counties' collectively as a single group. Since every county government is governed individually by county residents and are independent from all other counties in the state, an alternative finding that water rates are increasing faster than inflation rates for a smaller percentage of counties is more appropriate. A far larger percentage of counties are currently keeping water rate increases below inflationary levels. In fact, twice the number of counties were keeping water rates below inflation than are those who are escalating rates faster than inflation.

In order to determine if water rates are still considered affordable for Georgia residents, inflationary factors were only one variable of consideration in the study. Water rate changes relative to inflation levels only reflect how water rate are moving in relation to all priced goods in the consumer price index. This metric does not indicate a measure of whether water rates are

actually affordable for rate payers. The inflationary measurement was used to gage how fast water rates may be moving up relative to this well-known economic index. If rate payers are not staying ahead of inflation levels, then water rates that are increasing faster than inflation could prove to be very problematic to affordability considerations for many Georgians.

The three variables that are directly linked to an affordability measurement in this paper are per capita income, median family income, and median household income. A fourth variable, poverty levels, are also an important consideration since those living below the federal poverty level, regardless of median household income levels within a county, may be at far greater risk of affordability concerns than those living above the poverty level. The three income variables are analyzed relative to the guidance recommended by both the American Water Works Association and the Environmental Protection Agency on water affordability factors of 2% of median household income and 2.25% of median household income. The Environmental Protection Agency recommends no more than 4.5% of household income should be used for combined water and sewer services. For this research the assumption used was 2.25% for water and 2.25% for sewer services.

The guidance provided in the literature by both the American Water Works Association and the Environmental Protection Agency considers the ceiling of affordable water to be 2.0% and 2.25% of household income. For the analysis the lower end of the affordability spectrum was considered to be 2.0% and the upper ceiling 2.25%. If household spending for water services exceeded 1.50%, affordability begins to be of concern. For household spending levels for water service in the 1.51% to 2.00% these levels were considered to be approaching levels where affordability would be called into question. For spending levels that exceeded 2.00%, water was no longer considered affordable for those county residents.

The Environmental Protection Agency continues to recommend that a combined outlay of household income of less than 4.50% for water and sewer services be used to gage affordability. The American Water Works Association continues to recommend that water service account for 2.0% or less of household income in order to remain somewhat affordable. Any percentage over these quoted amounts put water service in the area of unaffordable for households.

The American Water Works Association set the upper limit of affordability for water based on household income. If households are spending more than 2.0% on water services, then affordability is compromised. It is also of note that the 2.0% makes no mention of water replacement costs that households may incur due to safety concerns presented by a public water system. Water replacement costs can increase the percentage of household income being used to pay for water services significantly. Water replacement has impacted communities like Detroit Michigan and Flint Michigan due to lead contamination and improper water treatment processes. When public water systems are not trusted by their customers, customers are often forced to find fresh water sources elsewhere. Often these other sources are in the form of bottled water that are many times more expensive than water provided by public water systems. An example of how much more costly water replacement can be for a customer the following example is included. A customer of the Macon Water Authority that uses 7,000 gallons of water in a month can expect a bill of $25.83. To replace that level of water with bottled water would be approximately $8,050.00. The replacement costs for residents of cities like Flint and Detroit Michigan are staggering and can force families into dire economic situations. The chart that follows represents the difference in costs from a public supplier versus a retail purchase. Water replacement costs are a reality for many communities in the United States, however

water replacement is not considered in this research or as part of the 2.0% or 2.25% basis for affordability.

Supplier	Price Per Gallon	Use in Gallons	Total Monthly Bill
Macon Water	$ 0.0037	7,000	$ 25.83
Kroger Water	$ 1.15	7,000	$ 8,050.00

Source:
https://www.maconwater.org
https://www.kroger.com/p/kroger-purified-drinking-water/0001111080332

The researcher chose to not only look at the median household income for al l59 counties in the State of Georgia but also the per capita income and median family income levels as well within those counties. These additional metrics were compared to the average spending by families for water annually. The affordability per capita was converted using the affordability factors for a household. The affordability per median family income used the same affordability factor used for a household. The volume of use was based on 7,000 gallons of water per month for a twelve month period of time. The monthly consumption was consistently applied across all 159 counties. The researcher was able to compute the county population numbers and by dividing the total county population by the total number of households arrive at a consistent number of people in each household for each county. This added a financial metric in which to test for affordability based on both median household income levels and family income levels as well as per capita income levels.

Water rate affordability has been stated as a percentage of median household income, which is a single metric on which to determine affordability. By using the available data and rearranging the information, the researcher believes that a second and third financial metric that provides additional affordability guidance was introduced. These included median family income levels and per capita income levels for each county where water rate information was

available. All three of these units of measure, median household income, median family income and per capita income were applied to all 159 counties. The analysis shown in the Table G reflects the findings across all 159 counties.

The affordability of water in Georgia based on median household income levels shows that of 139 counties where data was available in 2016, only 5% of the counties exceeded the 2.0% ceiling for affordability. This number increased to 6.60% in 2017, decreased to 6.2% in 2018 and was 5.9% in 2019. The analysis of affordability based on median household income also showed an increase in all percentage tiers over the four year period. This seems to indicate that more household income is being used to pay for water services each year. The trend during this time period indicates that more and more household income is needed to pay for water service and use.

TABLE G

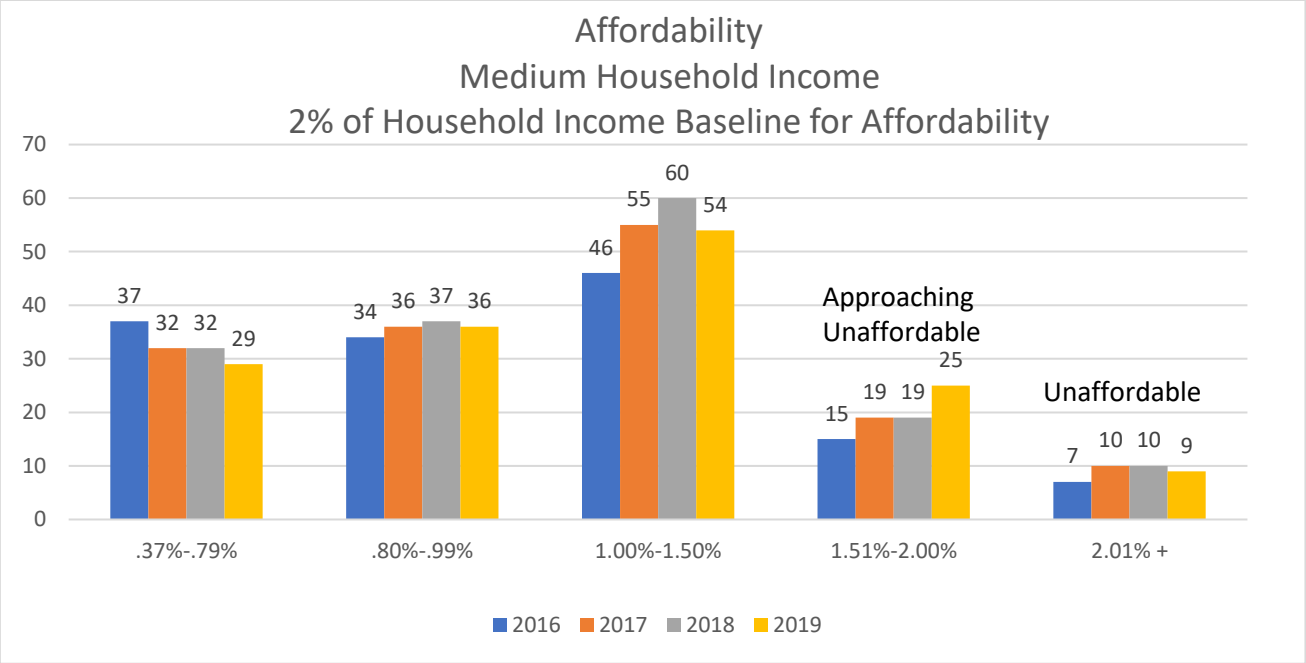
Affordability vs. Median Household Income

Number of Counties & Where They Fall In Relation to 2% Affordability by Year

Water Affordability

Medium Household Income

Year	.37%-.79%	.80%-.99%	1.00%-1.50%	1.51%-2.00%	2.01%+	No Data	Total
2016	37	34	46	15	7	20	159
2017	32	36	55	19	10	7	159
2018	32	37	60	19	10	1	159
2019	29	36	54	25	9	6	159



The affordability analysis based on per capita income is somewhat more problematic. If the affordability factors used for household income are converted into per capita by county, the affordability of water becomes much less affordable based on these statistics. Water becomes unaffordable at just .74% per person. If water affordability were based on a cost per person then in 2016 water becomes unaffordable for nearly 49% of the county's individual headcounts within the State of Georgia. While this is not a perfect conversion, it notes that affordability for a household may not necessarily correspond to affordability for an individual. By 2019 58% of the 153 reporting county's shows affordability rates on a per capita basis that were above the ceiling identified by the American Water Works Association and the Environmental Protection Agency. In addition, nearly one-third of all counties in each year were approaching water rates that were not affordable based on per capita income levels (Table H).

TABLE H

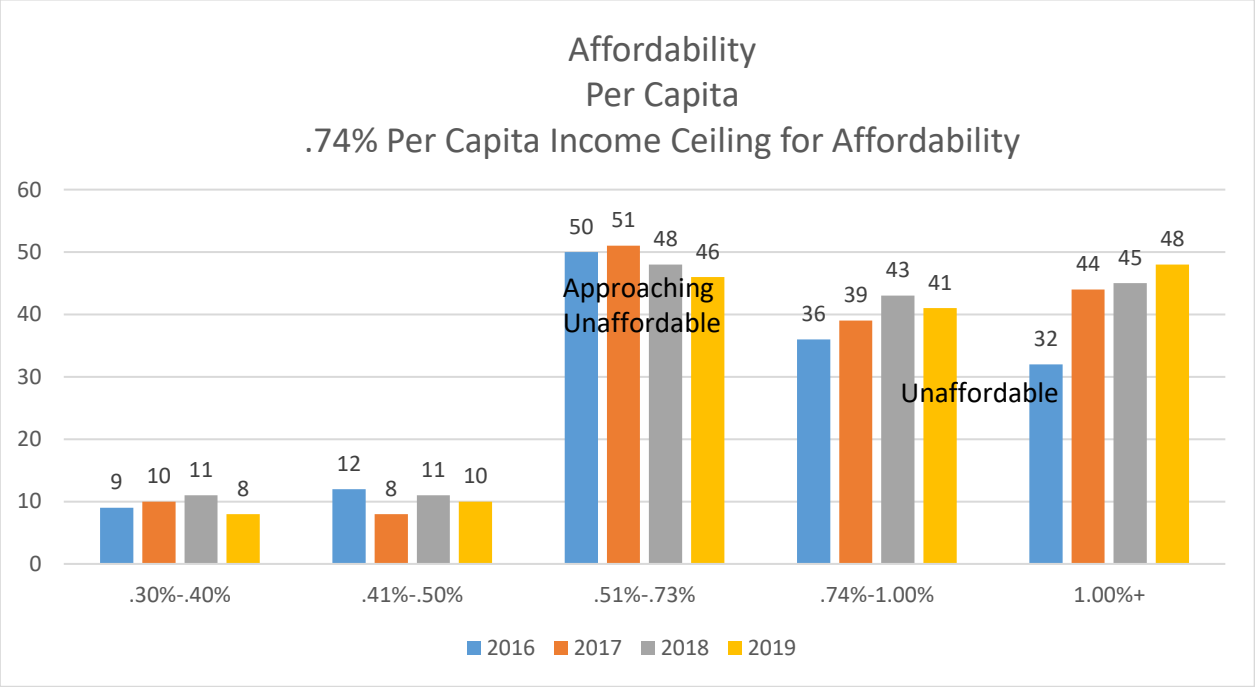
Affordability vs. Per Capita Income

Number of Counties & Where They Fall In Relation to .74% Affordability by Year per Capita

Water Affordability
Per Capita for Georgia

Year	.30%-.40%	.41%-.50%	.51%-73%	.74%-1.00%	1.00%+	No Data	Total
2016	9	12	50	36	32	20	159
2017	10	8	51	39	44	7	159
2018	11	11	48	43	45	1	159
2019	8	10	46	41	48	6	159

Affordability of 2% divided by average heads in household in Georgia = 2.70
Affordability per capita = .74%



The final financial metric looked at for affordability was the median family income. The median family income and water affordability levels were the most positive. Median family income levels were consistently higher in all counties, which is normally the case versus the household income levels. Families generally account for more members than do the

statistics included for households. This has the effect of increasing median income levels and thereby decreasing the percentage of income needed to pay for family water services. If affordability is quoted in terms of median family income levels versus median household income levels, the results may result in more positive findings if the percentage of spending for water is not adjusted accordingly. For this paper the same spending percentages were used for median family income level as were used for median household income levels (Table I).

TABLE I

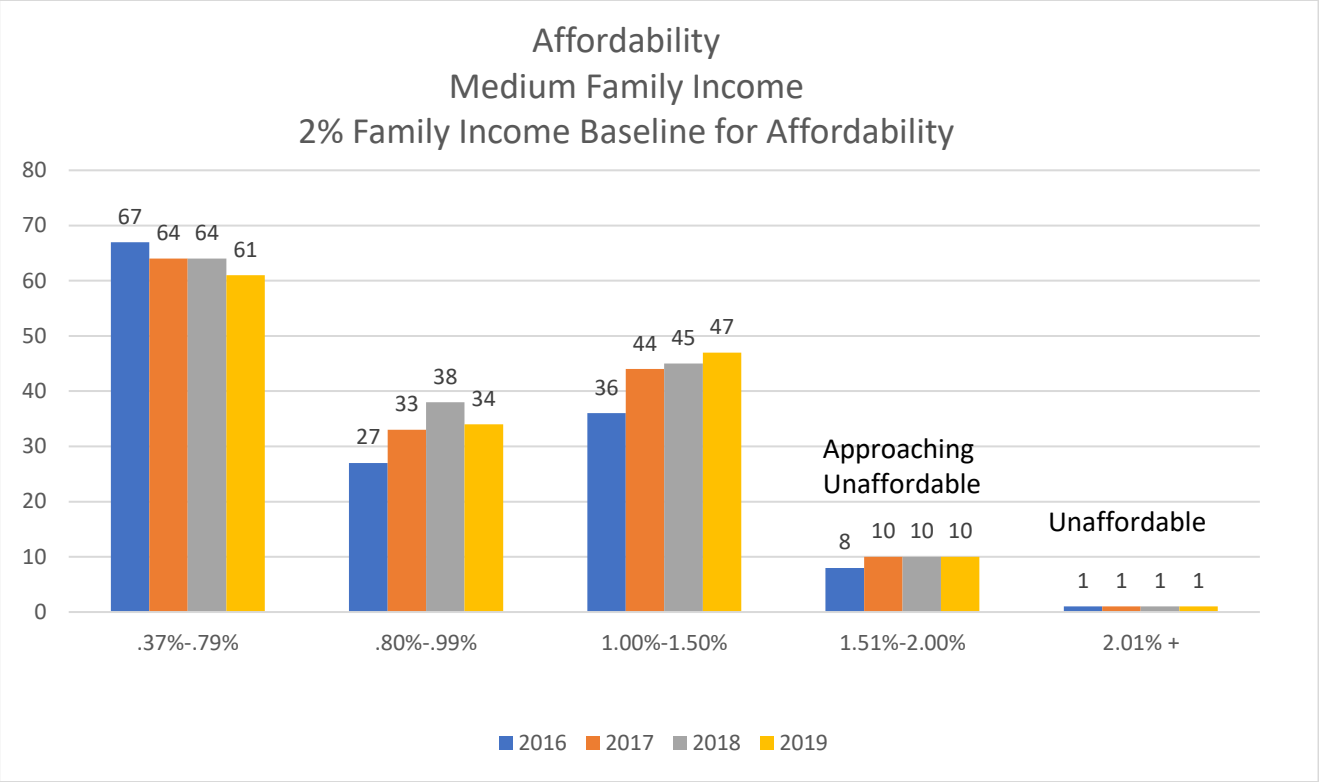
Affordability vs. Median Family Income

Number of Counties & Where They Fall In Relation to 2% Affordability by Year

Water Affordability

Medium Family Income

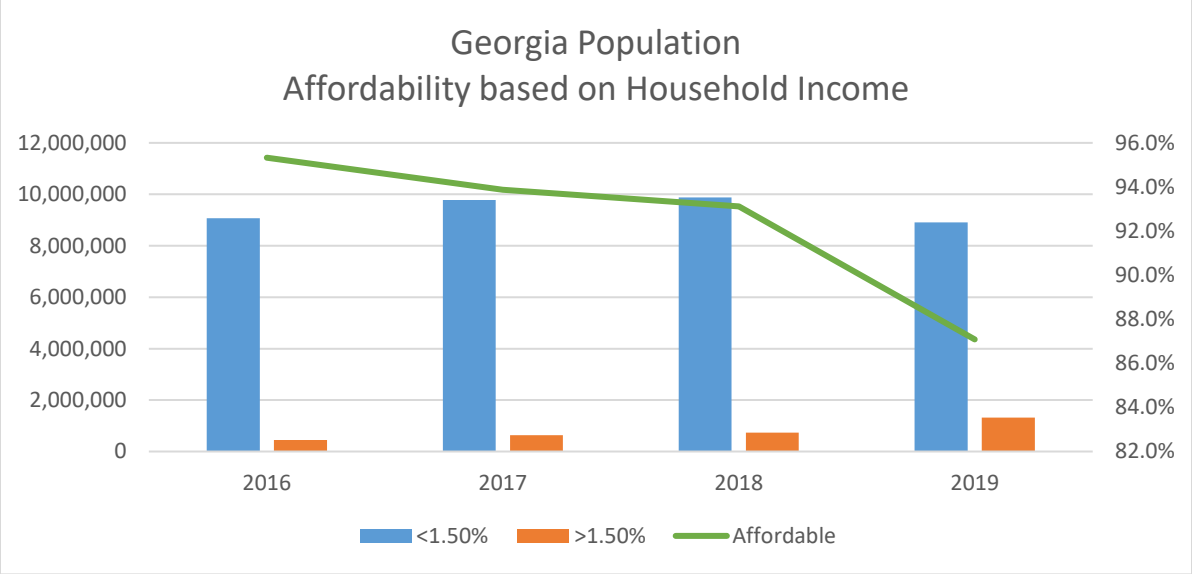
Year	.37%-.79%	.80%-.99%	1.00%-1.50%	1.51%-2.00%	2.01%+	No Data	Total
2016	67	27	36	8	1	20	159
2017	64	33	44	10	1	7	159
2018	64	38	45	10	1	1	159
2019	61	34	47	10	1	6	159



The prediction that water rates remain affordable for most Georgia residents based on median household income appears to be an accurate statement. Based on the total population of the State of Georgia derived from each individual county and using the median household income level, it does appear that water was affordable for a large percentage of the state population. In 2016, 95.3% of the population where data was available reflected water rates were below 1.50% of household income. Thus, making water rates affordable. During 2016, approximately 10.0% of the state's population were not included in the analysis due to lack of data. In 2017 water rates remained affordable for 93.9% of population with 98% of the total population of the state being accounted for in the data. By 2019, affordability had fallen to 87.1% of the state's population. (Table J). While this remains a significant portion of the overall population, the data suggests that water is in fact becoming less affordable over time for many households in the State of Georgia.

TABLE J

Water Affordability						
Population of Georgia						
Year	<1.50%	>1.50%	Total Population - Data Available	No Data	Total Population	Affordable
2016	9,072,304	444,741	9,517,045	1,100,378	10,617,423	95.3%
2017	9,781,942	638,977	10,420,919	196,504	10,617,423	93.9%
2018	9,876,233	730,536	10,606,769	10,654	10,617,423	93.1%
2019	8,905,868	1,320,684	10,226,552	390,871	10,617,423	87.1%



Research Question #2: Are water rates being affected by the amount of Capital Infrastructure Investment made by Local County Governments?

This second research question addressed whether the amount of capital infrastructure investment made by a county, influences how fast rate increases are occurring in the water service fee charged to county residents. The hypothesis is that the more spending a county invests in infrastructure, the faster the rate of increase in water service rates. The premise for the hypothesis was based in the literature review and included research on the implications that might occur from years of underfunding for infrastructure replacement and mis-pricing of water resources. The literature indicated that rate increases would be required to generate additional financial resources to support future catch-up of infrastructure investment due to a lack of sufficient past investment by many utilities.

The 159 counties included in this research were very diverse in terms of financial size and complexity of structure. The counties were also very diverse in citizen populations that each county government supported. The researcher wanted to determine how diverse the category for capital investment was for the five years included in the study. The investment ranges for total capital investment were reviewed for all five years. Table K reflects how diverse the ranges for infrastructure investment were for each year and how wide the range of investment spending was as shown.

TABLE K

	N	Range	Minimum	Maximum	Mean	Standard Deviation
Capital Spending 2015	132	$ 293,663,798	$ 122,097	$ 293,785,895	$ 12,916,881	$ 37,593,163
Capital Spending 2016	138	$ 302,785,720	$ 98,280	$ 302,884,000	$ 10,516,449	$ 31,499,171
Capital Spending 2017	130	$ 689,629,155	$ 79,065	$ 689,708,220	$ 15,635,573	$ 67,308,699
Capital Spending 2018	125	$ 731,045,763	$ 17,620	$ 731,063,383	$ 16,758,038	$ 69,922,538
Capital Spending 2019	94	$ 330,778,279	$ 128,721	$ 330,907,000	$ 13,827,819	$ 38,073,397
Valid N	86					

The number of counties reporting infrastructure investment ranged between 94 and 138 out of 159 possible counties throughout the years included in the research. However, the range of investments by the counties had a very wide dispersion. In 2018, of the 125 counties who reported data on capital investment, the range of spending ranged from a low of $17,620 to a high of $731,063,383. The range of spending may have been driven by many factors including population size served, available county tax base, availability to financing sources such as publicly issued debt or federal grants. The level of savings within the county government may also have played a role. Geography also played a role in the amount of infrastructure investment from county to county . Georgia county geography is very diverse among the 159 county structures. Counties with larger geographic footprints may be spending more on infrastructure simply because more linear footage of infrastructure exists and may require repair or replacement. The reasons for the dispersion of capital spending among counties nor the causes of that spending were within the scope of this research, however, the dispersion is being noted.

The researcher was also interested in understanding the amount of capital investment that each county spent on each resident of the county. Looking at the data based on a per

resident investment rather than total overall dollars invested, might provide a better understanding of infrastructure costs relative to each county's population. This was a way of normalizing the investment spending based on resident allocation rather than gross dollars. Over the course of a four year period, 2015 through 2018, the average capital investment was reviewed and then allocated to each resident based on each county's population. To understand how at least 75% of the state's population was being affected through county capital investment, the researcher selected all counties with populations of 50,000 residents or greater. This included 41 of the 159 counties and accounted for 8,382,526 Georgia residents, or 78.9% of the total population of the state. By isolating this group of counties and re-running the analysis and adjusting for two of the 41 counties who did not report capital investment spending, an average of $160.94 per resident had been spent over the course of the four year period. The average capital investment per resident was used for the top 41 most populated counties and compared against rate increases for this same group of counties which is shown in table L. It was hoped that this analysis might show a relationship between the higher per resident funding and increases in water rates over the same period for the 41 largest populated counties.

TABLE L

County	County Population	Per Citizen Spending	2019 Spending	2018 Spending	2017 Spending	2016 Spending	2015 Spending
Barrow	83,240	$ 112.90	$ 4,478,101	$ 10,300,466	$ 5,284,455	$ 12,607,466	$ 2,910,017
Bartow	107,738	$ 180.00	$ 14,795,026	$ 14,539,775	$ 21,134,775	$ 22,502,758	$ 20,808,960
Bibb	153,159	$ 199.83	$ 22,870,654	$ 35,651,000	$ 12,736,845	$ 43,429,965	$ 11,235,550
Bulloch	79,608	$ 128.14	$ 9,456,432	$ 14,090,314	$ 3,938,483	$ 12,574,419	$ 9,562,225
Camden	54,666	$ 60.02	$ 2,674,801	$ 2,429,404	$ 4,626,118	$ 2,787,100	$ 1,676,662
Carroll	119,992	$ 65.75	$ 6,070,593	$ 5,069,007	$ 12,709,725	$ 5,888,524	$ 5,397,450
Catoosa	67,580	$ 36.17	$ 1,991,305	$ 4,343,988	$ 1,171,410	$ 1,818,105	$ 3,913,179
Chatham	289,430	$ 99.87	$ 46,772,761	$ 30,267,930	$ 29,796,287	$ 26,655,423	$ 23,602,040
Cherokee	258,773	$ 144.14	$ 53,503,978	$ 48,106,846	$ 26,498,393	$ 37,289,535	$ 21,272,811
Clarke	128,331	$ 557.16	$ 17,916,620	$ 143,836,655	$ 18,537,260	$ 52,128,162	$ 88,725,899
Clayton	292,256	$ 95.07	$ 48,362,375	$ 34,964,224	$ 20,624,534	$ 27,765,707	$ 73,316,934
Cobb	760,141	$ 699.07	$ 132,907,669	$ 731,063,383	$ 689,708,220	$ 173,399,655	$ 191,954,277
Columbia	156,714	$ 246.21	$ 28,553,342	$ 21,668,132	$ 58,815,317	$ 35,269,617	$ 22,991,805
Coweta	148,509	$ 137.43	$ 25,843,588	$ 25,298,711	$ 17,117,730	$ 18,810,750	$ 10,271,697
De Kalb	759,297	$ 37.11	$ 46,958,000	$ 32,124,000	$ 24,590,000	$ 27,809,000	$ 42,202,000
Dougherty	87,956	$ 61.69	$ 5,177,218	$ 3,883,657	$ 3,222,460	$ 9,170,659	$ 10,938,689
Douglas	146,343	$ 46.46	$ 13,727,676	$ 6,459,876	$ 8,269,223	$ 5,666,488	$ 4,736,374
Effingham	64,296	$ 74.72	$ 17,159,881	$ 4,367,933	$ 2,729,509	$ 7,315,232	$ 32,109,204
Fayette	114,421	$ 125.17	$ 15,247,061	$ 7,168,557	$ 24,010,785	$ 11,788,409	$ 9,208,947
Floyd	98,498	$ 93.35	$ 14,586,006	$ 12,046,893	$ 4,312,639	$ 11,226,089	$ 9,257,349
Forsyth	244,252	$ 425.50	$ -	$ 64,679,111	$ 167,925,622	$ 79,182,720	$ 112,715,238
Fulton	1,063,937	$ 52.15	$ 80,999,000	$ 79,165,000	$ 24,284,000	$ 62,988,000	$ 88,709,000
Glynn	85,292	$ 297.47	$ 4,894,561	$ 40,221,445	$ 22,247,323	$ 13,646,605	$ 49,773,290
Gordon	57,963	$ 66.45	$ 2,605,848	$ 3,453,909	$ 1,487,191	$ 6,613,433	$ 3,493,677
Gwinnett	936,250	$ 288.42	$ 330,907,000	$ 204,528,000	$ 302,676,000	$ 302,884,000	$ 187,008,000
Hall	204,441	$ 60.28	$ 9,938,624	$ 8,167,445	$ 24,519,959	$ 4,284,241	$ 6,535,165
Henry	234,561	$ 96.84	$ 6,236,649	$ 16,008,449	$ 45,170,025	$ 6,969,170	$ 6,364,406
Houston	157,863	$ 104.09	$ 5,954,628	$ 13,828,871	$ 6,243,133	$ 29,223,142	$ 11,176,569
Jackson	72,977	$ 45.62	$ 1,910,916	$ 2,927,568	$ 4,330,650	$ 2,730,202	$ 10,859,286
Liberty	61,435	#VALUE!	$ -	$ -	$ 6,178,833	$ 1,803,845	$ 536,064
Lowndes	117,406	#VALUE!	$ -	$ 7,366,179	$ 10,783,955	$ -	$ 2,730,981
Muscogee	195,769	$ 207.36	$ 35,443,686	$ 17,209,489	$ 60,396,008	$ 44,176,484	$ 34,109,453
Newton	111,744	$ 28.48	$ 2,137,414	$ 3,241,190	$ 1,993,572	$ 4,312,579	$ 4,681,593
Paulding	168,667	$ 182.10	$ 22,967,670	$ 41,987,390	$ 31,212,212	$ 18,942,512	$ 18,097,581
Richmond	202,518	$ 310.15	$ -	$ 133,404,748	$ 30,832,763	$ 24,195,184	$ 293,785,895
Rockdale	90,896	$ 108.00	$ -	$ 12,676,472	$ 10,892,280	$ 5,881,524	$ 8,854,356
Spalding	66,703	$ 135.26	$ 4,471,243	$ 7,540,224	$ 16,896,054	$ 2,629,477	$ 3,085,941
Troup	69,922	$ 45.35	$ 428,911	$ 3,516,797	$ 3,353,866	$ 2,642,452	$ 9,738,311
Walker	69,761	$ 65.22	$ 6,534,403	$ 970,271	$ 1,710,602	$ 10,968,445	$ 3,190,834
Walton	94,593	$ 228.07	$ 7,346,234	$ 7,971,913	$ 6,451,094	$ 50,299,818	$ 2,270,234
Whitfield	104,628	$ 133.16	$ 10,702,386	$ 4,948,073	$ 24,620,084	$ 12,227,205	$ 5,926,326

It is important to note that while 25% of the counties contain 79.5% of the population of the state, this county cluster also contains 71.4% of the most at risk members of Georgia society, those already living in poverty. If water rates are indeed escalating due to infrastructure investment in these large, populated counties, the rate pressures may be disproportionately affecting a larger, poorer citizen base. Approximately 1,547,700 Georgia residents were listed as living in poverty in 2019. These 41 counties were home to 1,104,911 of these individuals.

More specifically, the eleven counties that were investing the most in infrastructure on a per resident basis, accounted for 40% of the state's poor population. Rates that were escalating faster than the rate of inflation in these counties may be contributing disproportionately to the poor becoming poorer due to the water rate increases as a contributing factor. The literature addressed the concerns that rate adjustments were affecting the poor in a much more disproportionate manner as rates escalate faster and use more and more of household income. Water rate increases have the same effect as a regressive tax by taking a greater percentage of household income at the very lowest of income levels. The poor become poorer simple because more of their income is required to pay the increasing rates. Table M shows the number of residents and poverty levels in the eleven high investment counties.

TABLE M

County	Population1	Poverty%	Number of Poor
Chatham	289,430	14.4%	41,678
Cherokee	258,773	7.4%	19,149
Clayton	292,256	17.6%	51,437
Cobb	760,141	9.1%	69,173
De Kalb	759,297	14.3%	108,579
Forsyth	244,252	5.0%	12,213
Fulton	1,063,937	13.5%	143,631
Gwinnett	936,250	9.2%	86,135
Hall	204,441	13.2%	26,986
Henry	234,561	7.5%	17,592
Richmond	202,518	21.9%	44,351
Grand Total	**5,245,856**	**133.1%**	**620,925**
			40%

The 41 counties tested in this group returned results that showed that 52.6%, or 22 counties had invested at least an average of $100 per resident over the five years in infrastructure. Investments of $100 or more per resident was compared to water rate increases from 2016 through 2019 for these same counties.

The results reflected that for counties spending the most per citizen, between 31.8% and 45.5% were also experiencing water rate increases that were far surpassing national annual inflationary levels for each year. While some of these counties may have increased rates more than inflation during the four year period, more than a third of them had increased rates more than the rate of inflation multiple times over the course of the five years. The means for each year of rate increases for the 41 largest populated counties is shown in table N.

TABLE N

County Spending	2019 Mean	2018 Mean	2017 Mean	2016 Mean
>$100 Per Resident	9.78%	2.21%	1.09%	7.98%
$28 - $97 Per Resident	7.85%	-0.44%	4.03%	-4.17%

The counties that had spent more than $100 per resident raised water rates an average of 9.78% in 2019; 2.21% in 2018; 1.09% in 2017 and 7.98% in 2016. Three of the four years reflected averaged rate increases greater than inflation.

The low end of investment spending for this group of counties, ranged from $28 to $97 per resident, and the means were much more erratic over the four years. The year 2019 rates increased on average by 7.85% and the 2017 average rate increases were 4.03%. Both tracked far more than the inflation rate for the two years. The year 2018 and 2016 saw average water rates decrease overall. The average deceases had the effect of offsetting all but the 2019 rate increases for the group. The review of these 41 largest populated counties, seemed to indicate that there may be a relationship between more investment on a per resident basis with higher rate increases occurring over the year in which high per resident investment was occurring. However, it was not conclusive and chance occurrence could not be ruled out.

The analysis was re-run for the 77 remaining counties that represented populations of less than 50,000 residents and where data was available. The statistics are shown in table O.

TABLE O

County Spending		2019 Mean	2018 Mean	2017 Mean	2016 Mean
<50,000 Residents	N= 77	2.40%	1.70%	5.30%	2.20%
Inflation Rate		2.30%	1.90%	2.10%	2.10%

The average per resident investment made in these counties was $130.74 over the five year period. What stood out in the smaller populated counties was that the mean investment per resident was only 18.7% less than the mean investment made in the larger populated county group. The large county mean investment was $160.94 per resident compared to $130.74 mean for the smaller populated counties. This was a modest difference in terms of dollars spent per resident but the mean average for annual rate increases were much less than in the largest counties. Rate adjustments for 2019, 2018 and 2016 were right at the inflation levels for each of the three years. This compared to the largest counties that were experiencing rate increases that were higher than inflation. The rate year 2017 was the only year that reflected an average rate adjustment that was 2.5 times the annual inflation rate for the smaller county group. This data may suggest that there is a relationship between spending on infrastructure and rate adjustments for a group of counties. The prediction that more infrastructure investment is leading to faster water rate increases however is not fully supported by the results.

Correlation Between Variables

The researcher was interested in trying to determine if there was any correlation between research variables that were used in this study to answer research question number two. There were a number of tests that were conducted in order to determine if a strong or weak positive or negative correlation existed between several of the variables included in this study. The research variables that were tested for correlation included the amounts spent by county governments in Georgia on capital infrastructure, the average amount of spending per county resident by county and the amount that rates increased in any given year. Water rates per 7,000 gallons of use were also tested to varying degrees to determine if correlation existed between

the rates being charged within a county in a particular year and the amount of infrastructure spending that occurred in the same year within the same county.

In order to determine if there was any correlation between capital spending by county government and rate increases, a Pearson Correlation test was conducted on each year of data. More specifically, each year of capital spending by county government was compared to water rate increases by year and by county. The data was run through a Pearson Correlation calculation to gage the degree of correlation, if any, existed. In addition to each individual year of capital investment and water rate increases being analyzed using the Pearson test, the average spend per county resident over the five years of data was also analyzed for possible correlation. The average spending per resident by county was analyzed in relation to annual water rate increases between the years 2016 and 2019.

Once the Pearson tests were conducted, a correlation matrix was run for the variables that were being used to help answer research question number two. The correlation matrix was run in excel and compared the correlations of eleven variables that were collected for 159 counties. Not all of the 159 counties had data for every category of variable. The correlation matrix in Table P compares the variables for 70 of the 159 counties or 44% of the total number of counties in Georgia. These 70 counties had data available for all the variables that were being tested. The matrix is color coded to reflect the strongest negative correlation, in red, compared to the strongest positive correlations in blue. The closer the correlation number between variables is too white, the closer the correlation is to no correlation at all between the variables. The strongest negative correlations are those that exist between the 2015 capital spending and the 2017 and 2018 water rates being charged by the counties that were included in the matrix.

The correlation between the amount of capital investment spending and the rates being charged for water by these 70 counties indicate that there is a very weak negative to no correlation occurring between the variables. Using this matrix, this would indicate that water rates are not being affected by capital infrastructure spending within this group of 70 counties.

TABLE P

	2019 Capital	*2018 Capital*	*2017 Capital*	*2016 Capital*	*2015 Capital*
2019 Rates	-0.087550461	-0.103668073	-0.076105295	-0.082881235	-0.143028116
2018 Rates	-0.094895654	-0.118601626	-0.102308849	-0.102921721	-0.165257776
2017 Rates	-0.105399264	-0.120307692	-0.105517146	-0.114497425	-0.174857075
2016 Rates	-0.07363564	-0.095705747	-0.082403862	-0.086946252	-0.135769597
2015 Rates	-0.023986657	-0.043709172	-0.038378439	-0.050128488	-0.068109509

The researcher re-ran the correlation matrix using fewer variables in an attempt to capture a larger N value of counties. The second test conducted looked at five variables versus eleven. The five variables were 2017, 2018 and 2019 capital investment spending and the water rates being charged in 2019. The increase in water rates between 2018 and 2019 were also part of this correlation test. This sample resulted in slightly more counties participating. A total of 87 counties were included in this study versus 70 where eleven variables were tested for correlation. The results of this test were similar to the first. There was virtually no correlation between 2019 water rates or 2019 rate increases and the capital spending in 2017, 2018 and 2019. The strongest positive correlation was actually between year over year capital spending in 2018 and 2019. This test would also seem to indicate that capital spending is not influencing water rates or water rate increases for these counties in the years included in this matrix test (table Q).

TABLE Q

	2019 Capital	2018 Capital	2017 Capital	2019 Water Rates	2019 Rate Increase
2019 Capital	1				
2018 Capital	0.5791614	1			
2017 Capital	0.676104296	0.965253889	1		
2019 Water Rates	-0.046691527	-0.033554844	-0.047196125	1	
2019 Rate Increase	0.028837609	0.035605092	0.064572419	0.321021035	1

The final correlation matrix was run using variables to test if there was any correlation between the previous year's rate increases and the spending by counties that took place the following year. A positive correlation may have indicated that higher rates in the previous year drove capital spending increases in the year that followed. However, as the matrix shows in Table R there is no correlation between increases in water rates and capital spending. The strongest positive correlation was once again between the capital spending across years. The N for this test returned 99 counties with data that was tested and accounted for 62.2% of the counties in Georgia.

TABLE R

	2018 Capital	*2017 Capital*	*2016 Capital*	*2019 Increase*	*2018 Increase*	*2017 Increase*
2018 Capital	1					
2017 Capital	0.961847489	1				
2016 Capital	0.68438772	0.779074747	1			
2019 Increase	0.027405929	0.062637994	0.057954388	1		
2018 Increase	-0.025723641	-0.017103369	0.010517817	-0.036820093	1	
2017 Increase	-0.042862634	-0.042529764	-0.051606342	-0.117878083	-0.045309216	1

Prior to the correlation matrix's being run for the three scenarios previously described, Pearson correlation tests were conducted on a combination of nine variable relationships. These tests included running a Pearson combination on capital investment spending by year from 2016 through 2019 and comparing each year worth of spending to the increase in water rates for the same years. The N for each of these tests are noted in Table S.

TABLE S

Pearson Correlation Tests

Test Variable	*Number of Counties Tested*
2019 Capital Spending	90
2019 Rate Increases	90
2018 Capital Spending	120
2018 Rate Increases	120
2017 Capital Spending	114
2017 Rate Increases	114
2016 Capital Spending	114
2016 Rate Increases	114
Averge Per Citizen Spending	111
2019 Water Rates	111
Averge Per Citizen Spending	114
2018 Water Rates	114
Averge Per Citizen Spending	111
2017 Water Rates	111
Averge Per Citizen Spending	102
2016 Water Rates	102
Averge Per Citizen Spending	106
2015 Water Rates	106

The Pearson Correlation test results for each of the variables reflect that there is a virtually no correlation between the variables being compared and therefore the variables are not influencing each other in any significant manner.

90 Counties comparing 2019 Capital Spending and 2019 Increases in Water Rates

PEARSONS TEST

Coeffecient (r):	0.02928	
N:	90	
T Statistic:	0.274791	
DF:	N-2	90-2
Pvalue:	0.784121	

120 Counties comparing 2018 Capital Spending and 2018 Increases in Water Rates

PEARSONS TEST

Coeffecient (r)	-0.00934	
N:	120.0	
T Statistic:	-0.1015	
DF:	N-2	118.0
Pvalue:	#NUM!	

114 Counties comparing 2017 Capital Spending and 2017 Increases in Water Rates

PEARSONS TEST

Coeffecient (r)	-0.03801	
N:	114.0	
T Statistic:	-0.40257	
DF:	N-2	112.0
Pvalue:	#NUM!	

114 Counties comparing 2016 Capital Spending and 2016 Increases in Water Rates

PEARSONS TEST

Coeffecient (r)	-0.0209	
N:	114.0	
T Statistic:	-0.22122	
DF:	N-2	112.0
Pvalue:	#NUM!	

111 Counties comparing Average Citizen Spending and 2019 Water Rates

PEARSONS TEST

Coeffecient (r)	0.043971	
N:	111.0	
T Statistic:	0.459516	
DF:	N-2	109.0
Pvalue:	0.646779	

114 Counties comparing Average Citizen Spending and 2018 Water Rates

PEARSONS TEST

Coeffecient (r):	0.027649	
N:	114.0	
T Statistic:	0.292721	
DF:	N-2	112.0
Pvalue:	0.770277	

111 Counties comparing Average Citizen Spending and 2017 Water Rates

PEARSONS TEST

Coeffecient (r)	0.005168	
N:	111.0	
T Statistic:	0.053951	
DF:	N-2	109.0
Pvalue:	0.957073	

102 Counties comparing Average Citizen Spending and 2016 Water Rates

PEARSONS TEST

Coeffecient (r)	-0.02887	
N:	102.0	
T Statistic:	-0.28882	
DF:	N-2	100.0
Pvalue:	#NUM!	

106 Counties comparing Average Citizen Spending and 2015 Water Rates

PEARSONS TEST

Coeffecient (r)	-0.0656	
N:	106.0	
T Statistic:	-0.67046	
DF:	N-2	104.0
Pvalue:	#NUM!	

The completion of the Pearson testing and the Correlation Matrix testing indicates that very minor to no correlation exists between the capital spending variables, the water rates that are being charged or by actual water rate increases that occurred across the years in the study. Although not all 159 counties supplied enough data to include 100% of the counties in the correlation testing, the correlation testing did include between 57% and 72% of all counties in Georgia. The results from the various test indicate that the variables are unrelated and capital spending did not positively influence the increase in water rates between 2016 and 2019.

This second research question was focused on trying to determine if there is a cause and effect between overall capital infrastructure spending by a municipal county government and water rate increases to area residents. One of the major challenges with addressing this question in this manner was identifying how best to define capital infrastructure investment. In order to best determine what capital spending should be included in the research, the structures of water utilities in the state of Georgia had to be researched and better understood. Public water utilities in Georgia are categorized for this study based on business structure in one of four ways. The categorization was based on the 2019 study by the University of North Carolina Environmental Finance Center that found that 83% of the nearly 500 water utilities included in the study were owned and operated by municipal governments in the state. Only 10% of the study group of water utilities were stand-a-lone authorities and less than 7% were run by a few consolidated governments or non-profits.

In counties where there may have been multiple water systems, the rates for each water system over the years studied were looked at in the context of the overall capital and infrastructure spending by the county in which the water systems are located. The researcher

included multiple water operations under a number of municipal governments and water rates for these types of water systems were consolidated and averaged.

Spending by county governments on infrastructure was analyzed in a manner that isolated the type of infrastructure included in the analysis. The researcher made every effort to include only infrastructure that was clearly listed in the county comprehensive annual financial report. The comprehensive annual financial report was the document used consistently for all of the counties identified in the study. The categories of capital assets additions for each year included in the study were comprised of buildings, equipment, machinery, and infrastructure clearly identified in the comprehensive annual report. In counties that included their water system operations as a separate business type activity on the annual report, capital asset investment from that business unit was included. This involved pulling in the separate business unit asset additions including infrastructure, equipment, and buildings and consolidating the investments with the overall county government investments. Non-depreciable capital spending or investments in land, a non-depreciable investment, were not included in the analysis.

This methodology for data collection was consistent for all counties that were included in the study. The research questions addressed the need to understand capital spending for infrastructure in general, which may be comprised of a number of different depreciable categories of assets. The question addressed was if capital infrastructure investment overall was affecting water rates in a specific county. While the level of infrastructure spending by a county could have been for any type of depreciable asset in the categories mentioned previously, the researcher wished to determine if there was any correlation between the amount of infrastructure spending taking place and how fast water rates from a fee based component of government were increasing.

The collection of total infrastructure spending for buildings, equipment and infrastructure was viewed as necessary for this study because of the manner in which county governments treated the consolidation of their utility operations. In some cases, utilities were treated as separate business type units while in other cases the financial information was not broken out separately. It was also a challenge at times to determine if the utility was actually a component unit of the county government.

A second challenge that faced the researcher involved the information found in the literature regarding the use of water revenue to fund general government activity. Information from in the literature revenue found that general governments have for years been taking revenue out of the water systems to pay for other government spending, including capital projects (Berahzer, 2013). One example in the state of Georgia is the case of Columbus Water Works Water Utility in Columbus Georgia. The municipal government that owns the utility charges a 5% a year "participation fee" to the water utility based on total revenues (Columbus Water, 2019). The funds generated by water sales are used for non-water related municipal government operations within the county.

The county governments that may be using revenues from a water enterprise fund to help pay for infrastructure unrelated to water should be accounted for in the total spending of the government. The researcher felt that by looking at all infrastructure spending, this use of funds would be included.

Chapter Five

Impact of Capital Spending on Water Rates

A CASE STUDY AND ANALYSIS OF CHATHAM COUNTY, DOUGHERTY COUNTY, MUSCOGEE COUNTY & RICHMOND COUNTY GEORGIA

Introduction

A major challenge in finding support for the hypothesis for research question number two was determining how, and from what financial sources, Georgia Counties were actually funding capital infrastructure replacement costs related to water treatment and water distribution services. The question also asked if water rates were being affected by capital spending. The hypothesis for question number two was based on the premise that the more spending a Georgia County laid out for infrastructure ultimately influences how fast water rates in the same county community would increase. This hypothesis is supported by much of the literature referenced in this research paper on a national level (Stein, 2019). The literature points to the need by many utilities to replace water infrastructure that has reached the end of its useful life. The literature also suggests that financing will have to come from water rate increases over the coming years in order to pay for the costs (Layne, 2019). The prospect of water rates increasing to support infrastructure upgrades and replacements continues to be a major area of concern and a future planning focus for water utilities across the country.

Water utility service rates may continue to rise and in some communities those increases may be as much as $300.00 to $550.00 per year for many households due to infrastructure replacement costs (Crow, 2012). This magnitude of annual water price increases would impact 90% of all counties in the State of Georgia in a very negative manner for millions of households. In the State of Georgia, an annual increase of $550.00 for water would impact 90% of the 159 counties by adding significant costs to household budgets. The percentage of county household income required to pay for water might increase between 1.0% and 2.3% for 143 of 159 counties based on median household income levels (United States Census, 2020) . Households that are already financially stretched to pay for water services could see their water bills more than double

in many counties as a percentage of total household income outlay. These types of increases, based on household income levels would no longer keep water affordable for many households.

Determining just how Georgia water utility rates are being used for infrastructure replacement financing is challenging. Water rates are collected by water utilities for providing water services to the public. These revenues flow through the utility and are used to support normal daily business operations as well as support debt service payments on borrowing to fund large capital projects. Capital projects that are often funded by public debt issues of water utilities are most often associated with capital infrastructure needs that support the treatment and distribution of water to customers (Prouty, 2020). In addition to the difficulty of determining how water revenues are being used to finance water infrastructure there is a challenge in determining what types of infrastructure is actually being funded from these water revenues. Water rates drive water revenues and revenues fund operational expenses and capital costs, but just how much and to what extent is difficult to ascertain. The literature certainly supports the premise that water rates are increasing to a certain extent due to the need to fund infrastructure.

The collection of data for research question number two looked at capital spending by Georgia County Governments and the spending in relation to water rate increases. This capital spending data was compiled from comprehensive annual financial reports that were consistent for all county governments in the study. The study of the impact of infrastructure investment on rising water rates also poses a challenge in identifying if water rates are being used to fund non-water related infrastructure as well. The researcher wanted to try to determine if county governments were utilizing water revenues to fund non-water related infrastructure?

It was important to try to determine if there was a relationship between increasing water rates and the amount of infrastructure replacement that is taking place within Georgia County

Government. However, this challenge was highlighted even more when Pearson Correlation testing was conducted and a correlation matrix was run for many of the variables used in the study. The Pearson tests showed a very low negative correlation to no correlation at all between water rates, water rate increases and the amount of capital spending in many of the Georgia Counties'.

This case study is being used to better understand if a relationship exists between water rates, water rate increases and the amount of capital infrastructure spending occurring at the county level by analyzing data for four Georgia Counties'. The results of the Pearson tests advanced the need for further study of the relationship between these three primary variables. This furthers the main research by using a case study to help support the hypothesis for research question number two.

This case study sampled four Georgia Counties' and the water utilities that serve the county residents. The case study was undertaken in an effort to better understand how infrastructure investment is being funded by water utility revenues. The researcher also wanted to determine if there is any relationship between water rates, water rate increases and capital infrastructure spending in the four counties. These areas include to what degree infrastructure is being funded by water rates and to what degree water rates may be increasing because of the infrastructure funding.

Literature Review

The literature review for this case study looked at support for rate increases within four counties in Georgia. The literature review hoped to find a connection between rate increases and infrastructure replacement costs within each county. If evidence can be found that support the hypothesis that water rates are increasing due to infrastructure replacement costs, then this may add additional qualifying support for the hypothesis to be true. The quantifying testing that took place using Pearson tests for correlation between the variables is so far leaning toward a conclusion that the hypothesis should be rejected and that the alternative should be accepted. The alternative is that water rates are not increasing due to county infrastructure spending and investment.

In addition to identifying some causes of water rate increases in these counties, the researcher looked for evidence that water utilities were funding other types of infrastructure with water revenues and water rate adjustments. This included looking into evidence that water utilities in the case study were paying a franchise fee or contributing revenue share to the county government. If this were found to be true it may indicate that water revenues and the underlying water rates were being used to fund other areas of government and capital projects that were not directly tied to water treatment, water production, and water distribution.

The case study did rely on some of the same quantifiable data that was included in the overall research project. This included the use of infrastructure reporting and spending that was taken from the county annual comprehensive annual reports for the four counties included in this case. The literature review for this case, however, was specific to the four counties included in the study.

The four communities were selected from the total population of counties used in the overall research paper. The counties that were selected for the case study were Chatham, Dougherty, Muscogee, and Richmond. It turns out that all four counties have prominent cities located within their borders with a sizable population. Chatham County is a coastal community and home to Savannah, an international destination for tourists. Dougherty County is home to Albany Georgia, one of the poorest communities in the United States according to census data (Center Square, 2019). The largest employer in the county is the historic Albany State University. A historic black college founded in 1903. Muscogee County boarders Alabama, and the largest city in Muscogee is Columbus Georgia, a university town as well. Muscogee County is one of only eight consolidated local governments in the State of Georgia. The counties' largest city, Columbus, is part of the consolidated government and the county is more correctly named Columbus-Muscogee County. Finally, Richmond county is home to Augusta and is also one of the eight consolidated local governments, Augusta-Richmond County. Consolidated local governments in the state of Georgia are a single governance unit responsible for managing a larger county geographic area as well as a more central city hub. The eight consolidated local governments at some point in their past were two separate local governments that were consolidated by voters in an attempt to gain efficiencies for the local residents.

Three of the four counties were selected because of demographic and economic considerations. These considerations included large minority populations, lower per capita income, median household incomes significantly below the federal median and high poverty levels. The fourth county, Chatham is a slightly more affluent community compared to the other three counties. While there is significant poverty in Chatham as well, Chatham is an area that was considered for the case study because it is a little different demographically than the

other three. It was hoped that the inclusion in the case would provide additional information.

The demographics for all four counties are in table T.

TABLE T

Prominent Cities Data from 2020	Chatham County Savannah, GA	Dougherty County Albany, GA	Muscogee County Columbus, GA	Richmond County Augusta, GA
Population estimates	265,127	87,956	195,769	200,518
Persons 65 years and over	14.4%	16.5%	13.0%	14.5%
Female persons	52.0%	54.0%	51.2%	51.5%
White alone	53.0%	26.3%	43.3%	37.1%
Black or African American alone	41.2%	71.0%	46.3%	57.7%
Hispanic or Latino	6.7%	3.1%	7.6%	5.1%
Median value of owner-occupied housing units	$ 194,500	$ 103,500	$ 141,300	$ 108,000
Median gross rent	$ 1,085	$ 746	906	$ 888
Households with a broadband Internet subscription, percent	85.2%	73.4%	78.4%	75.8%
High school graduate or higher, percent of persons age 25 years+	89.9%	83.4%	88.0%	84.1%
Bachelor's degree or higher, percent of persons age 25 years+	33.6%	21.4%	25.8%	21.4%
Persons without health insurance, under age 65 years	16.4%	16.5%	13.2%	14.3%
Median household income	$ 56,842	$ 39,584	$ 46,408	$ 42,728
Per capita income in past 12 months	$ 32,229	$ 22,059	$ 26,097	$ 22,787
Persons in poverty	14.4%	29.5%	20.1%	21.7%
National poverty level	11.1%	11.1%	11.1%	11.1%
Population per square mile	622	288	878	618
Land area in square miles	426	329	216	324

(Source US Census Bureau)

Two of the counties, Dougherty and Richmond had a black minority that was the majority in the county. In Dougherty County 71% of the population is black while in Richmond County, 57.7% of the population is black. Minority groups comprise the vast majority of residents in 3 of the 4 counties with only Chatham County being below 50% at 47.9%. Minority population was important in the case study because the literature has suggested that minorities are impacted by rate increases in a disproportionate manner than non-minority groups. Minority groups are also more apt to live at or below the poverty level than are non-minorities. In the case of all 4 counties, the county poverty level is well above the national average for 2020 of 11.1% (US Bureau of Labor Statistics, 2020). Even in the most affluent county of the four, Chatham, the poverty level is 30% higher than the national average. In Dougherty County it is nearly 200% higher. In Muscogee County it is 81% higher and in Richmond County, poverty is nearly double the national average.

First, identifying if water rates have actually increased in these counties over the period of years researched was important. Secondly, identifying reasons for those increases through review of the literature might provide additional qualitative support for the original hypothesis for research question number two. The water rate data collected over the five years indicate that except for Chatham County, rates have consistently increased since 2015.

County	2019	2018	2017	2016	2015- Base Year
Chatham County	No data	$ 21.36	$ 21.16	No Data	$ 39.14
Doughterty County	$ 22.09	$ 22.09	$ 21.65	$ 20.62	$ 20.28
Columbus-Muscogee County	$ 55.16	$ 22.43	$ 21.45	$ 20.54	$ 19.64
Augusta-Richmond County	$ 33.50	$ 33.46	$ 33.46	$ 32.49	$ 30.66

In the most recent water rate increases for Columbus-Muscogee County, the Columbus Water Works noted that in calendar year 2021 water rates would increase again by 3.75% (Columbus Water Works, 2020). These new rates could be expected to add almost $27.00 a year to a family's water costs. The water rate increases in Columbus-Muscogee County were expected to fund necessary upgrades in key areas of water infrastructure. Columbus-Muscogee County acknowledged that rate increases are necessary to avoid paying emergency repair costs that were typically three to five times more costly than planned or replacement costs of infrastructure (Columbus Water Works, 2020). This lends some support to the premise that rates were going up to fund capital water projects.

In January 2020, Augusta Utilities, the utility that provides services to Augusta-Richmond County residents, notified rate payers that rates would be increasing 3.0% for residential water bills on January 1st. This was more than the annual inflation rate at the time and seemed to indicate that Augusta had moved to a fixed 3.0% increase annually going forward. Augusta Utilities gave the need to fund capital improvements to the system as the main reason for the increases (WFXG, 2020).

Albany, the major city in Dougherty County, recognized in the Albany & Dougherty County Comprehensive Plan 2026 submitted for review in June 2016, that economic development was critical to decreasing poverty levels and increasing the standard of living in the county. Economic development and growth would require major water infrastructure funding and water was a major driver of economic development (Albany-Dougherty County, 2016). Water availability and affordability was important and expanding new and upgrading existing infrastructure was important for growth within the county. While water rates were

expected to finance some of the improvements, water had to remain affordable for residents. A balancing act of sorts between funding needs and water rates.

In another small water system within Dougherty County, the water system had been experiencing excess water loss due to an aging system for years. The water utility utilized an approved low interest loan from the Georgia Drinking Water State Revolving Fund to address much needed infrastructure repairs and recoup lost revenues (reports, F. Staff, 2020). Lines of credit, loans, and bond issues to support and finance infrastructure repairs require the ability by a water utility to service the debt for such repairs. Even low interest bearing loans require that a utility show an acceptable level of revenue generation and cash flow to service debt load placed on the utility. This means while rate hikes may not be exorbitant compared to inflation rates, the rate hikes are needed to fund debt incurred as a result of capital projects.

In 2017, the Albany Utilities Board found themselves defending their annual budget recommendations to the public. The budget included significant rate increases that were deemed necessary to address the aging infrastructure in the community. The proposed rate hike was expected to bring in an additional $2,600,000 in much needed revenue to address the deficiencies in the aging utility (WALB, 2017). This utility specifically addressed aging infrastructure as a primary reason for rate increases.

Within Chatham County and within the county's largest city, Savannah, the City Council approved a 2.0% rate increase in water rates and a 2.0% increase in sewer rates for 2021. Rate increases were deemed necessary to not only address operational costs, but necessary to continue with infrastructure replacement and upgrade costs (Thies, 2021). Again, addressing failing infrastructure through water rate increases.

In Columbus-Muscogee Georgia, the Columbus Water Works recently borrowed $13.3 million dollars from the Georgia Environmental Finance Authority to fund much needed water infrastructure and replacement costs (Georgia Communities, 2021). Low interest loans provided by the Georgia Clean Water State Revolving Fund may be less costly to Columbus Water Works than traditional financing, but the Georgia Environmental Finance Authority requires that a utility guarantee that loans can be repaid on time and that there is a history or strategy in place for addressing at least modest increases in water rates going forward. Staying at or below inflation rates for water rate increases is often a motivator for Water Utility Boards. However, this is often not in synch with the reality of needs required to update and improve water system assets.

During the COVID-19 pandemic, during a single board meeting, the Board of the Columbus Water Works proposed a comprehensive plan to address multiple years of rate increases at a single sitting of the Board. In October of 2020, the Columbus Water Works Board proposed a rate resolution that would eliminate the need to revisit rates annually for the next five years. Instead, the Board passed a resolution that locked in rate adjustments every January 1st in the amount of 3.75% a year from 2021 through 2025. The rate adjustments are based on meter size which is more in line with industry standards going forward. It also took the disruption of rate adjustment meetings out of annual discussions over the next five years. The Board specifically referenced the need to fund infrastructure needs as the driving factors for the rate adjustments (Reh, 2020).

In the 2019 Annual Drinking Water Quality Report, Augusta Utilities addressed the funding of major construction projects including the refurbishment of the Highland Avenue Water Treatment Plant and major transmission lines. Augusta also emphasized the importance

of their proactive capital improvement program and funding requirements (Augusta Water, 2019). Augusta tied these discussions back to rate increases.

The cost of water infrastructure replacement and rehabilitation continues to increase at alarming rates. The financing sources required to fund multi-million dollar capital water infrastructure projects, whether they are a pay-as-you-go project or are financed through loans and debt securities, still must be paid from rates generated by customers. The costs to improve, replace and upgrade infrastructure in these four communities are impacting water rates according to the literature. There is evidence to suggest that rates are increasing, in some cases significantly more than inflation specifically to pay for and fund water infrastructure projects. The projects are often not expansion but rather replacement of existing infrastructure.

This case study also looked at the literature to see if any indication existed that might support that water revenues were being extracted from the utility to fund other non-water related government spending. The increase in water utility rates within the four counties in the case study are supported by the literature that references the financing to fix, improve and upgrade existing water infrastructure. However, if any of the four county water utility revenues were being used to fund other government related spending through the use of franchise fees or revenue sharing, it may suggest that increasing water rates are being impacted by non-water related expenditures as well.

In Columbus-Muscogee County, the Columbus Water Authority is a water and sewer utility that generated just under $70,000,000 in total operating revenues during their fiscal year 2019. Water sales accounted for approximately 46% of the total revenue for the year. Sewer accounted for 38% and the remaining 16% came from government contracts and miscellaneous income and fees. At the end of 2019, the Columbus Water Works transferred 5.3% of their

gross revenues for the year to the consolidated government of Columbus-Muscogee County. The $3.7 million that was drawn out of the water and sewer utility enterprise was sent to the general fund for other uses (Columbus Water Works, 2020). This is a county example where water revenues are being used for non-water related spending.

Savannah Georgia Water and Sewage Department generated $80,000,000 in revenue during fiscal year 2020. As part of a larger general government, the Savannah water system is operated as an enterprise fund and accounted for accordingly. A review of available literature reflects that enterprise fund revenues generated by the water and sewage department are being used to fund water and sewer infrastructure, service water and sewer public debt and re-invest in the water and sewer system (Savannah Georgia, 2020). By all accounts, water rate increases in Chatham County are funding only water related projects.

The main water utility in Dougherty County Georgia generated $22,500,000 in water revenues during fiscal year 2019. This water utility is also operated as an enterprise fund and operations are accounted for accordingly. There was no evidence found that would support any intergovernmental transfers occurring between the water utility and Daugherty County. There were modest transfers of $566,000 made to the City of Albany from water utility funds. Based on review of public financial reports all revenues generated by the Albany water utility go directly in the water system to support infrastructure replacement and upgrades as well as on-going operations of the system (Albany Georgia, 2020).

The Augusta-Richmond water utility generated $99,000,000 in operating revenues during fiscal year 2020. The Water and Sewer System Enterprise Fund of Augusta-Richmond is used to account for the activity of providing water and sewer services to the residents of the County. The activities that are required of the utility to provide all related services are

accounted for in this enterprise fund. This includes operations, maintenance, financing and related debt service, and billing and collection requirements. All water revenues remain and are re-invested into the water infrastructure and operations (Augusta Georgia Government, 2020).

In the case of all but Columbus-Muscogee County and the Columbus Water Works, review of available literature suggests that the revenues generated by the water utility operations of each county in this case remain with the utility. Water revenue sources and therefore water rates are funding water related infrastructure. This case represents a positive indication that while there is mention in national literature to water revenues being used to fund general government, three of the four counties in the case, do not appear to be pulling water revenues out of the utility for anything other than utility operations.

Method

This case study was selected to try to add additional support for the hypothesis for research question number two. The testing of all the counties in Georgia and the variables identified for Pearson tests, had resulted in low to no correlation between rates and capital spending. This case study selected three independent Georgia counties with high poverty, a significant minority population and low median household incomes relative to national levels. This selection process was used because of the negative impact that water rate increases often have on these demographic groups within communities. By selecting these counties, if water rates were increasing due to capital water infrastructure and replacement costs, counties with a demographic make-up that included more at risk groups were included in the case. The researcher selected the fourth county because it was slightly more affluent and had a lower at risk demographic group in the makeup. The decision to include Chatham County in the case was to see if there were any similarities or differences with less affluent communities.

The case study and the selection of county literature to support rate hikes occurring due to county capital spending was another tool to try to support the hypothesis of question number two. After finding virtually no relationship between the variables, a case study provided more quantifiable data that might provide additional information for the overall research question.

Discussion

One of the problems that the researcher faced in answering the research question was the results of the Pearson Correlation tests. It was hypothesized that water rates were increasing due to capital spending in the county. However, the correlation tests showed no such association. The national literature suggested that water rates were increasing due to the demand put on water utilities to fund infrastructure replacement costs. There was a very significant disparity between the literature and the testing for Georgia counties.

Another problem was the possibility that capital spending categories included in the main study were too comprehensive. It was possible that data was being included in the capital spending categories that should have been excluded as impacting water rate increases.

Findings

The case study provided additional evidence that water rates in all four counties were increasing due to capital water infrastructure replacement project costs. The literature review for all four counties provided support for recent rate increases as well as future increases. These increases were tied to a need by the utility to finance costly capital projects related to water infrastructure. While operational costs were mentioned, the capital outlays were the primary reason given for rate hikes. This support for the case also aligns with the national literature that support the rationale for water rate hikes being tied to capital replacement costs. This case study looked at recent rate hikes in the four counties and while there was no additional quantitative

testing completed, the literature points to capital projects and replacement costs being a major influencer on rate adjustments.

The case also looked at alternative use of water revenues to fund non-water related infrastructure. In two of the four counties included in the case, water utilities were having water revenues extracted from the utility for non-water related spending. Columbus-Muscogee County was using water revenues to fund non-water related expenditures. In Dougherty County, Albany Utilities transferred a small percentage of their gross revenues to another government enterprise.

The findings in the case study only supports that water rates in these four counties are increasing due to capital water project spending. The results are limited to these counties but do provide some support to suggest that rates may be increasing in other counties in Georgia due to capital water project spending as well. There is also reason to believe that some water utilities are having their water revenues used for other purposes other than water operations and capital improvements.

Case Study Limitations

The case study has some limitations of use. These limitations include a very limited review that was conducted on 4 out of 159 Georgia Counties. The case study is also limited by time constrains and access to additional data that may have helped further refine the study. The findings in four counties, while supported by both local and national literature does not necessarily correlate to other counties in Georgia.

Suggestions for Further Research

The counties selected in the case study were selected due to at risk demographic groups. High poverty among a large minority population is often made worse off due to water rate increases. Even if these rate increases are deemed necessary for addressing infrastructure concerns. The impact of water rate increases on poverty levels in these four counties and other counties located in Georgia may be of interest for further research.

In regard to poverty and the impact of water rate increases on poverty levels in these four counties the following has been added to the case.

Many factors contribute to poverty levels in a community. The lack of available jobs, job skills, education levels, technology and health are a few of the variables that affect poverty. Prior to reviewing the changes in water rates, the trends appear to be positive since 2017 in all four counties and show that poverty levels have been decreasing. The impact that changes in water rates may be having on the economic health of the community were reviewed over the period 2015 through 2019. Base year water rates were established using 2015 rates for 7,000 gallons of water supplied to the home. In the case of all four counties, rates increased significantly over the years 2016 through 2019. Not only did all four counties raise rates in at least three of the four years, but rates increased significantly more than the annual inflation rate in eleven out of the fifteen cases. Table U lists the year-over-year rate change percentages for each county in the case study.

TABLE U

	Chatham County Savannah, GA	Dougherty County Albany, GA	Muscogee County Columbus, GA	Richmond County Augusta, GA
	Increased Water Rates Above National Inflation in Red			
2019	**3.50%**	**3.70%**	-0.60%	0.10%
2018	**2.50%**	**2.00%**	**4.60%**	0.00%
2017	**5.60%**	**5.00%**	**4.40%**	**3.00%**
2016	-15.10%	-6.30%	**7.80%**	**4.10%**

(Source University of North Carolina Environmental Finance Center)

There was no support found that the rate increases were affecting affordability. While water rates were increasing at double or triple the national inflation rate, poverty levels overall were improving in each county. There may be other variables accounting for this improvement in poverty levels. Water rate increases may however be slowing the rate at which poverty levels are improving but further research would be required.

The amount of capital investment spending by each county over the five year period was overwhelmingly, a more is better approach. In the case of Chatham County, investments in infrastructure increased significantly every year and the five year average was 20.2% a year increase over the previous year. Dougherty County, the poorest of the four counties averaged a negative 6.8% over the five year period. Muscogee County averaged 25.2% a year increase over the previous year's level of spending. Richmond County averaged 67.1% increase each year over the previous year. Dougherty County, while they averaged a reduction in year over year spending of 6.8%, spending in the two most recent years increased significantly.

The case study shows that all four counties increased water rates, in some cases significantly more than inflation. All four counties spent between $32 million and $482 million

on infrastructure projects over the course of the five years and increased their spending year over year. At the same time that water rates were increasing and capital infrastructure spending was increasing, poverty levels were decreasing in all four counties. Table V shows the level of capital spending and year over year increases.

TABLE V

	Chatham County Savannah, GA	Dougherty County Albany, GA	Muscogee County Columbus, GA	Richmond County Augusta, GA
2019	$46,772,761	$ 5,177,218	$ 35,443,686	No data
2018	$30,267,930	$ 3,883,657	$ 17,209,489	$ 133,404,748
2017	$29,796,287	$ 3,222,460	$ 60,396,008	$ 30,832,763
2016	$26,655,423	$ 9,170,659	$ 44,176,484	$ 24,195,184
2015	$23,602,040	$10,938,689	$ 34,109,453	$ 293,785,895
5 - Year Spend	$ 157,094,441	$ 32,392,683	$ 191,335,120	$ 482,218,590

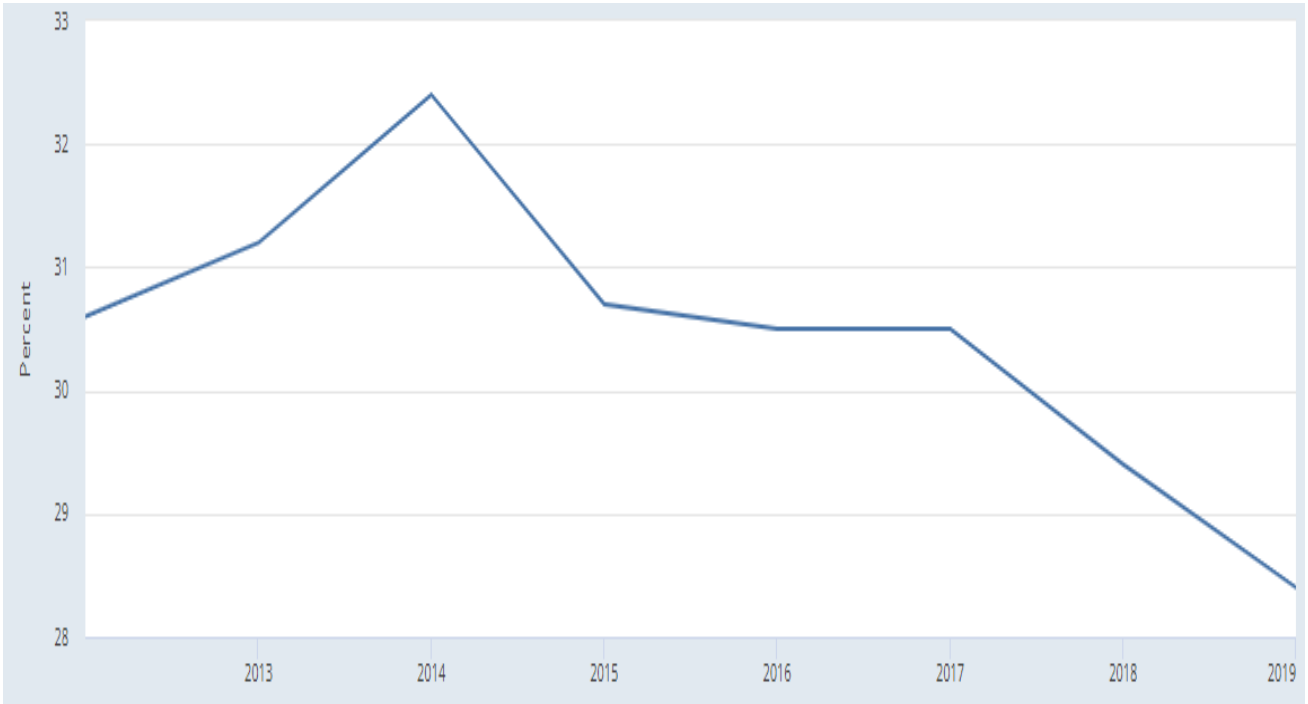
	Chatham County Savannah, GA	Dougherty County Albany, GA	Muscogee County Columbus, GA	Richmond County Augusta, GA
	Year Over Year Increase			
2019	54.5%	33.3%	106.0%	0.1%
2018	1.6%	20.5%	-71.5%	332.7%
2017	11.8%	-64.9%	36.7%	27.4%
2016	12.9%	-16.2%	29.5%	-91.8%
5 - Year Average	20.2%	-6.8%	25.2%	67.1%
Aver per Resident	$ 100.00	$ 62.00	$ 207.00	$ 310.00

The poverty graphs reflected in table W show the improvement in poverty levels in all four counties since 2017 (United States Census, 2019)

POVERTY GRAPHS – TABLE W

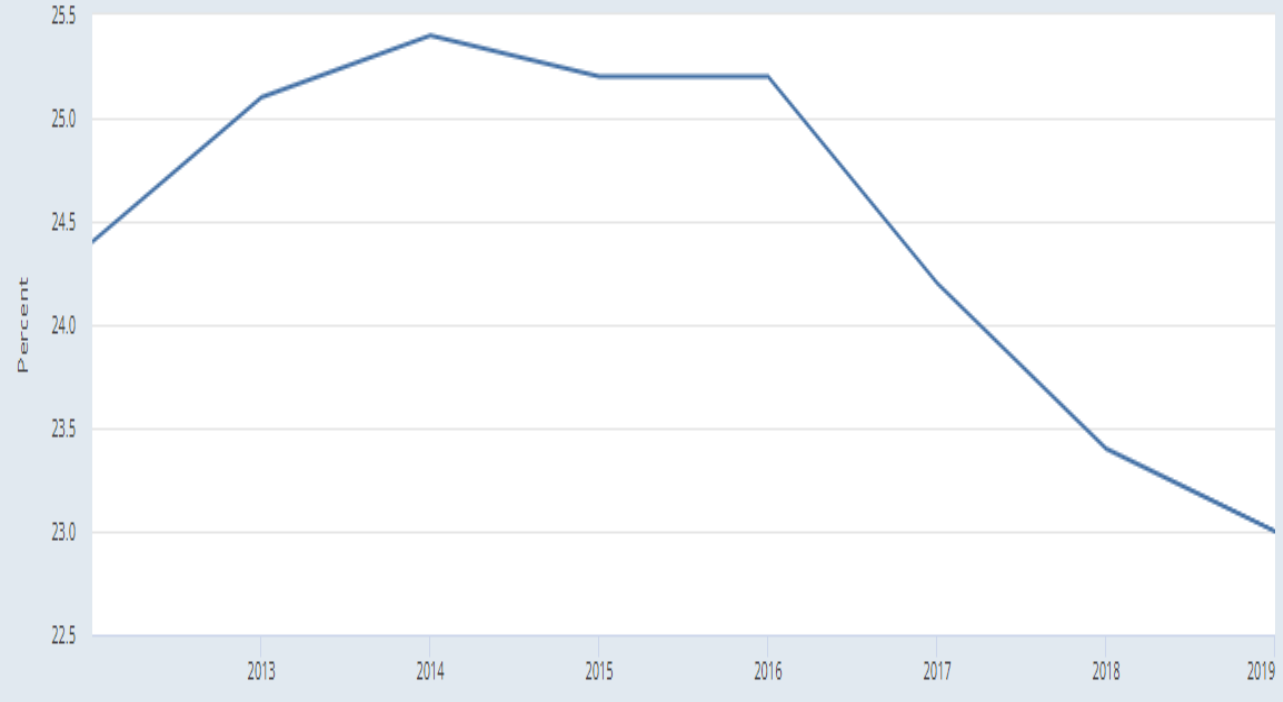
Chatham County Georgia Poverty Levels 2012 - 2019

Dougherty County Georgia Poverty Levels 2012 - 2019



Muscogee County Georgia Poverty Levels 2012-2019

Richmond County Georgia Poverty Levels 2012 -2019



It had been hypothesized that water rates in the state of Georgia were increasing at a slightly faster rate than the national inflation rate for any given year. Through the analysis of available data, the means of the annual rate increases were found to be increasing at a much faster rate than inflationary rates for three of the four years tested and for the five year period overall. Only one of the years reflected modest rate increases well below inflation levels. The case study also supports the premise of higher than inflationary rate increases would be occurring. However, the case study does not provide any evidence that increases and spending are negatively influencing poverty rates The support for the first research question would be validation of the prediction overall, however the researcher believes this response over-simplified the results and increases the risk of accepting the null hypothesis when it should in fact be rejected. A little professional skepticism about the mean averages for the entire group of counties may be skewing averages for the group due to the weighting of individual counties and larger rate adjustments overall.

The second research question asked if the amount of capital investment is influencing water rate increases, the data for the counties spending the most per resident suggest that it may be an influencing factor in how fast rates may be escalating. The researcher concluded that further study would be required to confirm this finding. This conclusion was reached based on the mean averages of the group of counties that were spending over $100 per resident on average in the populated counties with more than 50,000 residents. The researcher believes that the funding for question two is inconclusive.

Conclusion

The case study found an association between water rate increases and capital spending for water infrastructure among all four counties included in the case. The water rate structure in all four counties were increasing due to needed current and future capital costs. Rate increases were being used to fund directly or through loans and debt, the repair and replacement to water system infrastructure.

In addition, the case study determined that one county was utilizing water revenues to fund non-water related spending through a franchise fee charged by the county government. Another county included in the case appeared to have transferred approximately 2.4% of grow water revenues out of the water utility to the general government. Two of the counties in the case were using water revenues to fund only water related projects and operations.

Chapter Six: Conclusion and Discussion

Water utilities in the United States are facing an uphill battle to ensure that safe, reliable water service remains available and affordable for every citizen regardless of social or economic standing. The literature review that has been included as part of this project speaks to the causes that have led to the current situation facing many community water systems in the United States. The lack of timely investment, the requirement to finance unfunded mandates, environmental concerns, increase in conservation efforts and aging infrastructure are only some of the many challenges facing water systems. In addition, major reductions in available federal funding over the past few decades, funding that had traditionally aided water utilities for capital projects, have contributed to many of America's water systems becoming less safe in the near term. Water systems are currently in dire need of capital infusion and upgrading (Eskaf, 2015).

The COVID-19 pandemic that began in the spring of 2020 and has continued into 2021 has put a renewed emphasis on the water rate crisis facing the poor. At a time when access to safe, reliable, and affordable water has been critical to fighting the pandemic, it has become evident to many that more Americans are finding it more and more difficult to pay for basic water service due to rate escalations (Wrase, 2019). While concerns on water rate affordability were already present well before the pandemic, this crisis has helped elevate the risk factors facing customers even more. For those economically challenged customers, run-a-way price increases facing water utilities are creating financial burdens on a daily basis for millions. For millions of Americans, rate concerns continue to be a challenge to their very way of life.

There has been national concern about water rate affordability for the poorest and most disenfranchised members of our society for years (Vock, 2014). For years, the cost of

reinvesting in our infrastructure will only continue to increase the pressures on water utilities to raise rates.

A national concern often does not translate to local communities in the same way. A water rate crisis in Colorado does not necessarily connect with a water utility operating in other parts of the country. Water utilities are often autonomous, disconnected and operationally independent from each other, even within the same county community. This is the norm in the United States and each community generally has their own unique challenges and rate structures.

Starting with an identified risk at the national level and working to determine if similar concerns exist at an individual state and county level was the undertaking for this research paper. The state of Georgia is a very diverse state and is comprised of 159 local county governments. These counties are geographically, economically, and racially diverse, self-governing, home-rule entities that often have very different concerns, challenges, and motives regarding their residents. However, one topic area that seems to be a shared concern across county government is water affordability. There is a requirement that residents continue to have access to safe, affordable public water service. It has been estimated that 93% of Georgia's population is serviced by public water systems (UNC Environmental Finance Center, 2019). The topic of water rate affordability is therefore a common unifier that is a shared concern by many county governments. Even in the most rural of counties in Georgia, there are public water systems that are tasked at serving some members of the local community.

The statistical review of data that was completed for Georgia county financial information, was undertaken to try to determine if water rates were currently affordable for Georgia residents. The data was analyzed to determine if rate increases that other communities

around the country have experienced , due to a number of variables, might be occurring in Georgia and leading to water becoming less affordable for residents. While the literature addressed national trends, the outcome of the analysis hoped to support the hypothesis that similar events were occurring in Georgia Counties'.

Pursuit of Findings

The state of Georgia was an important test environment for water rate increase impact and affordability testing because of the high population of minority residents and the level of poverty. In addition to the high number of minority residents, the state is one of the poorest in the continental Unites States with high numbers of both urban and rural poor living at or below federal poverty levels (Bureau USC, 2019). If rate affordability is becoming more and more of a problem nationally for people living at or below the poverty levels, then understanding how fast water rates are escalating in one of the poorest states in the nation may provide a better understanding for developing more pro-active approaches to combating future water accessibility challenges.

Hypothesis Results

The hypothesis of research question #1 was that water rates in Georgia were not affordable for Georgia residents. The testing did not support this hypothesis. Water rates, while continuing to escalate annually, are still affordable for most of Georgia residents based on the guidance provided by both the American Water Works Association and the Environmental Protection Agency. While most county water rates were shown to be escalating faster as a collective group than the rates of annual inflation in most of the years tested, there is no support that rates have become overwhelming unaffordable for Georgia households.. In many counties rates were showing no indication of rate hikes and in some cases, rates were decreased year

over year, although decreases were few. The overall mean averages of increases for all counties for the years tested, reflected a trend that may see water rate adjustments continuing indefinitely well above national inflation levels which at some point in the future may lead to water becoming unaffordable for many households.

In the original hypothesis stated for research question #2, it was predicted that counties that were making investments in infrastructure replacement and rehabilitation would be exhibiting water rate hikes that could prove more and more problematic for residents from a cost standpoint. This would be especially true if rate hikes were increasing at rates greater than inflation and if counties with high poverty levels were being impacted in a significant way. The statistical analysis did indicate that some counties that were investing the most per resident in infrastructure replacement were also experiencing average increases that surpassed annual inflationary rates. A separate case study also indicated that water rate increases are being driven by the need to reinvest in water infrastructure. These findings however were not consistent across all counties nor was it consistent for counties with large versus small populations. It was also not consistent for counties who were contributing more to infrastructure investment on a per resident basis, than those counties who were contributing the least.

The findings that rate adjustments were increasing within counties that were spending the most on infrastructure per resident supported the hypothesis that infrastructure investment may be a contributing factor to rate adjustments. Rate increases within these specific counties would also support the finding in the literature review that suggested that people living in poverty may be being impacted disproportionally due to water rate increases acting similarly to a repressive tax.

The case study also reflected that in the four counties in the study, all four had increasing levels of spending. In addition, all four counties had increases in water rates far greater than annual inflation levels. While spending and rates were increasing, however, poverty levels were actually declining overall. The case study did not provide any additional support to suggest that the poor were becoming poorer due to spending or increasing water rates.

The following table X shows the 41 counties that contain 71% of the resident in Georgia living in poverty as of 2019. Twenty-two of these counties had a mean increase in water rates that were well above inflation. This may also support the prediction that large poor populations may be poorer due to rising water rates although there was no direct correlation confirmed in the case study counties.

TABLE X

County	Population1	Poverty%	Number of Poor
Barrow	83,240	9.5%	7,908
Bartow	107,738	12.2%	13,144
Bibb	153,159	24.7%	37,830
Bulloch	79,608	22.9%	18,230
Camden	54,666	15.8%	8,637
Carroll	119,992	16.8%	20,159
Catoosa	67,580	11.9%	8,042
Chatham	289,430	14.4%	41,678
Cherokee	258,773	7.4%	19,149
Clarke	128,331	27.0%	34,649
Clayton	292,256	17.6%	51,437
Cobb	760,141	9.1%	69,173
Columbia	156,714	7.1%	11,127
Coweta	148,509	10.2%	15,148
De Kalb	759,297	14.3%	108,579
Dougherty	87,956	29.5%	25,947
Douglas	146,343	12.6%	18,439
Effingham	64,296	8.3%	5,337
Fayette	114,421	5.0%	5,721
Floyd	98,498	20.7%	20,389
Forsyth	244,252	5.0%	12,213
Fulton	1,063,937	13.5%	143,631
Glynn	85,292	16.6%	14,158
Gordon	57,963	16.8%	9,738
Gwinnett	936,250	9.2%	86,135
Hall	204,441	13.2%	26,986
Henry	234,561	7.5%	17,592
Houston	157,863	12.1%	19,101
Jackson	72,977	8.7%	6,349
Liberty	61,435	16.1%	9,891
Lowndes	117,406	25.9%	30,408
Muscogee	195,769	20.1%	39,350
Newton	111,744	14.8%	16,538
Paulding	168,667	7.8%	13,156
Richmond	202,518	21.9%	44,351
Rockdale	90,896	13.2%	11,998
Spalding	66,703	17.3%	11,540
Troup	69,922	20.2%	14,124
Walker	69,761	15.5%	10,813
Walton	94,593	11.9%	11,257
Whitfield	104,628	14.2%	14,857

Final Thoughts

This research set out to find the support in the data for two research questions. The results were mixed. The results show evidence to suggest that water rates are increasing but that rates currently remain affordable for most of the residents of Georgia when viewed collectively for all 159 counties. In addition, there were findings in the data that support the premise that infrastructure investment spending is driving up rates as well. The researcher believes that support for question number one shows rates are affordable. The support for question number two reflects no direct correlation between spending and rates. There must be additional steps taken to produce more conclusive results that may increase the level of confidence.

A few of the recommendations for continuing this research and improving the amount of data available for study would include the following.

- Increasing the number of available years of rate increases in the study
- Expanding the number of years of data.
- Reviewing county level data in more clusters
- County information might be segmented in different clusters to compare county types which may increase the number of controlling variables in the study

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Appendix A

DATA Code	County	Annual Inflation 2019	Annual Inflation 2018	Annual Inflatio 2017	Annual Inflatio 2016	Annual Inflatio 2015
1	Appling	2.3%	1.9%	2.1%	2.1%	0.7%
2	Atkinson	2.3%	1.9%	2.1%	2.1%	0.7%
3	Bacon	2.3%	1.9%	2.1%	2.1%	0.7%
4	Baker	2.3%	1.9%	2.1%	2.1%	0.7%
5	Baldwin	2.3%	1.9%	2.1%	2.1%	0.7%
6	Banks	2.3%	1.9%	2.1%	2.1%	0.7%
7	Barrow	2.3%	1.9%	2.1%	2.1%	0.7%
8	Bartow	2.3%	1.9%	2.1%	2.1%	0.7%
9	Ben Hill	2.3%	1.9%	2.1%	2.1%	0.7%
10	Berrien	2.3%	1.9%	2.1%	2.1%	0.7%
11	Bibb	2.3%	1.9%	2.1%	2.1%	0.7%
12	Bleckley	2.3%	1.9%	2.1%	2.1%	0.7%
13	Brantley	2.3%	1.9%	2.1%	2.1%	0.7%
14	Brooks	2.3%	1.9%	2.1%	2.1%	0.7%
15	Bryan	2.3%	1.9%	2.1%	2.1%	0.7%
16	Bulloch	2.3%	1.9%	2.1%	2.1%	0.7%
17	Burke	2.3%	1.9%	2.1%	2.1%	0.7%
18	Butts	2.3%	1.9%	2.1%	2.1%	0.7%
19	Calhoun	2.3%	1.9%	2.1%	2.1%	0.7%
20	Camden	2.3%	1.9%	2.1%	2.1%	0.7%
21	Candler	2.3%	1.9%	2.1%	2.1%	0.7%
22	Carroll	2.3%	1.9%	2.1%	2.1%	0.7%
23	Catoosa	2.3%	1.9%	2.1%	2.1%	0.7%
24	Charlton	2.3%	1.9%	2.1%	2.1%	0.7%
25	Chatham	2.3%	1.9%	2.1%	2.1%	0.7%
26	Chattahoochee	2.3%	1.9%	2.1%	2.1%	0.7%
27	Chattooga	2.3%	1.9%	2.1%	2.1%	0.7%
28	Cherokee	2.3%	1.9%	2.1%	2.1%	0.7%
29	Clarke	2.3%	1.9%	2.1%	2.1%	0.7%
30	Clay	2.3%	1.9%	2.1%	2.1%	0.7%
31	Clayton	2.3%	1.9%	2.1%	2.1%	0.7%
32	Clinch	2.3%	1.9%	2.1%	2.1%	0.7%
33	Cobb	2.3%	1.9%	2.1%	2.1%	0.7%
34	Coffee	2.3%	1.9%	2.1%	2.1%	0.7%
35	Colquitt	2.3%	1.9%	2.1%	2.1%	0.7%
36	Columbia	2.3%	1.9%	2.1%	2.1%	0.7%
37	Cook	2.3%	1.9%	2.1%	2.1%	0.7%
38	Coweta	2.3%	1.9%	2.1%	2.1%	0.7%
39	Crawford	2.3%	1.9%	2.1%	2.1%	0.7%
40	Crisp	2.3%	1.9%	2.1%	2.1%	0.7%
41	Dade	2.3%	1.9%	2.1%	2.1%	0.7%
42	Dawson	2.3%	1.9%	2.1%	2.1%	0.7%
43	Decatur	2.3%	1.9%	2.1%	2.1%	0.7%
44	De Kalb	2.3%	1.9%	2.1%	2.1%	0.7%
45	Dodge	2.3%	1.9%	2.1%	2.1%	0.7%
46	Dooly	2.3%	1.9%	2.1%	2.1%	0.7%
47	Dougherty	2.3%	1.9%	2.1%	2.1%	0.7%
48	Douglas	2.3%	1.9%	2.1%	2.1%	0.7%
49	Early	2.3%	1.9%	2.1%	2.1%	0.7%
50	Echols	2.3%	1.9%	2.1%	2.1%	0.7%
51	Effingham	2.3%	1.9%	2.1%	2.1%	0.7%
52	Elbert	2.3%	1.9%	2.1%	2.1%	0.7%
53	Emanuel	2.3%	1.9%	2.1%	2.1%	0.7%
54	Evans	2.3%	1.9%	2.1%	2.1%	0.7%
55	Fannin	2.3%	1.9%	2.1%	2.1%	0.7%
56	Fayette	2.3%	1.9%	2.1%	2.1%	0.7%
57	Floyd	2.3%	1.9%	2.1%	2.1%	0.7%

Appendix A

DATA Code	County	Annual Inflation 2019	Annual Inflation 2018	Annual Inflatio 2017	Annual Inflatio 2016	Annual Inflatio 2015
58	Forsyth	2.3%	1.9%	2.1%	2.1%	0.7%
59	Franklin	2.3%	1.9%	2.1%	2.1%	0.7%
60	Fulton	2.3%	1.9%	2.1%	2.1%	0.7%
61	Gilmer	2.3%	1.9%	2.1%	2.1%	0.7%
62	Glascock	2.3%	1.9%	2.1%	2.1%	0.7%
63	Glynn	2.3%	1.9%	2.1%	2.1%	0.7%
64	Gordon	2.3%	1.9%	2.1%	2.1%	0.7%
65	Grady	2.3%	1.9%	2.1%	2.1%	0.7%
66	Greene	2.3%	1.9%	2.1%	2.1%	0.7%
67	Gwinnett	2.3%	1.9%	2.1%	2.1%	0.7%
68	Habersham	2.3%	1.9%	2.1%	2.1%	0.7%
69	Hall	2.3%	1.9%	2.1%	2.1%	0.7%
70	Hancock	2.3%	1.9%	2.1%	2.1%	0.7%
71	Haralson	2.3%	1.9%	2.1%	2.1%	0.7%
72	Harris	2.3%	1.9%	2.1%	2.1%	0.7%
73	Hart	2.3%	1.9%	2.1%	2.1%	0.7%
74	Heard	2.3%	1.9%	2.1%	2.1%	0.7%
75	Henry	2.3%	1.9%	2.1%	2.1%	0.7%
76	Houston	2.3%	1.9%	2.1%	2.1%	0.7%
77	Irwin	2.3%	1.9%	2.1%	2.1%	0.7%
78	Jackson	2.3%	1.9%	2.1%	2.1%	0.7%
79	Jasper	2.3%	1.9%	2.1%	2.1%	0.7%
80	Jeff Davis	2.3%	1.9%	2.1%	2.1%	0.7%
81	Jefferson	2.3%	1.9%	2.1%	2.1%	0.7%
82	Jenkins	2.3%	1.9%	2.1%	2.1%	0.7%
83	Johnson	2.3%	1.9%	2.1%	2.1%	0.7%
84	Jones	2.3%	1.9%	2.1%	2.1%	0.7%
85	Lamar	2.3%	1.9%	2.1%	2.1%	0.7%
86	Lanier	2.3%	1.9%	2.1%	2.1%	0.7%
87	Laurens	2.3%	1.9%	2.1%	2.1%	0.7%
88	Lee	2.3%	1.9%	2.1%	2.1%	0.7%
89	Liberty	2.3%	1.9%	2.1%	2.1%	0.7%
90	Lincoln	2.3%	1.9%	2.1%	2.1%	0.7%
91	Long	2.3%	1.9%	2.1%	2.1%	0.7%
92	Lowndes	2.3%	1.9%	2.1%	2.1%	0.7%
93	Lumpkin	2.3%	1.9%	2.1%	2.1%	0.7%
94	Macon	2.3%	1.9%	2.1%	2.1%	0.7%
95	Madison	2.3%	1.9%	2.1%	2.1%	0.7%
96	Marion	2.3%	1.9%	2.1%	2.1%	0.7%
97	McDuffie	2.3%	1.9%	2.1%	2.1%	0.7%
98	McIntosh	2.3%	1.9%	2.1%	2.1%	0.7%
99	Meriwether	2.3%	1.9%	2.1%	2.1%	0.7%
100	Miller	2.3%	1.9%	2.1%	2.1%	0.7%
101	Mitchell	2.3%	1.9%	2.1%	2.1%	0.7%
102	Monroe	2.3%	1.9%	2.1%	2.1%	0.7%
103	Montgomery	2.3%	1.9%	2.1%	2.1%	0.7%
104	Morgan	2.3%	1.9%	2.1%	2.1%	0.7%
105	Murray	2.3%	1.9%	2.1%	2.1%	0.7%
106	Muscogee	2.3%	1.9%	2.1%	2.1%	0.7%
107	Newton	2.3%	1.9%	2.1%	2.1%	0.7%
108	Oconee	2.3%	1.9%	2.1%	2.1%	0.7%
109	Oglethorpe	2.3%	1.9%	2.1%	2.1%	0.7%
110	Paulding	2.3%	1.9%	2.1%	2.1%	0.7%
111	Peach	2.3%	1.9%	2.1%	2.1%	0.7%
112	Pickens	2.3%	1.9%	2.1%	2.1%	0.7%
113	Pierce	2.3%	1.9%	2.1%	2.1%	0.7%
114	Pike	2.3%	1.9%	2.1%	2.1%	0.7%

Appendix A

DATA Code	County	Annual Inflation 2019	Annual Inflation 2018	Annual Inflatio 2017	Annual Inflatio 2016	Annual Inflatio 2015
115	Polk	2.3%	1.9%	2.1%	2.1%	0.7%
116	Pulaski	2.3%	1.9%	2.1%	2.1%	0.7%
117	Putnam	2.3%	1.9%	2.1%	2.1%	0.7%
118	Quitman	2.3%	1.9%	2.1%	2.1%	0.7%
119	Rabun	2.3%	1.9%	2.1%	2.1%	0.7%
120	Randolph	2.3%	1.9%	2.1%	2.1%	0.7%
121	Richmond	2.3%	1.9%	2.1%	2.1%	0.7%
122	Rockdale	2.3%	1.9%	2.1%	2.1%	0.7%
123	Schley	2.3%	1.9%	2.1%	2.1%	0.7%
124	Screven	2.3%	1.9%	2.1%	2.1%	0.7%
125	Seminole	2.3%	1.9%	2.1%	2.1%	0.7%
126	Spalding	2.3%	1.9%	2.1%	2.1%	0.7%
127	Stephens	2.3%	1.9%	2.1%	2.1%	0.7%
128	Stewart	2.3%	1.9%	2.1%	2.1%	0.7%
129	Sumter	2.3%	1.9%	2.1%	2.1%	0.7%
130	Talbot	2.3%	1.9%	2.1%	2.1%	0.7%
131	Taliaferro	2.3%	1.9%	2.1%	2.1%	0.7%
132	Tattnall	2.3%	1.9%	2.1%	2.1%	0.7%
133	Taylor	2.3%	1.9%	2.1%	2.1%	0.7%
134	Telfair	2.3%	1.9%	2.1%	2.1%	0.7%
135	Terrell	2.3%	1.9%	2.1%	2.1%	0.7%
136	Thomas	2.3%	1.9%	2.1%	2.1%	0.7%
137	Tift	2.3%	1.9%	2.1%	2.1%	0.7%
138	Toombs	2.3%	1.9%	2.1%	2.1%	0.7%
139	Towns	2.3%	1.9%	2.1%	2.1%	0.7%
140	Treutlen	2.3%	1.9%	2.1%	2.1%	0.7%
141	Troup	2.3%	1.9%	2.1%	2.1%	0.7%
142	Turner	2.3%	1.9%	2.1%	2.1%	0.7%
143	Twiggs	2.3%	1.9%	2.1%	2.1%	0.7%
144	Union	2.3%	1.9%	2.1%	2.1%	0.7%
145	Upson	2.3%	1.9%	2.1%	2.1%	0.7%
146	Walker	2.3%	1.9%	2.1%	2.1%	0.7%
147	Walton	2.3%	1.9%	2.1%	2.1%	0.7%
148	Ware	2.3%	1.9%	2.1%	2.1%	0.7%
149	Warren	2.3%	1.9%	2.1%	2.1%	0.7%
150	Washington	2.3%	1.9%	2.1%	2.1%	0.7%
151	Wayne	2.3%	1.9%	2.1%	2.1%	0.7%
152	Webster	2.3%	1.9%	2.1%	2.1%	0.7%
153	Wheeler	2.3%	1.9%	2.1%	2.1%	0.7%
154	White	2.3%	1.9%	2.1%	2.1%	0.7%
155	Whitfield	2.3%	1.9%	2.1%	2.1%	0.7%
156	Wilcox	2.3%	1.9%	2.1%	2.1%	0.7%
157	Wilkes	2.3%	1.9%	2.1%	2.1%	0.7%
158	Wilkinson	2.3%	1.9%	2.1%	2.1%	0.7%
159	Worth	2.3%	1.9%	2.1%	2.1%	0.7%

Appendix A		Variable = Static						
DATA		2019	Capital Investment					
Code	County	Population	2019	2018	2017	2016	2015
1	Appling	18,386	No data	No data	No data	No data	No data
2	Atkinson	8,165	$ 1,342,871	$ 824,989	$ 211,096	$ 2,168,895	No data
3	Bacon	11,164	No data	No data	No data	$ 1,310,191	No data
4	Baker	3,038	No data	No data	No data	No data	No data
5	Baldwin	44,890	No data	$ 2,813,985	$ 8,679,973	$ 5,299,059	$ 608,771
6	Banks	19,234	$ 2,666,646	$ 1,341,185	$ 1,464,848	$ 5,180,649	$ 2,272,547
7	Barrow	83,240	$ 4,478,101	$ 10,300,466	$ 5,284,455	$ 12,607,466	$ 2,910,017
8	Bartow	107,738	$ 14,795,026	$ 14,539,775	$ 21,134,775	$ 22,502,758	$ 20,808,960
9	Ben Hill	16,700	No data	No data	No data	No data	$ 356,413
10	Berrien	19,397	No data	No data	No data	$ 2,637,271	$ 1,519,548
11	Bibb	153,159	$ 22,870,654	$ 35,651,000	$ 12,736,845	$ 43,429,965	$ 11,235,550
12	Bleckley	12,873	No data	$ 891,121	$ 2,211,457	$ 1,579,529	$ 310,821
13	Brantley	19,109	No data	$ 1,805,330	$ 1,876,511	$ 1,499,877	$ 3,463,005
14	Brooks	15,457	No data	$ 2,369,015	$ 3,229,469	$ 2,158,298	$ 1,304,043
15	Bryan	39,627	No data	$ 5,350,713	$ 5,395,292	No data	$ 3,307,270
16	Bulloch	79,608	$ 9,456,432	$ 14,090,314	$ 3,938,483	$ 12,574,419	$ 9,562,225
17	Burke	22,383	$ 31,854,482	$ 8,743,073	$ 4,629,023	$ 5,144,303	$ 6,273,549
18	Butts	24,936	$ 2,466,322	$ 2,616,054	$ 1,660,301	$ 3,586,821	$ 1,574,600
19	Calhoun	6,189	No data	No data	$ 171,644	$ 210,000	$ 205,309
20	Camden	54,666	$ 2,674,801	$ 2,429,404	$ 4,626,118	$ 2,787,100	$ 1,676,662
21	Candler	10,803	$ 1,655,791	$ 1,980,743	$ 1,708,303	$ 3,081,821	$ 1,167,657
22	Carroll	119,992	$ 6,070,593	$ 5,069,007	$ 12,709,725	$ 5,888,524	$ 5,397,450
23	Catoosa	67,580	$ 1,991,305	$ 4,343,988	$ 1,171,410	$ 1,818,105	$ 3,913,179
24	Charlton	13,392	$ 2,135,721	$ 928,963	$ 1,334,296	$ 1,426,001	$ 3,052,449
25	Chatham	289,430	$ 46,772,761	$ 30,267,930	$ 29,796,287	$ 26,655,423	$ 23,602,040
26	Chattahoochee	10,907	No data	No data	No data	No data	No data
27	Chattooga	24,789	No data	No data	No data	No data	No data
28	Cherokee	258,773	$ 53,503,978	$ 48,106,846	$ 26,498,393	$ 37,289,535	$ 21,272,811
29	Clarke	128,331	$ 17,916,620	$ 143,836,655	$ 18,537,260	$ 52,128,162	$ 88,725,899
30	Clay	2,834	No data	No data	No data	No data	No data
31	Clayton	292,256	$ 48,362,375	$ 34,964,224	$ 20,624,534	$ 27,765,707	$ 73,316,934
32	Clinch	6,618	$ 1,168,693	$ 484,843	$ 1,004,297	$ 946,942	$ 876,429
33	Cobb	760,141	$ 132,907,669	$ 731,063,383	$ 689,708,220	$ 173,399,655	$ 191,954,277
34	Coffee	43,273	No data	No data	No data	$ 1,766,027	No data
35	Colquitt	45,600	$ 7,514,195	$ 6,303,960	$ 4,823,155	$ 1,701,792	$ 1,572,923
36	Columbia	156,714	$ 28,553,342	$ 21,668,132	$ 58,815,317	$ 35,269,617	$ 22,991,805
37	Cook	17,270	No data	No data	No data	No data	$ 5,356,802
38	Coweta	148,509	$ 25,843,588	$ 25,298,711	$ 17,117,730	$ 18,810,750	$ 10,271,697
39	Crawford	12,404	$ 931,765	$ 1,456,618	$ 603,628	$ 753,549	$ 1,780,837
40	Crisp	22,372	$ 5,476,968	$ 4,609,634	$ 7,094,362	$ 2,244,978	$ 5,557,376
41	Dade	16,116	$ 1,995,971	$ 1,669,498	$ 2,121,687	$ 983,360	$ 452,118
42	Dawson	26,108	$ 5,395,794	$ 3,532,593	$ 8,095,543	$ 4,728,565	$ 1,147,071
43	Decatur	26,404	No data	$ 4,813,129	$ 1,843,134	$ 7,274,545	$ 56,200,302
44	De Kalb	759,297	$ 46,958,000	$ 32,124,000	$ 24,590,000	$ 27,809,000	$ 42,202,000
45	Dodge	20,605	No data	No data	No data	$ 241,760	No data
46	Dooly	13,390	$ 3,029,906	$ 2,453,583	$ 1,628,865	$ 299,120	$ 314,774
47	Dougherty	87,956	$ 5,177,218	$ 3,883,657	$ 3,222,460	$ 9,170,659	$ 10,938,689
48	Douglas	146,343	$ 13,727,676	$ 6,459,876	$ 8,269,223	$ 5,666,488	$ 4,736,374
49	Early	10,190	$ 1,869,176	No data	No data	$ 554,652	$ 1,952,472
50	Echols	4,006	No data	No data	No data	No data	No data
51	Effingham	64,296	$ 17,159,881	$ 4,367,933	$ 2,729,509	$ 7,315,232	$ 32,109,204
52	Elbert	19,194	No data	$ 1,042,412	$ 1,126,351	$ 543,829	$ 715,169
53	Emanuel	22,646	$ 2,192,006	$ 349,995	$ 947,777	$ 3,109,738	No data
54	Evans	10,654	$ 1,834,397	$ 4,734,722	$ 2,682,159	$ 737,514	$ 1,930,063
55	Fannin	26,188	$ 5,923,433	No data	No data	No data	No data
56	Fayette	114,421	$ 15,247,061	$ 7,168,557	$ 24,010,785	$ 11,788,409	$ 9,208,947
57	Floyd	98,498	$ 14,586,006	$ 12,046,893	$ 4,312,639	$ 11,226,089	$ 9,257,349

Appendix A		Variable = Static					
DATA		2019	**Capital Investment**				
Code	***County***	***Population***	***2019***	***2018***	***2017***	***2016***	***2015***
58	Forsyth	244,252	No data	$ 64,679,111	$ 167,925,622	$ 79,182,720	$ 112,715,238
59	Franklin	23,349	No data	$ 1,432,986	$ 831,802	$ 583,016	$ 902,291
60	Fulton	1,063,937	$ 80,999,000	$ 79,165,000	$ 24,284,000	$ 62,988,000	$ 88,709,000
61	Gilmer	31,369	No data	$ 1,785,993	$ 1,803,622	$ 3,619,428	$ 886,542
62	Glascock	2,971	No data	$ 952,445	$ 492,743	$ 1,373,160	$ 605,887
63	Glynn	85,292	$ 4,894,561	$ 40,221,445	$ 22,247,323	$ 13,646,605	$ 49,773,290
64	Gordon	57,963	$ 2,605,848	$ 3,453,909	$ 1,487,191	$ 6,613,433	$ 3,493,677
65	Grady	24,633	$ 479,322	$ 1,185,242	$ 1,902,595	$ 2,342,775	$ 776,844
66	Greene	18,324	$ 797,622	$ 3,602,922	$ 9,491,085	$ 1,154,482	$ 1,388,469
67	Gwinnett	936,250	$ 330,907,000	$ 204,528,000	$ 302,676,000	$ 302,884,000	$ 187,008,000
68	Habersham	45,328	$ 10,072,883	$ 3,375,444	$ 21,943,452	$ 4,596,881	$ 39,469,886
69	Hall	204,441	$ 9,938,624	$ 8,167,445	$ 24,519,959	$ 4,284,241	$ 6,535,165
70	Hancock	8,457	No data	$ 734,188	$ 1,053,205	$ 765,763	No data
71	Haralson	29,792	$ 428,648	$ 636,286	$ 6,734,670	$ 468,580	$ 694,582
72	Harris	35,236	$ 2,146,359	$ 12,400,556	$ 9,303,086	$ 1,566,586	$ 4,871,144
73	Hart	26,205	No data	No data	No data	No data	No data
74	Heard	11,923	No data	No data	No data	$ 1,874,531	$ 1,962,602
75	Henry	234,561	$ 6,236,649	$ 16,008,449	$ 45,170,025	$ 6,969,170	$ 6,364,406
76	Houston	157,863	$ 5,954,628	$ 13,828,871	$ 6,243,133	$ 29,223,142	$ 11,176,569
77	Irwin	9,416	No data	No data	No data	$ 262,882	No data
78	Jackson	72,977	$ 1,910,916	$ 2,927,568	$ 4,330,650	$ 2,730,202	$ 10,859,286
79	Jasper	14,219	$ 1,369,885	$ 1,527,127	$ 626,861	$ 813,504	$ 1,127,042
80	Jeff Davis	15,115	No data	$ 788,744	$ 1,273,222	$ 2,768,789	$ 1,025,296
81	Jefferson	15,362	$ 2,115,421	$ 2,951,666	$ 2,792,811	$ 1,588,267	$ 3,214,571
82	Jenkins	8,676	No data	No data	$ 5,773,688	$ 337,695	$ 4,239,819
83	Johnson	9,643	No data	No data	No data	No data	No data
84	Jones	28,735	$ 2,439,588	$ 5,144,751	$ 1,112,777	$ 2,083,733	$ 1,348,991
85	Lamar	19,077	$ 3,517,082	$ 760,000	$ 727,000	$ 999,000	$ 2,178,500
86	Lanier	10,423	No data	No data	$ 79,065	$ 763,402	$ 288,668
87	Laurens	47,546	$ 15,474,792	$ 4,757,066	$ 9,787,927	$ 6,073,222	$ 6,045,764
88	Lee	29,992	$ 128,721	$ 44,982,572	$ 2,112,873	$ 1,083,546	$ 482,973
89	Liberty	61,435	No data	No data	$ 6,178,833	$ 1,803,845	$ 536,064
90	Lincoln	7,921	$ 747,734	$ 916,033	$ 1,456,613	$ 363,135	$ 613,323
91	Long	19,559	No data	No data	No data	No data	No data
92	Lowndes	117,406	No data	$ 7,366,179	$ 10,783,955	No data	$ 2,730,981
93	Lumpkin	33,610	$ 4,301,110	$ 3,998,220	$ 4,390,427	$ 3,283,541	$ 3,084,821
94	Macon	12,947	$ 484,538	$ 428,661	$ 385,246	$ 783,522	$ 315,546
95	Madison	29,880	No data	$ 665,206	$ 366,845	$ 3,998,439	$ 2,117,188
96	Marion	8,359	$ 1,806,998	$ 1,028,806	$ 1,006,671	$ 142,797	$ 437,118
97	McDuffie	21,312	$ 2,054,351	$ 3,195,734	$ 2,155,977	$ 3,780,994	$ 1,121,285
98	McIntosh	14,378	No data	No data	No data	$ 526,625	$ 864,157
99	Meriwether	21,167	No data	No data	No data	$ 357,894	No data
100	Miller	5,718	No data	No data	$ 150,134	$ 720,230	No data
101	Mitchell	21,863	No data	$ 864,212	$ 1,628,347	$ 364,347	$ 702,042
102	Monroe	27,578	$ 3,370,346	$ 808,585	$ 1,066,042	$ 7,286,110	$ 3,463,801
103	Montgomery	9,172	$ 2,898,065	$ 753,998	$ 1,275,612	$ 471,941	$ 381,344
104	Morgan	19,276	$ 2,913,817	$ 844,857	$ 1,494,745	$ 377,594	$ 515,003
105	Murray	40,096	$ 2,443,170	$ 843,647	$ 1,128,375	$ 2,443,170	$ 2,109,406
106	Muscogee	195,769	$ 35,443,686	$ 17,209,489	$ 60,396,008	$ 44,176,484	$ 34,109,453
107	Newton	111,744	$ 2,137,414	$ 3,241,190	$ 1,993,572	$ 4,312,579	$ 4,681,593
108	Oconee	40,280	$ 38,096,503	$ 10,285,996	$ 23,237,327	$ 6,855,551	$ 5,002,441
109	Oglethorpe	15,259	No data	$ 890,358	$ 653,440	$ 1,260,318	$ 429,518
110	Paulding	168,667	$ 22,967,670	$ 41,987,390	$ 31,212,212	$ 18,942,512	$ 18,097,581
111	Peach	27,546	$ 720,611	$ 473,800	$ 2,556,812	$ 14,436,824	$ 2,459,717
112	Pickens	32,591	$ 4,081,852	$ 2,062,525	$ 1,562,910	$ 859,502	$ 2,794,633
113	Pierce	19,465	No data	$ 2,884,839	$ 2,350,184	No data	No data
114	Pike	18,962	No data	$ 1,525,439	$ 657,957	$ 1,114,654	$ 530,620

Appendix A		Variable = Static					
DATA		2019	**Capital Investment**				
Code	***County***	***Population***	***2019***	***2018***	***2017***	***2016***	***2015***
115	Polk	42,613	No data	$ 4,211,828	$ 1,826,553	$ 2,761,412	$ 1,298,396
116	Pulaski	11,137	No data	$ 344,396	$ 331,684	$ 115,887	$ 816,448
117	Putnam	22,119	$ 6,210,264	$ 1,690,452	$ 3,267,284	$ 3,428,176	$ 1,719,813
118	Quitman	2,299	$ 416,783	$ 370,147	$ 312,286	$ 98,280	$ 122,097
119	Rabun	17,137	$ 5,207,081	$ 1,764,413	$ 2,582,629	$ 1,047,819	$ 2,830,723
120	Randolph	6,778	No data	No data	$ 262,105	$ 2,152,177	$ 611,088
121	Richmond	202,518	No data	$ 133,404,748	$ 30,832,763	$ 24,195,184	$ 293,785,895
122	Rockdale	90,896	No data	$ 12,676,472	$ 10,892,280	$ 5,881,524	$ 8,854,356
123	Schley	5,257	No data	$ 17,620	$ 331,380	$ 645,076	$ 307,635
124	Screven	13,966	No data	$ 1,790,306	No data	No data	No data
125	Seminole	8,090	$ 1,525,996	$ 1,663,876	$ 2,597,548	No data	No data
126	Spalding	66,703	$ 4,471,243	$ 7,540,224	$ 16,896,054	$ 2,629,477	$ 3,085,941
127	Stephens	25,925	$ 1,267,429	$ 912,752	$ 685,806	$ 1,948,930	$ 3,410,132
128	Stewart	6,621	No data	$ 646,681	No data	No data	No data
129	Sumter	29,524	No data	$ 1,920,432	$ 298,125	$ 3,895,394	$ 140,317
130	Talbot	6,195	$ 1,090,139	$ 408,810	$ 98,176	$ 181,613	$ 529,596
131	Taliaferro	1,537	No data	$ 435,122	$ 684,191	$ 774,547	$ 161,196
132	Tattnall	25,286	No data	$ 2,410,635	No data	$ 7,279,608	$ 2,357,873
133	Taylor	8,020	No data	No data	No data	$ 2,302,817	$ 1,036,034
134	Telfair	15,860	$ 1,873,710	$ 736,348	$ 1,040,301	$ 2,518,011	$ 1,229,528
135	Terrell	8,531	$ 686,176	No data	$ 286,232	$ 181,018	$ 395,782
136	Thomas	44,451	$ 2,499,972	$ 3,668,868	$ 2,962,852	$ 6,434,546	$ 5,445,438
137	Tift	40,644	$ 3,388,249	$ 4,418,317	$ 1,747,980	$ 13,016,754	No data
138	Toombs	26,830	No data	$ 1,170,376	No data	No data	No data
139	Towns	12,037	$ 463,361	$ 527,374	$ 2,685,613	$ 806,393	No data
140	Treutlen	6,901	No data	No data	No data	$ 179,307	$ 174,310
141	Troup	69,922	$ 428,911	$ 3,516,797	$ 3,353,866	$ 2,642,452	$ 9,738,311
142	Turner	7,985	No data	$ 263,212	$ 2,406,712	$ 2,287,366	$ 1,760,574
143	Twiggs	8,120	No data	No data	No data	$ 658,082	$ 1,019,320
144	Union	24,511	$ 1,416,691	$ 2,452,110	$ 2,274,671	$ 3,021,643	$ 1,407,238
145	Upson	26,320	$ 1,405,325	$ 3,604,795	$ 1,818,945	$ 2,613,934	$ 1,141,000
146	Walker	69,761	$ 6,534,403	$ 970,271	$ 1,710,602	$ 10,968,445	$ 3,190,834
147	Walton	94,593	$ 7,346,234	$ 7,971,913	$ 6,451,094	$ 50,299,818	$ 2,270,234
148	Ware	35,734	No data	$ 3,334,675	$ 3,172,279	$ 3,984,454	$ 2,831,324
149	Warren	5,254	$ 700,348	$ 2,078,270	$ 1,651,069	$ 1,167,806	$ 1,963,669
150	Washington	20,374	No data	$ 273,590	$ 945,722	No data	$ 1,849,752
151	Wayne	29,927	$ 18,499,929	$ 3,760,605	$ 3,366,060	$ 2,821,220	$ 3,756,680
152	Webster	2,607	No data	$ 1,072,513	$ 352,497	$ 149,040	$ 311,334
153	Wheeler	7,855	No data	No data	$ 715,052	$ 379,720	$ 545,781
154	White	30,798	$ 3,761,837	$ 1,766,558	$ 3,845,067	$ 2,245,491	$ 1,951,743
155	Whitfield	104,628	$ 10,702,386	$ 4,948,073	$ 24,620,084	$ 12,227,205	$ 5,926,326
156	Wilcox	8,635	No data	No data	No data	No data	No data
157	Wilkes	9,777	$ 1,777,592	$ 3,863,239	$ 3,434,597	$ 2,340,900	$ 874,756
158	Wilkinson	8,954	No data	No data	$ 578,248	$ 648,215	$ 374,518
159	Worth	20,247	$ 2,748,269	$ 1,078,103	$ 2,114,140	$ 964,745	$ 1,195,716
		10,617,423					

Appendix A

DATA		Average	Savings Rate = Net Postion Incr/Decr YOY				
Code	***County***	***Per Resident***	***2019***	***2018***	***2017***	***2016***	***2015***
1	Appling	#VALUE!	No data	No data	No data	No data	No data
2	Atkinson	Average	$ 17,175,042	$ 16,245,000	$ 15,709,000	$ 16,055,000	$ 15,638,000
3	Bacon	#VALUE!	No data	No data	No data	$ 38,659,000	$ 39,385,000
4	Baker	#VALUE!	No data	No data	No data	No data	No data
5	Baldwin	$ 125	No data	$ 85,911,000	$ 84,756,000	$ 84,104,000	$ 84,073,000
6	Banks	$ 138	$ 75,242,000	$ 71,145,000	$ 69,866,000	$ 68,097,117	$ 66,835,149
7	Barrow	$ 113	$ 183,299,000	$ 163,046,000	$ 150,079,000	$ 136,237,000	$ 124,534,000
8	Bartow	$ 180	$ 276,200,000	$ 257,374,000	$ 335,176,000	$ 339,534,000	$ 336,050,565
9	Ben Hill	#VALUE!	No data	No data	No data	No data	$ 12,802,000
10	Berrien	#VALUE!	No data	No data	No data	$ 15,028,000	$ 14,722,000
11	Bibb	$ 200	$ 90,213,000	$ 62,206,000	$ 139,137,000	$ 184,642,000	$ 197,997,000
12	Bleckley	$ 121	No data	$ 10,948,000	$ 10,401,000	$ 8,394,755	$ 7,629,166
13	Brantley	$ 90	No data	$ 34,149,796	$ 31,758,351	$ 30,302,107	$ 29,514,730
14	Brooks	$ 167	No data	$ 33,036,109	$ 30,061,335	$ 27,096,686	$ 25,103,839
15	Bryan	#VALUE!	No data	$ 75,480,286	$ 75,694,190	$ 76,381,000	$ 75,477,903
16	Bulloch	$ 128	$ 96,038,763	$ 88,242,615	$ 74,918,918	$ 69,024,158	$ 75,270,800
17	Burke	$ 276	$ 93,652,910	$ 85,360,897	$ 79,424,268	$ 69,027,800	$ 60,567,945
18	Butts	$ 105	$ 68,907,996	$ 73,053,596	$ 73,754,880	$ 77,228,562	$ 81,737,038
19	Calhoun	#VALUE!	No data	No data	$ 4,558,745	$ 4,752,296	$ 4,577,616
20	Camden	$ 60	$ 116,466,000	$ 118,511,000	$ 122,140,000	$ 123,176,000	$ 133,402,000
21	Candler	$ 209	$ 16,003,080	$ 16,629,490	$ 15,498,688	$ 16,515,884	$ 14,463,521
22	Carroll	$ 66	$ 129,571,709	$ 125,042,992	$ 124,953,926	$ 123,014,816	$ 124,022,820
23	Catoosa	$ 36	$ 436,900,000	$ 440,000,000	$ 444,100,000	$ 450,300,000	$ 460,100,000
24	Charlton	$ 92	No data	$ 234,449,814	$ 21,886,182	$ 21,458,505	$ 19,794,548
25	Chatham	$ 100	$ 819,533,656	$ 792,074,819	$ 1,077,691,634	$ 1,089,600,983	$ 1,088,536,773
26	Chattahoochee	#VALUE!	$ 15,723,000	$ 16,428,000	No data	No data	No data
27	Chattooga	#VALUE!	No data	No data	No data	No data	$ 15,148,667
28	Cherokee	$ 144	$ 955,477,005	$ 956,580,265	$ 961,899,304	$ 974,567,648	$ 982,647,197
29	Clarke	$ 557	$ 759,527,754	$ 705,169,659	$ 745,682,919	$ 741,576,076	$ 732,177,340
30	Clay	#VALUE!	No data	No data	No data	No data	No data
31	Clayton	$ 95	$ 545,655	$ 545,421	$ 670,507	$ 689,073	$ 717,852
32	Clinch	$ 123	$ 11,280,935	$ 11,866,952	$ 13,008,274	$ 14,089,078	$ 15,184,155
33	Cobb	$ 699	$ 4,764,198,124	$ 4,764,198,126	$ 4,642,260,905	$ 4,721,658,777	$ 4,551,658,777
34	Coffee	#VALUE!	No data	No data	No data	$ 122,251,018	No data
35	Colquitt	$ 94	$ 82,725,323	$ 79,929,933	$ 76,347,505	$ 78,711,518	$ 82,543,194
36	Columbia	$ 246	$ 680,760,640	$ 645,795,415	$ 618,162,673	$ 589,401,984	$ 559,643,566
37	Cook	#VALUE!	No data	No data	No data	No data	$ 32,914,505
38	Coweta	$ 137	$ 239,218,923	$ 237,073,976	$ 272,963,180	$ 287,809,015	$ 301,350,955
39	Crawford	$ 76	$ 18,977,043	$ 19,020,983	$ 18,511,726	$ 17,629,084	$ 17,708,996
40	Crisp	$ 208	$ 63,759,708	$ 62,275,464	$ 61,810,889	$ 62,028,973	$ 60,745,513
41	Dade	$ 99	$ 14,472,040	$ 13,935,639	$ 13,834,440	$ 13,285,608	$ 17,755,650
42	Dawson	$ 209	$ 95,384,000	$ 91,047,000	$ 86,852,000	$ 82,747,000	$ 80,030,000
43	Decatur	$ 176	No data	$ 1,321,809,000	$ 1,296,121,000	$ 46,702,000	$ 46,988,000
44	De Kalb	$ 37	$ 1,320,649,000	$ 54,424,000	$ 49,303,000	$ 1,145,872,000	$ 1,136,527,000
45	Dodge	#VALUE!	No data	No data	No data	$ 15,161,634	No data
46	Dooly	$ 109	$ 14,725,488	$ 12,276,066	$ 12,877,162	$ 11,168,315	$ 11,490,518
47	Dougherty	$ 62	$ 202,900,000	$ 206,700,000	$ 204,700,000	$ 202,600,000	$ 201,300,000
48	Douglas	$ 46	$ 160,422,852	$ 168,727,811	$ 168,944,270	$ 210,548,363	$ 216,203,086
49	Early	#VALUE!	$ 18,721,923	No data	No data	$ 16,957,632	$ 17,239,212
50	Echols	#VALUE!	No data	No data	No data	No data	No data
51	Effingham	$ 75	$ 133,200,000	$ 126,800,000	$ 117,800,000	$ 113,100,000	$ 108,700,000
52	Elbert	$ 47	No data	$ 20,342,027	$ 19,383,784	$ 19,218,811	$ 19,529,243
53	Emanuel	$ 65	$ 331,007,203	$ 25,205,288	$ 25,543,618	$ 23,302,020	$ 23,736,953
54	Evans	$ 255	$ 19,616,545	$ 18,196,404	$ 14,977,746	$ 13,211,813	$ 13,268,169
55	Fannin	#VALUE!	$ 47,573,933	No data	No data	No data	No data
56	Fayette	$ 125	$ 292,117,539	$ 271,161,677	$ 161,165,964	$ 261,248,242	$ 261,444,418
57	Floyd	$ 93	$ 267,717,806	$ 273,223,379	$ 276,415,983	$ 285,311,149	$ 284,193,935

Appendix A

DATA		Average	Savings Rate = Net Postion Incr/Decr YOY				
Code	***County***	***Per Resident***	***2019***	***2018***	***2017***	***2016***	***2015***
58	Forsyth	$ 425	No data	$ 1,670,145,000	$ 1,587,375,000	$ 1,480,577,000	$ 1,384,630,000
59	Franklin	$ 41	No data	$ 45,021,713	$ 43,243,901	$ 44,555,316	$ 43,928,821
60	Fulton	$ 52	$ 250,391,000	$ 203,818,000	$ 476,146,000	$ 865,862,000	$ 951,201,000
61	Gilmer	$ 77	No data	$ 46,553,927	$ 44,455,232	$ 43,883,770	$ 41,669,982
62	Glascock	$ 316	No data	$ 7,133,730	$ 6,764,960	$ 7,088,747	$ 6,752,845
63	Glynn	$ 297	$ 378,807,341	$ 398,006,509	$ 379,539,043	$ 394,333,593	$ 406,381,379
64	Gordon	$ 66	$ 135,609,214	$ 133,486,779	$ 131,330,701	$ 129,616,793	$ 129,048,023
65	Grady	$ 73	$ 54,456,780	$ 49,441,867	$ 49,402,985	$ 48,026,081	$ 48,347,525
66	Greene	$ 259	$ 73,867,026	$ 71,537,252	$ 68,181,059	$ 64,011,772	$ 59,712,764
67	Gwinnett	$ 288	$ 7,235,926,000	$ 6,957,054,000	$ 6,711,201,000	$ 6,676,574,000	$ 6,455,456,000
68	Habersham	$ 220	$ 81,745,449	$ 75,542,030	$ 70,970,142	$ 68,774,229	$ 63,679,172
69	Hall	$ 60	$ 470,439,000	$ 415,819,000	$ 429,709,000	$ 427,716,000	$ 441,947,000
70	Hancock	$ 101	No data	$ 13,974,289	$ 15,765,158	$ 18,402,949	No data
71	Haralson	$ 88	$ 22,134,961	$ 21,131,609	$ 18,833,760	$ 18,614,126	$ 18,216,072
72	Harris	$ 220	$ 87,964,412	$ 80,145,925	$ 78,295,711	$ 78,307,548	$ 75,283,941
73	Hart	#VALUE!	No data	No data	No data	No data	No data
74	Heard	#VALUE!	No data	No data	No data	$ 48,259,658	$ 46,609,783
75	Henry	$ 97	$ 731,575,551	$ 708,525,998	$ 725,334,409	$ 710,436,236	$ 690,182,396
76	Houston	$ 104	$ 329,479,465	$ 329,479,465	$ 321,628,114	$ 329,903,585	$ 325,566,484
77	Irwin	#VALUE!	No data	No data	No data	$ 4,449,110	No data
78	Jackson	$ 46	$ 115,828,000	$ 110,459,000	$ 110,340,000	$ 108,688,000	$ 108,416,000
79	Jasper	$ 70	$ 17,316,099	$ 15,703,993	$ 12,071,877	$ 11,300,257	$ 10,763,194
80	Jeff Davis	$ 107	No data	$ 19,383,206	$ 18,830,229	$ 18,155,191	$ 15,473,247
81	Jefferson	$ 159	$ 29,654,124	$ 27,628,716	$ 26,110,261	$ 24,837,227	$ 24,214,582
82	Jenkins	#VALUE!	No data	No data	$ 15,923,463	$ 15,872,062	$ 14,857,559
83	Johnson	#VALUE!	No data	No data	No data	No data	No data
84	Jones	$ 97	$ 45,693,257	$ 43,154,679	$ 41,027,799	$ 40,156,031	$ 40,214,399
85	Lamar	$ 43	$ 14,993,740	$ 19,001,326	$ 17,724,583	$ 16,882,400	$ 16,365,929
86	Lanier	#VALUE!	No data	No data	$ 7,655,598	$ 7,514,461	$ 6,805,408
87	Laurens	$ 145	$ 56,025,826	$ 51,475,790	$ 47,446,220	$ 43,916,878	$ 40,852,608
88	Lee	$ 535	$ 95,566,257	$ 95,526,548	$ 51,060,893	$ 48,946,164	$ 46,812,847
89	Liberty	#VALUE!	No data	No data	$ 99,900,000	$ 89,600,000	$ 103,200,000
90	Lincoln	$ 115	$ 26,661,055	$ 25,622,425	$ 25,391,224	$ 25,851,242	$ 26,386,543
91	Long	#VALUE!	No data	No data	No data	No data	No data
92	Lowndes	#VALUE!	No data	$ 113,310,000	$ 113,430,000	No data	$ 133,780,000
93	Lumpkin	$ 116	$ 91,568,000	$ 83,724,000	$ 81,494,000	$ 78,544,000	$ 76,857,000
94	Macon	$ 41	$ 20,687,679	$ 20,041,341	$ 19,773,860	$ 19,096,283	$ 19,532,558
95	Madison	$ 56	No data	$ 205,216,865	$ 213,500,739	$ 221,876,689	$ 232,697,330
96	Marion	$ 87	$ 14,197,059	$ 12,520,870	$ 11,377,691	$ 11,840,810	$ 11,721,097
97	McDuffie	$ 143	$ 53,295,674	$ 49,459,747	$ 45,773,546	$ 38,468,622	$ 41,986,793
98	McIntosh	#VALUE!	No data	No data	No data	$ 28,269,531	$ 24,038,001
99	Meriwether	#VALUE!	No data	No data	No data	$ 4,868,923	No data
100	Miller	#VALUE!	No data	No data	$ 9,305,964	$ 9,390,559	No data
101	Mitchell	$ 44	No data	$ 28,653,430	$ 28,339,665	$ 25,733,041	$ 22,895,569
102	Monroe	$ 111	$ 107,756,931	$ 108,273,807	$ 104,586,683	$ 102,419,305	$ 101,794,765
103	Montgomery	$ 91	$ 13,447,048	$ 10,982,773	$ 10,613,509	$ 10,070,932	$ 9,552,272
104	Morgan	$ 47	$ 59,586,799	$ 58,255,368	$ 56,673,703	$ 55,337,784	$ 57,346,916
105	Murray	$ 37	No data	$ 48,266,047	$ 47,703,974	$ 48,560,134	$ 51,156,327
106	Muscogee	$ 207	$ 352,848,776	$ 342,141,903	$ 328,862,084	$ 318,200,000	$ 327,400,000
107	Newton	$ 28	$ 235,649,139	$ 227,669,601	$ 231,191,166	$ 244,760,659	$ 258,692,137
108	Oconee	$ 334	$ 174,510,000	$ 170,720,000	$ 169,160,000	$ 162,470,000	$ 153,820,000
109	Oglethorpe	$ 61	No data	$ 28,313,276	$ 27,840,861	$ 28,410,023	$ 28,819,067
110	Paulding	$ 182	$ 734,767,000	$ 681,520,000	$ 648,863,000	$ 607,020,000	$ 586,892,000
111	Peach	$ 211	$ 50,686,671	$ 52,708,193	$ 52,040,141	$ 52,919,679	$ 53,432,582
112	Pickens	$ 46	$ 53,550,939	$ 53,186,366	$ 51,766,826	$ 52,949,455	$ 51,672,167
113	Pierce	#VALUE!	No data	$ 35,510,955	$ 33,902,079	$ 33,508,285	$ 33,757,188
114	Pike	$ 58	No data	$ 8,739,619	$ 7,973,274	$ 11,766,367	$ 11,447,590

Appendix A

DATA		Average	Savings Rate = Net Postion Incr/Decr YOY				
Code	***County***	***Per Resident***	***2019***	***2018***	***2017***	***2016***	***2015***
115	Polk	$ 69	No data	$ 47,883,125	$ 47,258,846	$ 49,851,166	$ 48,753,513
116	Pulaski	$ 24	No data	$ 12,248,401	$ 12,086,964	$ 11,887,606	$ 11,999,978
117	Putnam	$ 126	$ 38,068,200	$ 37,182,466	$ 36,311,215	$ 37,015,832	$ 37,890,077
118	Quitman	$ 113	$ 12,574,802	$ 12,735,725	$ 12,684,754	$ 12,633,473	$ 12,567,413
119	Rabun	$ 105	$ 47,188,000	$ 44,200,000	$ 42,282,000	$ 47,711,000	$ 49,358,000
120	Randolph	#VALUE!	No data	No data	$ 11,776,024	$ 11,252,818	$ 11,008,417
121	Richmond	$ 310	No data	$ 1,081,940,000	$ 1,105,045,000	$ 1,054,488,568	$ 983,702,872
122	Rockdale	$ 108	No data	$ 426,180,847	$ 444,092,249	$ 439,719,099	$ 443,618,802
123	Schley	$ 63	No data	$ 7,117,746	$ 7,129,951	$ 6,600,584	$ 7,129,957
124	Screven	#VALUE!	No data	$ 26,343,132	No data	No data	No data
125	Seminole	#VALUE!	$ 20,408,238	$ 19,300,604	$ 18,792,194	No data	No data
126	Spalding	$ 135	$ 98,874,362	$ 92,560,804	$ 96,274,046	$ 99,339,050	$ 103,737,993
127	Stephens	$ 46	$ 59,100,000	$ 60,070,000	$ 59,870,000	$ 62,110,000	$ 63,340,000
128	Stewart	#VALUE!	No data	$ 8,101,592	No data	No data	No data
129	Sumter	$ 69	No data	$ 69,473,658	$ 68,921,022	$ 68,496,271	$ 69,867,433
130	Talbot	$ 37	$ 14,734,152	$ 14,144,070	$ 12,665,875	$ 12,250,667	$ 10,996,761
131	Taliaferro	$ 411	No data	$ 16,306,185	$ 14,545,674	$ 14,088,346	$ 13,148,410
132	Tattnall	#VALUE!	No data	$ 27,538,345	No data	$ 25,282,037	$ 20,762,294
133	Taylor	#VALUE!	No data	No data	No data	$ 20,821,699	$ 19,224,014
134	Telfair	$ 90	$ 19,372,387	$ 19,103,006	$ 18,880,733	$ 17,765,069	$ 16,165,371
135	Terrell	#VALUE!	$ 11,860,079	No data	$ 10,427,894	$ 11,279,456	$ 11,613,519
136	Thomas	$ 98	$ 108,387,420	$ 105,955,327	$ 106,232,500	$ 104,254,203	$ 96,735,731
137	Tift	$ 157	$ 82,311,398	$ 85,039,362	$ 86,206,733	$ 86,220,091	$ 89,554,539
138	Toombs	#VALUE!	No data	$ 33,767,343	$ 34,089,047	No data	No data
139	Towns	$ 111	$ 24,535,171	$ 24,322,687	$ 24,366,972	$ 25,426,377	$ 23,609,844
140	Treutlen	#VALUE!	No data	No data	No data	$ 7,173,682	$ 7,151,960
141	Troup	$ 45	$ 147,421,991	$ 125,508,351	$ 122,117,601	$ 140,224,994	$ 135,682,879
142	Turner	$ 207	No data	$ 19,960,960	$ 20,031,898	$ 20,553,345	$ 18,785,556
143	Twiggs	#VALUE!	No data	No data	No data	$ 18,021,806	$ 18,303,095
144	Union	$ 105	$ 51,912,889	$ 50,295,750	$ 50,447,142	$ 49,719,426	$ 49,185,201
145	Upson	$ 102	$ 48,374,890	$ 44,378,361	$ 41,161,214	$ 43,276,803	$ 42,038,077
146	Walker	$ 65	$ 94,905,259	$ 77,118,572	$ 63,219,168	$ 60,313,769	$ 67,040,973
147	Walton	$ 228	$ 247,036,000	$ 228,185,000	$ 230,276,000	$ 225,639,000	$ 227,812,000
148	Ware	$ 98	No data	$ 104,120,000	$ 104,010,000	$ 105,020,000	$ 106,720,000
149	Warren	$ 311	$ 23,483,694	$ 23,015,457	$ 22,072,801	$ 21,877,226	$ 216,410,606
150	Washington	#VALUE!	No data	$ 37,287,621	$ 42,670,524	$ 46,946,810	$ 49,559,983
151	Wayne	$ 111	$ 91,703,877	$ 83,842,462	$ 85,902,383	$ 80,961,297	$ 73,381,042
152	Webster	$ 201	No data	$ 7,096,895	$ 6,324,371	$ 6,189,621	$ 6,153,951
153	Wheeler	#VALUE!	No data	No data	$ 7,591,505	$ 6,987,946	$ 7,067,042
154	White	$ 85	$ 51,328,861	$ 49,386,787	$ 42,750,012	$ 41,210,843	$ 40,392,301
155	Whitfield	$ 133	$ 246,800,053	$ 258,822,953	$ 268,033,610	$ 272,904,983	$ 282,868,997
156	Wilcox	#VALUE!	No data	No data	No data	No data	No data
157	Wilkes	$ 329	$ 33,183,831	$ 30,131,902	$ 26,965,986	$ 24,218,477	$ 22,971,862
158	Wilkinson	#VALUE!	No data	No data	$ 16,896,942	$ 18,268,893	$ 19,293,150
159	Worth	$ 68	$ 32,392,596	$ 30,114,196	$ 29,539,720	$ 28,438,033	$ 28,824,005

Appendix A

DATA

			County Water Rates for 7,000 Gallons per month				
Code	***County***	***YOY Inc/Dec***	***2019***	***2018***	***2017***	***2016***	***2015- Base Year***
1	Appling	#VALUE!	$ 28.35	$ 28.35	$ 28.35	$ 27.45	$ 28.17
2	Atkinson	$ 536,000	$ 30.36	$ 30.36	$ 30.36	$ 30.36	$ 25.00
3	Bacon	#VALUE!	$ 24.05	$ 66.30	$ 66.30	$ 66.30	$ 19.05
4	Baker	#VALUE!	$ 19.00	$ 19.00	$ 19.00	No Data	No Data
5	Baldwin	$ 1,155,000	$ 48.60	$ 48.60	$ 42.60	$ 39.45	$ 32.60
6	Banks	$ 1,279,000	$ 53.20	$ 53.20	$ 50.95	$ 49.70	$ 67.10
7	Barrow	$ 12,967,000	$ 62.25	$ 61.85	$ 51.60	$ 56.50	$ 31.95
8	Bartow	$ (77,802,000)	$ 61.49	$ 51.60	$ 46.67	$ 44.63	$ 26.50
9	Ben Hill	#VALUE!	$ 21.70	$ 13.40	$ 21.70	$ 21.70	$ 21.70
10	Berrien	#VALUE!	No data	$ 21.70	No data	$ 21.70	No Data
11	Bibb	$ (76,931,000)	$ 32.10	$ 31.16	$ 30.22	$ 29.29	$ 27.85
12	Bleckley	$ 547,000	$ 33.50	$ 33.50	$ 23.50	$ 23.50	$ 23.50
13	Brantley	$ 2,391,445	$ 23.68	$ 23.68	$ 21.60	$ 18.70	$ 22.23
14	Brooks	$ 2,974,774	$ 31.55	$ 31.46	$ 25.02	$ 24.65	$ 25.15
15	Bryan	$ (213,904)	$ 36.35	$ 36.35	$ 35.35	$ 35.30	$ 35.30
16	Bulloch	$ 13,323,697	$ 23.25	$ 23.25	$ 23.25	$ 22.25	$ 22.25
17	Burke	$ 5,936,629	No data	$ 33.29	No data	No Data	No Data
18	Butts	$ (701,284)	$ 32.76	$ 38.00	$ 33.29	$ 33.28	$ 31.26
19	Calhoun	#VALUE!	$ 23.50	$ 22.17	$ 23.50	$ 21.25	$ 21.25
20	Camden	$ (3,629,000)	$ 19.68	$ 18.68	$ 19.68	No Data	$ 19.68
21	Candler	$ 1,130,802	$ 22.82	$ 22.82	$ 22.82	$ 21.80	$ 21.80
22	Carroll	$ 89,066	$ 47.15	$ 46.15	$ 46.15	$ 45.15	$ 43.65
23	Catoosa	$ (4,100,000)	$ 33.08	$ 33.08	$ 33.08	$ 33.08	$ 33.08
24	Charlton	$ 212,563,632	$ 38.10	$ 37.54	$ 31.68	$ 31.20	$ 30.71
25	Chatham	$ (285,616,815)	No data	$ 21.36	$ 21.16	No Data	$ 39.14
26	Chattahoochee	#VALUE!	No data	$ 44.00	$ 44.00	No Data	No Data
27	Chattooga	#VALUE!	$ 37.43	$ 36.35	$ 30.00	$ 30.00	$ 30.00
28	Cherokee	$ (5,319,039)	$ 39.30	$ 37.45	$ 37.45	$ 37.45	$ 37.45
29	Clarke	$ (40,513,260)	$ 78.98	$ 66.72	$ 64.81	No Data	$ 34.00
30	Clay	#VALUE!	$ 32.45	$ 32.45	$ 32.45	$ 30.75	$ 30.75
31	Clayton	$ (125,086)	$ 37.54	$ 39.88	$ 39.88	$ 43.85	$ 36.77
32	Clinch	$ (1,141,322)	$ 22.50	$ 22.50	$ 22.50	$ 20.00	$ 20.00
33	Cobb	$ 121,937,221	$ 31.84	$ 28.67	$ 28.67	$ 28.67	$ 28.67
34	Coffee	#VALUE!	$ 29.50	$ 29.50	$ 29.50	No Data	No Data
35	Colquitt	$ 3,582,428	$ 29.00	$ 29.00	$ 29.00	$ 29.00	$ 32.25
36	Columbia	$ 27,632,742	$ 26.63	$ 26.63	$ 26.63	$ 26.63	$ 26.15
37	Cook	#VALUE!	$ 24.28	$ 24.28	$ 24.28	$ 24.28	$ 24.28
38	Coweta	$ (35,889,204)	$ 54.59	$ 54.59	$ 54.59	$ 54.59	$ 54.59
39	Crawford	$ 509,257	$ 45.00	$ 51.50	$ 51.50	$ 45.00	$ 51.50
40	Crisp	$ 464,575	$ 47.50	$ 47.50	$ 47.50	$ 47.50	$ 44.50
41	Dade	$ 101,199	$ 36.45	$ 36.45	$ 36.45	$ 36.45	$ 36.45
42	Dawson	$ 4,195,000	$ 47.10	$ 47.10	$ 47.10	$ 41.20	$ 41.20
43	Decatur	$ 25,688,000	$ 33.48	$ 33.36	$ 28.67	$ 27.49	$ 24.87
44	De Kalb	$ 5,121,000	$ 22.58	$ 22.58	$ 22.58	$ 22.58	$ 22.58
45	Dodge	#VALUE!	$ 18.30	$ 18.30	$ 18.30	$ 18.30	$ 18.30
46	Dooly	$ (601,096)	$ 26.15	$ 26.15	$ 23.43	No Data	$ 25.43
47	Dougherty	$ 2,000,000	$ 22.09	$ 22.09	$ 21.65	$ 20.62	$ 20.28
48	Douglas	$ (216,459)	$ 47.07	$ 47.07	$ 46.18	$ 44.80	$ 453.53
49	Early	#VALUE!	$ 33.43	$ 29.93	$ 28.88	$ 26.75	$ 26.75
50	Echols	#VALUE!	$ 24.00	$ 24.00	$ 24.00	$ 24.00	$ 24.00
51	Effingham	$ 9,000,000	$ 27.52	$ 27.52	$ 27.52	$ 27.52	$ 27.52
52	Elbert	$ 958,243	$ 37.75	$ 26.90	$ 28.55	$ 28.55	$ 30.20
53	Emanuel	$ (338,330)	$ 30.15	$ 26.06	No Data	No Data	$ 23.70
54	Evans	$ 3,218,658	$ 29.40	No Data	$ 29.40	$ 27.40	No Data
55	Fannin	#VALUE!	$ 55.00	$ 55.00	$ 55.00	$ 51.50	$ 54.00
56	Fayette	$ 109,995,713	$ 34.63	$ 34.63	$ 34.63	$ 34.63	$ 30.39
57	Floyd	$ (3,192,604)	$ 33.60	$ 33.60	$ 33.60	$ 33.60	$ 33.60

Appendix A

DATA

			County Water Rates for 7,000 Gallons per month				
Code	***County***	***YOY Inc/Dec***	***2019***	***2018***	***2017***	***2016***	***2015- Base Year***
58	Forsyth	$ 82,770,000	$ 34.65	$ 33.53	$ 33.53	$ 33.53	$ 33.53
59	Franklin	$ 1,777,812	$ 42.35	$ 42.35	$ 42.35	$ 37.10	$ 37.10
60	Fulton	$ (272,328,000)	$ 27.52	$ 26.21	$ 24.98	$ 24.59	$ 24.59
61	Gilmer	$ 2,098,695	$ 35.17	$ 34.62	$ 34.62	No Data	No Data
62	Glascock	$ 368,770	$ 26.00	$ 26.00	$ 26.00	$ 25.50	$ 25.50
63	Glynn	$ 18,467,466	$ 26.47	$ 23.29	$ 23.29	No Data	No Data
64	Gordon	$ 2,156,078	$ 27.60	$ 20.79	$ 26.01	$ 25.37	$ 24.66
65	Grady	$ 38,882	$ 27.30	$ 25.90	$ 25.90	$ 23.90	$ 21.90
66	Greene	$ 3,356,193	$ 59.28	$ 59.28	$ 59.28	$ 59.28	$ 59.28
67	Gwinnett	$ 245,853,000	$ 40.95	$ 41.94	$ 40.39	$ 39.90	$ 39.90
68	Habersham	$ 4,571,888	$ 39.23	$ 38.48	$ 37.00	$ 34.00	$ 34.00
69	Hall	$ (13,890,000)	$ 76.29	$ 41.94	$ 40.94	No Data	No Data
70	Hancock	$ (1,790,869)	$ 28.00	$ 42.75	$ 42.75	$ 42.75	$ 42.75
71	Haralson	$ 2,297,849	No data	$ 35.57	$ 35.57	$ 35.57	$ 35.57
72	Harris	$ 1,850,214	$ 44.56	$ 44.56	$ 44.56	$ 44.56	$ 44.56
73	Hart	#VALUE!	$ 41.78	$ 38.80	$ 38.80	$ 38.80	$ 38.80
74	Heard	#VALUE!	$ 56.35	$ 48.95	$ 48.95	$ 48.95	$ 48.95
75	Henry	$ (16,808,411)	$ 48.49	$ 48.51	$ 47.51	$ 46.84	$ 46.84
76	Houston	$ 7,851,351	$ 16.97	$ 16.97	$ 16.97	$ 16.97	$ 16.97
77	Irwin	#VALUE!	$ 17.75	$ 17.75	$ 17.75	$ 17.75	$ 15.75
78	Jackson	$ 119,000	$ 60.68	$ 59.29	$ 59.29	$ 57.82	$ 57.82
79	Jasper	$ 3,632,116	$ 47.60	$ 47.60	$ 47.60	$ 47.10	$ 47.10
80	Jeff Davis	$ 552,977	$ 26.25	$ 26.25	$ 26.25	$ 26.25	No Data
81	Jefferson	$ 1,518,455	$ 34.50	$ 34.50	$ 34.50	$ 33.50	$ 29.25
82	Jenkins	#VALUE!	$ 26.49	$ 26.49	$ 26.49	$ 25.07	$ 25.07
83	Johnson	#VALUE!	$ 12.95	$ 12.95	No Data	$ 12.95	$ 12.95
84	Jones	$ 2,126,880	$ 40.87	$ 37.41	$ 36.20	$ 36.20	$ 33.50
85	Lamar	$ 1,276,743	$ 39.00	$ 39.00	$ 39.00	$ 36.00	$ 36.00
86	Lanier	#VALUE!	$ 33.00	$ 33.00	$ 33.00	$ 33.00	$ 33.00
87	Laurens	$ 4,029,570	$ 30.95	$ 28.50	$ 28.50	$ 26.40	$ 25.70
88	Lee	$ 44,465,655	$ 33.75	$ 33.75	$ 34.75	$ 34.75	$ 34.75
89	Liberty	#VALUE!	$ 41.30	$ 41.30	$ 41.30	No Data	No Data
90	Lincoln	$ 231,201	$ 71.22	$ 64.01	$ 64.01	$ 60.67	$ 53.50
91	Long	#VALUE!	$ 25.30	$ 25.30	$ 25.30	$ 25.30	$ 25.30
92	Lowndes	$ (120,000)	$ 29.16	$ 28.86	$ 28.56	$ 28.03	$ 27.77
93	Lumpkin	$ 2,230,000	$ 90.50	$ 90.50	$ 90.50	$ 90.50	$ 90.50
94	Macon	$ 267,481	$ 19.75	$ 38.66	$ 40.59	No Data	$ 16.25
95	Madison	$ (8,283,874)	$ 44.00	$ 44.00	$ 51.05	$ 51.00	$ 48.70
96	Marion	$ 1,143,179	$ 45.30	$ 45.30	$ 39.86	$ 51.05	No Data
97	McDuffie	$ 3,686,201	$ 45.63	$ 42.69	$ 50.50	No Data	No Data
98	McIntosh	#VALUE!	$ 50.50	$ 50.50	$ 50.50	$ 50.50	$ 50.50
99	Meriwether	#VALUE!	$ 54.90	$ 54.90	$ 54.90	No Data	No Data
100	Miller	#VALUE!	$ 31.50	$ 31.50	$ 31.50	$ 40.50	$ 32.60
101	Mitchell	$ 313,765	$ 19.25	$ 19.25	$ 19.25	$ 19.25	$ 32.00
102	Monroe	$ 3,687,124	$ 38.20	$ 38.20	$ 38.64	$ 40.88	$ 36.90
103	Montgomery	$ 369,264	$ 24.75	$ 24.75	No Data	$ 22.75	$ 21.75
104	Morgan	$ 1,581,665	$ 48.70	$ 48.70	$ 48.70	$ 48.70	$ 36.10
105	Murray	$ 562,073	$ 68.93	$ 30.30	$ 28.85	$ 25.95	$ 25.95
106	Muscogee	$ 13,279,819	$ 55.16	$ 22.43	$ 21.45	$ 20.54	$ 19.64
107	Newton	$ (3,521,565)	$ 46.25	$ 46.25	$ 46.25	$ 45.62	$ 44.84
108	Oconee	$ 1,560,000	$ 52.36	$ 51.94	$ 51.07	$ 52.79	$ 52.02
109	Oglethorpe	$ 472,415	$ 53.00	$ 38.66	$ 50.00	No Data	$ 16.25
110	Paulding	$ 32,657,000	$ 68.53	$ 63.61	$ 59.97	$ 55.12	$ 53.16
111	Peach	$ 668,052	$ 41.17	$ 41.17	$ 41.17	$ 39.34	$ 37.42
112	Pickens	$ 1,419,540	$ 72.00	$ 72.00	$ 72.00	$ 71.00	$ 71.00
113	Pierce	$ 1,608,876	$ 28.52	$ 28.52	$ 27.09	$ 26.02	$ 26.02
114	Pike	$ 766,345	No data	$ 69.50	$ 69.50	$ 69.50	$ 59.50

Appendix A

DATA

			County Water Rates for 7,000 Gallons per month				
Code	***County***	***YOY Inc/Dec***	***2019***	***2018***	***2017***	***2016***	***2015- Base Year***
115	Polk	$ 624,279	$ 52.75	$ 46.94	$ 44.94	$ 48.76	$ 39.49
116	Pulaski	$ 161,437	$ 26.53	$ 21.00	$ 23.83	$ 21.70	$ 21.70
117	Putnam	$ 871,251	$ 60.35	$ 55.44	$ 55.44	$ 53.44	$ 52.44
118	Quitman	$ 50,971	$ 25.02	$ 36.25	$ 36.25	$ 11.40	$ 11.40
119	Rabun	$ 1,918,000	$ 63.00	$ 63.00	$ 63.00	$ 63.00	No Data
120	Randolph	#VALUE!	$ 27.50	$ 27.50	$ 27.50	$ 27.50	No Data
121	Richmond	$ (23,105,000)	$ 33.50	$ 33.46	$ 33.46	$ 32.49	$ 30.66
122	Rockdale	$ (17,911,402)	$ 43.89	$ 40.66	$ 40.66	$ 40.66	$ 40.66
123	Schley	$ (12,205)	$ 43.00	$ 43.00	$ 43.00	$ 43.00	$ 43.00
124	Screven	#VALUE!	$ 27.20	$ 22.80	$ 27.22	$ 27.22	$ 24.64
125	Seminole	$ 508,410	$ 27.54	$ 27.54	$ 27.54	$ 27.54	$ 26.50
126	Spalding	$ (3,713,242)	$ 65.30	$ 65.30	$ 65.30	$ 65.30	$ 63.13
127	Stephens	$ 200,000	$ 39.50	$ 39.50	$ 38.50	$ 38.50	$ 38.50
128	Stewart	#VALUE!	$ 25.75	$ 23.25	$ 29.25	No Data	$ 29.25
129	Sumter	$ 552,636	$ 26.58	$ 28.81	$ 25.58	$ 25.58	$ 24.18
130	Talbot	$ 1,478,195	$ 58.09	$ 58.09	$ 58.09	$ 38.76	$ 38.73
131	Taliaferro	$ 1,760,511	$ 41.10	$ 41.10	$ 41.10	$ 41.10	$ 41.10
132	Tattnall	#VALUE!	$ 39.85	$ 39.85	$ 39.85	$ 39.85	$ 39.85
133	Taylor	#VALUE!	$ 26.90	$ 26.90	$ 26.90	No Data	$ 26.90
134	Telfair	$ 222,273	$ 20.65	$ 20.65	$ 20.65	$ 20.65	$ 20.65
135	Terrell	#VALUE!	$ 25.50	$ 25.50	$ 25.50	$ 25.50	$ 25.50
136	Thomas	$ (277,173)	$ 45.63	$ 42.69	$ 39.86	No Data	$ 34.85
137	Tift	$ (1,167,371)	$ 16.26	$ 16.26	$ 16.26	$ 16.26	$ 16.26
138	Toombs	$ (321,704)	$ 16.30	$ 16.30	$ 16.30	$ 16.30	$ 14.80
139	Towns	$ (44,285)	$ 59.00	$ 59.00	$ 59.00	$ 59.00	$ 55.00
140	Treutlen	#VALUE!	$ 17.50	$ 17.50	$ 17.50	$ 17.50	No Data
141	Troup	$ 3,390,750	$ 34.98	$ 34.98	$ 34.98	$ 34.98	$ 34.56
142	Turner	$ (70,938)	$ 24.75	$ 24.75	$ 24.75	$ 24.75	$ 21.25
143	Twiggs	#VALUE!	$ 49.75	$ 49.75	$ 49.75	$ 48.50	$ 48.50
144	Union	$ (151,392)	$ 30.50	$ 30.50	$ 30.50	$ 30.50	$ 30.50
145	Upson	$ 3,217,147	$ 51.75	$ 51.75	$ 56.25	$ 56.25	$ 43.30
146	Walker	$ 13,899,404	$ 51.55	$ 46.90	$ 45.00	$ 28.50	$ 32.00
147	Walton	$ (2,091,000)	$ 59.35	$ 59.35	$ 59.35	$ 57.50	$ 57.50
148	Ware	$ 110,000	$ 26.65	$ 26.65	$ 26.65	$ 26.25	$ 26.25
149	Warren	$ 942,656	$ 44.93	$ 42.54	$ 42.54	$ 42.08	$ 41.62
150	Washington	$ (5,382,903)	$ 27.75	$ 27.75	$ 27.75	$ 22.00	$ 22.00
151	Wayne	$ (2,059,921)	$ 21.80	$ 21.59	$ 21.52	$ 21.45	$ 21.45
152	Webster	$ 772,524	$ 20.00	$ 20.00	$ 20.00	$ 20.00	$ 20.00
153	Wheeler	#VALUE!	$ 16.25	$ 16.25	$ 16.25	$ 16.25	$ 16.25
154	White	$ 6,636,775	$ 55.63	$ 53.63	$ 53.63	$ 53.63	$ 52.60
155	Whitfield	$ (9,210,657)	$ 23.78	$ 23.76	No Data	$ 22.54	$ 21.14
156	Wilcox	#VALUE!	$ 18.50	$ 18.50	No Data	$ 10.00	$ 10.00
157	Wilkes	$ 3,165,916	$ 48.20	$ 48.20	$ 47.00	$ 47.00	$ 47.00
158	Wilkinson	#VALUE!	$ 37.50	$ 37.50	$ 37.50	$ 37.50	$ 37.50
159	Worth	$ 574,476	$ 31.21	$ 31.21	$ 31.21	$ 31.21	$ 31.21

Appendix A

Variable = Static

DATA						Poverty %	Number in Poverty
Code	***County***	***2019***	***2018***	***2017***	***2,016***	***2019***	***2019***
1	Appling	0.0%	0.0%	3.3%	-2.6%	21.9%	4,027
2	Atkinson	0.0%	0.0%	0.0%	21.4%	26.1%	2,131
3	Bacon	-63.7%	0.0%	0.0%	248.0%	22.8%	2,545
4	Baker	0.0%	0.0%	#VALUE!	#VALUE!	22.9%	696
5	Baldwin	0.0%	14.1%	8.0%	21.0%	23.8%	10,684
6	Banks	0.0%	4.4%	2.5%	-25.9%	13.0%	2,500
7	Barrow	0.6%	19.9%	-8.7%	76.8%	9.5%	7,908
8	Bartow	19.2%	10.6%	4.6%	68.4%	12.2%	13,144
9	Ben Hill	61.9%	-38.2%	0.0%	0.0%	26.2%	4,375
10	Berrien	#VALUE!	#VALUE!	#VALUE!	#VALUE!	21.8%	4,229
11	Bibb	3.0%	3.1%	3.2%	5.2%	24.7%	37,830
12	Bleckley	0.0%	42.6%	0.0%	0.0%	18.7%	2,407
13	Brantley	0.0%	9.6%	15.5%	-15.9%	18.3%	3,497
14	Brooks	0.3%	25.7%	1.5%	-2.0%	24.5%	3,787
15	Bryan	0.0%	2.8%	0.1%	0.0%	8.6%	3,408
16	Bulloch	0.0%	0.0%	4.5%	0.0%	22.9%	18,230
17	Burke	#VALUE!	#VALUE!	#VALUE!	#VALUE!	22.0%	4,924
18	Butts	-13.8%	14.2%	0.0%	6.5%	19.7%	4,912
19	Calhoun	6.0%	-5.7%	10.6%	0.0%	37.2%	2,302
20	Camden	5.4%	-5.1%	#VALUE!	#VALUE!	15.8%	8,637
21	Candler	0.0%	0.0%	4.7%	0.0%	24.6%	2,658
22	Carroll	2.2%	0.0%	2.2%	3.4%	16.8%	20,159
23	Catoosa	0.0%	0.0%	0.0%	0.0%	11.9%	8,042
24	Charlton	1.5%	18.5%	1.5%	1.6%	25.6%	3,428
25	Chatham	#VALUE!	0.9%	#VALUE!	#VALUE!	14.4%	41,678
26	Chattahoochee	#VALUE!	0.0%	#VALUE!	#VALUE!	17.3%	1,887
27	Chattooga	3.0%	21.2%	0.0%	0.0%	19.5%	4,834
28	Cherokee	4.9%	0.0%	0.0%	0.0%	7.4%	19,149
29	Clarke	18.4%	2.9%	#VALUE!	#VALUE!	27.0%	34,649
30	Clay	0.0%	0.0%	5.5%	0.0%	29.8%	845
31	Clayton	-5.9%	0.0%	-9.1%	19.3%	17.6%	51,437
32	Clinch	0.0%	0.0%	12.5%	0.0%	25.8%	1,707
33	Cobb	11.1%	0.0%	0.0%	0.0%	9.1%	69,173
34	Coffee	0.0%	0.0%	#VALUE!	#VALUE!	23.9%	10,342
35	Colquitt	0.0%	0.0%	0.0%	-10.1%	23.9%	10,898
36	Columbia	0.0%	0.0%	0.0%	1.8%	7.1%	11,127
37	Cook	0.0%	0.0%	0.0%	0.0%	24.5%	4,231
38	Coweta	0.0%	0.0%	0.0%	0.0%	10.2%	15,148
39	Crawford	-12.6%	0.0%	14.4%	-12.6%	18.5%	2,295
40	Crisp	0.0%	0.0%	0.0%	6.7%	27.4%	6,130
41	Dade	0.0%	0.0%	0.0%	0.0%	13.6%	2,192
42	Dawson	0.0%	0.0%	14.3%	0.0%	8.7%	2,271
43	Decatur	0.3%	16.4%	4.3%	10.5%	23.2%	6,126
44	De Kalb	0.0%	0.0%	0.0%	0.0%	14.3%	108,579
45	Dodge	0.0%	0.0%	0.0%	0.0%	26.5%	5,460
46	Dooly	0.0%	11.6%	#VALUE!	#VALUE!	29.1%	3,896
47	Dougherty	0.0%	2.0%	5.0%	1.7%	29.5%	25,947
48	Douglas	0.0%	1.9%	3.1%	-90.1%	12.6%	18,439
49	Early	11.7%	3.6%	8.0%	0.0%	26.5%	2,700
50	Echols	0.0%	0.0%	0.0%	0.0%	24.4%	977
51	Effingham	0.0%	0.0%	0.0%	0.0%	8.3%	5,337
52	Elbert	40.3%	-5.8%	0.0%	-5.5%	18.5%	3,551
53	Emanuel	15.7%	#VALUE!	#VALUE!	#VALUE!	25.1%	5,684
54	Evans	#VALUE!	#VALUE!	7.3%	#VALUE!	26.6%	2,834
55	Fannin	0.0%	0.0%	6.8%	-4.6%	16.8%	4,400
56	Fayette	0.0%	0.0%	0.0%	14.0%	5.0%	5,721
57	Floyd	0.0%	0.0%	0.0%	0.0%	20.7%	20,389

Appendix A

Variable = Static

DATA						Poverty %	Number in Poverty
Code	***County***	***2019***	***2018***	***2017***	***2,016***	***2019***	***2019***
58	Forsyth	3.3%	0.0%	0.0%	0.0%	5.0%	12,213
59	Franklin	0.0%	0.0%	14.2%	0.0%	16.4%	3,829
60	Fulton	5.0%	4.9%	1.6%	0.0%	13.5%	143,631
61	Gilmer	1.6%	0.0%	#VALUE!	#VALUE!	17.4%	5,458
62	Glascock	0.0%	0.0%	2.0%	0.0%	17.5%	520
63	Glynn	13.7%	0.0%	#VALUE!	#VALUE!	16.6%	14,158
64	Gordon	32.8%	-20.1%	2.5%	2.9%	16.8%	9,738
65	Grady	5.4%	0.0%	8.4%	9.1%	20.0%	4,927
66	Greene	0.0%	0.0%	0.0%	0.0%	19.3%	3,537
67	Gwinnett	-2.4%	3.8%	1.2%	0.0%	9.2%	86,135
68	Habersham	1.9%	4.0%	8.8%	0.0%	14.9%	6,754
69	Hall	81.9%	2.4%	#VALUE!	#VALUE!	13.2%	26,986
70	Hancock	-34.5%	0.0%	0.0%	0.0%	30.7%	2,596
71	Haralson	#VALUE!	0.0%	0.0%	0.0%	15.9%	4,737
72	Harris	0.0%	0.0%	0.0%	0.0%	8.7%	3,066
73	Hart	7.7%	0.0%	0.0%	0.0%	15.0%	3,931
74	Heard	15.1%	0.0%	0.0%	0.0%	17.1%	2,039
75	Henry	0.0%	2.1%	1.4%	0.0%	7.5%	17,592
76	Houston	0.0%	0.0%	0.0%	0.0%	12.1%	19,101
77	Irwin	0.0%	0.0%	0.0%	12.7%	24.3%	2,288
78	Jackson	2.3%	0.0%	2.5%	0.0%	8.7%	6,349
79	Jasper	0.0%	0.0%	1.1%	0.0%	15.4%	2,190
80	Jeff Davis	0.0%	0.0%	0.0%	#VALUE!	20.6%	3,114
81	Jefferson	0.0%	0.0%	3.0%	14.5%	22.3%	3,426
82	Jenkins	0.0%	0.0%	5.7%	0.0%	31.8%	2,759
83	Johnson	0.0%	#VALUE!	#VALUE!	0.0%	30.0%	2,893
84	Jones	9.2%	3.3%	0.0%	8.1%	14.5%	4,167
85	Lamar	0.0%	0.0%	8.3%	0.0%	17.3%	3,300
86	Lanier	0.0%	0.0%	0.0%	0.0%	20.3%	2,116
87	Laurens	8.6%	0.0%	8.0%	2.7%	24.6%	11,696
88	Lee	0.0%	-2.9%	0.0%	0.0%	12.4%	3,719
89	Liberty	0.0%	0.0%	#VALUE!	#VALUE!	16.1%	9,891
90	Lincoln	11.3%	0.0%	5.5%	13.4%	17.2%	1,362
91	Long	0.0%	0.0%	0.0%	0.0%	16.8%	3,286
92	Lowndes	1.0%	1.1%	1.9%	0.9%	25.9%	30,408
93	Lumpkin	0.0%	0.0%	0.0%	0.0%	14.9%	5,008
94	Macon	-48.9%	-4.8%	#VALUE!	#VALUE!	30.5%	3,949
95	Madison	0.0%	-13.8%	0.1%	4.7%	16.1%	4,811
96	Marion	0.0%	13.6%	-21.9%	#VALUE!	22.8%	1,906
97	McDuffie	6.9%	-15.5%	#VALUE!	#VALUE!	19.9%	4,241
98	McIntosh	0.0%	0.0%	0.0%	0.0%	21.5%	3,091
99	Meriwether	0.0%	0.0%	#VALUE!	#VALUE!	24.4%	5,165
100	Miller	0.0%	0.0%	-22.2%	24.2%	22.4%	1,281
101	Mitchell	0.0%	0.0%	0.0%	-39.8%	29.3%	6,406
102	Monroe	0.0%	-1.1%	-5.5%	10.8%	13.0%	3,585
103	Montgomery	0.0%	#VALUE!	#VALUE!	4.6%	22.1%	2,027
104	Morgan	0.0%	0.0%	0.0%	34.9%	12.7%	2,448
105	Murray	127.5%	5.0%	11.2%	0.0%	15.2%	6,095
106	Muscogee	145.9%	4.6%	4.4%	4.6%	20.1%	39,350
107	Newton	0.0%	0.0%	1.4%	1.7%	14.8%	16,538
108	Oconee	0.8%	1.7%	-3.3%	1.5%	5.7%	2,296
109	Oglethorpe	37.1%	-22.7%	#VALUE!	#VALUE!	13.8%	2,106
110	Paulding	7.7%	6.1%	8.8%	3.7%	7.8%	13,156
111	Peach	0.0%	0.0%	4.7%	5.1%	24.0%	6,611
112	Pickens	0.0%	0.0%	1.4%	0.0%	11.0%	3,585
113	Pierce	0.0%	5.3%	4.1%	0.0%	18.1%	3,523
114	Pike	#VALUE!	0.0%	0.0%	16.8%	10.6%	2,010

Appendix A

Variable = Static

DATA						Poverty %	Number in Poverty
Code	***County***	***2019***	***2018***	***2017***	***2,016***	***2019***	***2019***
115	Polk	12.4%	4.5%	-7.8%	23.5%	21.8%	9,290
116	Pulaski	26.3%	-11.9%	9.8%	0.0%	23.9%	2,662
117	Putnam	8.9%	0.0%	3.7%	1.9%	16.1%	3,561
118	Quitman	-31.0%	0.0%	218.0%	0.0%	25.5%	586
119	Rabun	0.0%	0.0%	0.0%	#VALUE!	14.2%	2,433
120	Randolph	0.0%	0.0%	0.0%	#VALUE!	30.8%	2,088
121	Richmond	0.1%	0.0%	3.0%	6.0%	21.9%	44,351
122	Rockdale	7.9%	0.0%	0.0%	0.0%	13.2%	11,998
123	Schley	0.0%	0.0%	0.0%	0.0%	18.1%	952
124	Screven	19.3%	-16.2%	0.0%	10.5%	25.9%	3,617
125	Seminole	0.0%	0.0%	0.0%	3.9%	25.4%	2,055
126	Spalding	0.0%	0.0%	0.0%	3.4%	17.3%	11,540
127	Stephens	0.0%	2.6%	0.0%	0.0%	16.3%	4,226
128	Stewart	10.8%	-20.5%	#VALUE!	#VALUE!	37.9%	2,509
129	Sumter	-7.7%	12.6%	0.0%	5.8%	25.7%	7,588
130	Talbot	0.0%	0.0%	49.9%	0.1%	24.8%	1,536
131	Taliaferro	0.0%	0.0%	0.0%	0.0%	24.6%	378
132	Tattnall	0.0%	0.0%	0.0%	0.0%	25.6%	6,473
133	Taylor	0.0%	0.0%	#VALUE!	#VALUE!	22.9%	1,837
134	Telfair	0.0%	0.0%	0.0%	0.0%	31.9%	5,059
135	Terrell	0.0%	0.0%	0.0%	0.0%	27.8%	2,372
136	Thomas	6.9%	7.1%	#VALUE!	#VALUE!	20.2%	8,979
137	Tift	0.0%	0.0%	0.0%	0.0%	19.6%	7,966
138	Toombs	0.0%	0.0%	0.0%	10.1%	24.9%	6,681
139	Towns	0.0%	0.0%	0.0%	7.3%	16.0%	1,926
140	Treutlen	0.0%	0.0%	0.0%	#VALUE!	26.3%	1,815
141	Troup	0.0%	0.0%	0.0%	1.2%	20.2%	14,124
142	Turner	0.0%	0.0%	0.0%	16.5%	27.9%	2,228
143	Twiggs	0.0%	0.0%	2.6%	0.0%	21.3%	1,730
144	Union	0.0%	0.0%	0.0%	0.0%	13.8%	3,383
145	Upson	0.0%	-8.0%	0.0%	29.9%	21.6%	5,685
146	Walker	9.9%	4.2%	57.9%	-10.9%	15.5%	10,813
147	Walton	0.0%	0.0%	3.2%	0.0%	11.9%	11,257
148	Ware	0.0%	0.0%	1.5%	0.0%	23.6%	8,433
149	Warren	5.6%	0.0%	1.1%	1.1%	25.7%	1,350
150	Washington	0.0%	0.0%	26.1%	0.0%	25.9%	5,277
151	Wayne	1.0%	0.3%	0.3%	0.0%	18.6%	5,566
152	Webster	0.0%	0.0%	0.0%	0.0%	22.7%	592
153	Wheeler	0.0%	0.0%	0.0%	0.0%	39.6%	3,111
154	White	3.7%	0.0%	0.0%	2.0%	14.1%	4,343
155	Whitfield	0.1%	#VALUE!	#VALUE!	6.6%	14.2%	14,857
156	Wilcox	0.0%	#VALUE!	#VALUE!	0.0%	30.8%	2,660
157	Wilkes	0.0%	2.6%	0.0%	0.0%	20.3%	1,985
158	Wilkinson	0.0%	0.0%	0.0%	0.0%	23.3%	2,086
159	Worth	0.0%	0.0%	0.0%	0.0%	20.5%	4,151

GEORGIA COUNTY GOVERNEMENT ECONOMIC DATA									
Rank	County	Per Capital Incom	Median Househol	Median Fami	Population	Number of Household	# of people in household	3	5
	Georgia	$25,134	$49,347	$58,790	9,687,653	3,585,584	2.70	0.6%	#REF!
75	Appling	$18,977	$36,155	$46,005	18,236	6,969	2.62	0.8%	1.4%
143	Atkinson	$15,456	$33,834	$34,859	8,375	2,983	2.81	0.9%	1.5%
110	Bacon	$17,110	$31,429	$45,442	11,096	4,214	2.63	1.0%	1.6%
124	Baker	$16,379	$27,462	$42,585	3,451	1,372	2.52	1.1%	1.8%
103	Baldwin	$17,488	$37,237	$47,714	45,720	16,788	2.72	0.8%	1.3%
65	Banks	$19,497	$40,455	$48,606	18,395	6,700	2.75	0.7%	1.2%
48	Barrow	$20,882	$48,958	$55,415	69,367	23,971	2.89	0.6%	1.0%
36	Bartow	$22,241	$49,216	$56,281	100,157	35,782	2.80	0.6%	1.0%
142	Ben Hill	$15,529	$30,134	$35,868	17,634	6,794	2.60	1.0%	1.7%
133	Berrien	$16,049	$32,202	$40,869	19,286	7,443	2.59	0.9%	1.6%
42	Bibb	$21,436	$38,798	$52,158	155,547	60,295	2.58	0.8%	1.3%
77	Bleckley	$18,960	$35,661	$48,750	13,063	4,660	2.80	0.8%	1.4%
79	Brantley	$18,905	$37,343	$43,028	18,411	6,885	2.67	0.8%	1.3%
54	Brooks	$20,346	$41,309	$47,599	16,243	6,457	2.52	0.7%	1.2%
10	Bryan	$28,365	$63,244	$72,118	30,233	10,738	2.82	0.5%	0.8%
96	Bulloch	$17,812	$34,327	$51,904	70,217	25,575	2.75	0.9%	1.5%
136	Burke	$15,934	$33,155	$41,659	23,316	8,533	2.73	0.9%	1.5%
47	Butts	$20,963	$52,257	$59,511	23,655	7,881	3.00	0.6%	1.0%
157	Calhoun	$12,452	$30,522	$37,309	6,694	2,002	3.34	1.0%	1.6%
38	Camden	$22,022	$49,230	$57,366	50,513	18,047	2.80	0.6%	1.0%
132	Candler	$16,068	$35,828	$39,105	10,998	4,041	2.72	0.8%	1.4%
52	Carroll	$20,523	$45,559	$53,703	110,527	39,187	2.82	0.7%	1.1%
31	Catoosa	$22,563	$46,544	$54,796	63,942	24,475	2.61	0.6%	1.1%
120	Charlton	$16,652	$40,850	$45,913	12,171	3,927	3.10	0.7%	1.2%
19	Chatham	$25,397	$44,928	$54,933	265,128	103,038	2.57	0.7%	1.1%
37	Chattahoochee	$22,202	$51,089	$55,745	11,267	2,686	4.19	0.6%	1.0%
145	Chattooga	$15,158	$32,419	$39,037	26,015	9,548	2.72	0.9%	1.5%
7	Cherokee	$30,217	$66,320	$77,190	214,346	75,936	2.82	0.5%	0.8%
60	Clarke	$19,839	$34,253	$51,687	116,714	45,414	2.57	0.9%	1.5%
154	Clay	$13,353	$26,250	$31,354	3,183	1,331	2.39	1.1%	1.9%
78	Clayton	$18,958	$43,311	$48,064	259,424	90,633	2.86	0.7%	1.2%
118	Clinch	$16,709	$31,963	$45,350	6,798	2,572	2.64	0.9%	1.6%
5	Cobb	$33,110	$65,522	$78,920	688,078	260,056	2.65	0.5%	0.8%
119	Coffee	$16,664	$35,202	$39,880	42,356	14,817	2.86	0.9%	1.4%
106	Colquitt	$17,362	$32,902	$39,086	45,498	16,317	2.79	0.9%	1.5%
8	Columbia	$29,479	$66,333	$74,426	124,053	44,898	2.76	0.5%	0.8%
123	Cook	$16,528	$31,390	$37,352	17,212	6,339	2.72	1.0%	1.6%
14	Coweta	$26,161	$61,550	$68,469	127,317	45,673	2.79	0.5%	0.8%
49	Crawford	$20,692	$37,062	$48,623	12,630	4,822	2.62	0.8%	1.3%
108	Crisp	$17,187	$29,960	$41,616	23,439	9,079	2.58	1.0%	1.7%
56	Dade	$20,168	$39,760	$48,881	16,633	6,291	2.64	0.8%	1.3%
18	Dawson	$25,557	$51,128	$60,236	22,330	8,433	2.65	0.6%	1.0%
95	Decatur	$17,833	$33,297	$44,322	27,842	10,390	2.68	0.9%	1.5%
9	DeKalb	$28,412	$51,349	$60,718	691,893	271,809	2.55	0.6%	1.0%
128	Dodge	$16,288	$33,580	$46,460	21,796	8,177	2.67	0.9%	1.5%
148	Dooly	$14,871	$31,038	$39,622	14,918	5,286	2.82	1.0%	1.6%
71	Dougherty	$19,210	$32,435	$39,951	94,565	36,508	2.59	0.9%	1.5%

GEORGIA COUNTY GOVERNEMENT ECONOMIC DATA									
Rank	County	Per Capital Incom	Median Househol	Median Fami	Population	Number of Household	# of people in household	3	5
22	Douglas	$24,515	$55,852	$62,977	132,403	46,624	2.84	0.5%	0.9%
125	Early	$16,330	$26,928	$40,238	11,008	4,228	2.60	1.1%	1.9%
150	Echols	$14,201	$32,390	$33,664	4,034	1,329	3.04	0.9%	1.5%
29	Effingham	$23,465	$56,903	$63,277	52,250	18,092	2.89	0.5%	0.9%
111	Elbert	$17,100	$30,543	$35,550	20,166	8,063	2.50	1.0%	1.6%
131	Emanuel	$16,076	$30,205	$36,402	22,598	8,430	2.68	1.0%	1.7%
73	Evans	$19,072	$40,796	$45,938	11,000	4,033	2.73	0.7%	1.2%
44	Fannin	$21,103	$34,145	$41,422	23,682	10,187	2.32	0.9%	1.5%
3	Fayette	$35,076	$82,216	$92,976	106,567	38,167	2.79	0.4%	0.6%
50	Floyd	$20,640	$41,066	$49,310	96,317	35,930	2.68	0.7%	1.2%
1	Forsyth	$37,211	$56,709	$75,579	244,252	76,753	3.18	0.5%	0.9%
69	Franklin	$19,276	$36,739	$44,667	22,084	8,540	2.59	0.8%	1.4%
2	Fulton	$35,385	$87,605	$96,501	175,511	59,433	2.95	0.3%	0.6%
53	Gilmer	$20,439	$36,741	$45,317	28,292	11,314	2.50	0.8%	1.4%
115	Glascock	$16,844	$37,149	$46,283	3,082	1,162	2.65	0.8%	1.3%
11	Glynn	$28,040	$50,337	$62,445	79,626	31,774	2.51	0.6%	1.0%
87	Gordon	$18,285	$40,916	$47,964	55,186	19,715	2.80	0.7%	1.2%
97	Grady	$17,785	$32,247	$39,159	25,011	9,418	2.66	0.9%	1.6%
21	Greene	$24,943	$38,513	$42,307	15,994	6,519	2.45	0.8%	1.3%
13	Gwinnett	$26,901	$63,219	$70,767	805,321	268,519	3.00	0.5%	0.8%
68	Habersham	$19,286	$40,192	$49,182	43,041	15,472	2.78	0.7%	1.2%
27	Hall	$23,675	$50,876	$57,774	179,684	60,691	2.96	0.6%	1.0%
158	Hancock	$10,925	$22,283	$27,168	9,429	3,341	2.82	1.3%	2.2%
74	Haralson	$19,033	$38,996	$45,339	28,780	10,757	2.68	0.8%	1.3%
6	Harris	$31,073	$67,018	$74,457	32,024	11,823	2.71	0.4%	0.7%
72	Hart	$19,124	$36,109	$44,451	25,213	10,121	2.49	0.8%	1.4%
91	Heard	$18,077	$42,685	$47,591	11,834	4,400	2.69	0.7%	1.2%
16	Henry	$25,773	$63,923	$70,972	203,922	70,255	2.90	0.5%	0.8%
20	Houston	$25,206	$55,098	$67,227	139,900	53,051	2.64	0.5%	0.9%
122	Irwin	$16,561	$38,376	$51,262	9,538	3,495	2.73	0.8%	1.3%
34	Jackson	$22,473	$51,506	$58,239	60,485	21,343	2.83	0.6%	1.0%
55	Jasper	$20,263	$42,081	$52,177	13,900	5,044	2.76	0.7%	1.2%
138	Jeff Davis	$15,730	$32,928	$40,313	15,068	5,689	2.65	0.9%	1.5%
144	Jefferson	$15,165	$29,268	$36,980	16,930	6,241	2.71	1.0%	1.7%
101	Jenkins	$17,629	$27,686	$35,876	8,340	3,192	2.61	1.1%	1.8%
139	Johnson	$15,659	$27,607	$35,750	9,980	3,347	2.98	1.1%	1.8%
39	Jones	$21,598	$50,717	$56,038	28,669	10,586	2.71	0.6%	1.0%
99	Lamar	$17,725	$37,536	$42,218	18,317	6,618	2.77	0.8%	1.3%
114	Lanier	$16,894	$37,522	$43,162	10,078	3,608	2.79	0.8%	1.3%
67	Laurens	$19,387	$38,280	$46,466	48,434	18,641	2.60	0.8%	1.3%
25	Lee	$23,867	$59,811	$67,943	28,298	9,706	2.92	0.5%	0.8%
81	Liberty	$18,662	$42,674	$46,818	63,453	22,155	2.86	0.7%	1.2%
63	Lincoln	$19,627	$36,399	$43,872	7,996	3,281	2.44	0.8%	1.4%
146	Long	$15,068	$41,186	$46,654	14,464	5,023	2.88	0.7%	1.2%
58	Lowndes	$20,041	$39,096	$48,296	109,233	39,747	2.75	0.8%	1.3%
57	Lumpkin	$20,088	$43,394	$50,318	29,966	10,989	2.73	0.7%	1.2%
155	Macon	$12,902	$27,950	$37,218	14,740	4,999	2.95	1.1%	1.8%
76	Madison	$18,975	$41,343	$49,713	28,120	10,508	2.68	0.7%	1.2%
98	Marion	$17,729	$31,581	$51,000	8,742	3,420	2.56	0.9%	1.6%
107	McDuffie	$17,261	$35,414	$42,472	21,875	8,289	2.64	0.8%	1.4%

GEORGIA COUNTY GOVERNEMENT ECONOMIC DATA									
Rank	County	Per Capital Incom	Median Househol	Median Fami	Population	Number of Household	# of people in household	3	5
46	McIntosh	$20,964	$39,075	$51,765	14,333	5,971	2.40	0.8%	1.3%
85	Meriwether	$18,295	$37,845	$47,126	21,992	8,522	2.58	0.8%	1.3%
59	Miller	$19,895	$33,196	$40,685	6,125	2,426	2.52	0.9%	1.5%
126	Mitchell	$16,322	$36,198	$43,930	23,498	8,055	2.92	0.8%	1.4%
28	Monroe	$23,656	$48,297	$61,110	26,424	9,662	2.73	0.6%	1.0%
109	Montgomery	$17,168	$35,182	$45,989	9,123	3,287	2.78	0.9%	1.4%
12	Morgan	$27,732	$45,817	$57,724	17,868	6,660	2.68	0.7%	1.1%
113	Murray	$16,925	$38,226	$45,420	39,628	14,080	2.81	0.8%	1.3%
33	Muscogee	$22,514	$41,331	$50,771	189,885	74,081	2.56	0.7%	1.2%
40	Newton	$21,583	$52,361	$56,519	99,958	34,390	2.91	0.6%	1.0%
4	Oconee	$34,271	$74,352	$85,371	32,808	11,622	2.82	0.4%	0.7%
102	Oglethorpe	$17,572	$39,319	$52,955	14,899	5,647	2.64	0.8%	1.3%
30	Paulding	$23,450	$62,348	$67,117	142,324	48,105	2.96	0.5%	0.8%
80	Peach	$18,681	$41,014	$53,708	27,695	9,958	2.78	0.7%	1.2%
15	Pickens	$25,892	$49,945	$59,955	29,431	11,291	2.61	0.6%	1.0%
89	Pierce	$18,283	$37,062	$47,157	18,758	7,083	2.65	0.8%	1.3%
45	Pike	$21,051	$53,213	$57,458	17,869	6,187	2.89	0.6%	0.9%
90	Polk	$18,214	$38,646	$43,172	41,475	15,092	2.75	0.8%	1.3%
121	Pulaski	$16,621	$36,262	$46,850	12,010	4,475	2.68	0.8%	1.4%
17	Putnam	$25,576	$41,529	$49,814	21,218	8,601	2.47	0.7%	1.2%
152	Quitman	$13,642	$28,912	$34,342	2,513	1,053	2.39	1.0%	1.7%
35	Rabun	$22,471	$34,406	$50,410	16,276	6,780	2.40	0.9%	1.5%
100	Randolph	$17,632	$26,194	$29,800	7,719	3,187	2.42	1.1%	1.9%
51	Richmond	$20,604	$37,882	$45,220	200,549	76,924	2.61	0.8%	1.3%
23	Rockdale	$24,367	$55,779	$63,167	85,215	30,027	2.84	0.5%	0.9%
130	Schley	$16,122	$35,096	$47,234	5,010	1,872	2.68	0.9%	1.4%
129	Screven	$16,189	$32,155	$44,244	14,593	5,596	2.61	0.9%	1.6%
70	Seminole	$19,263	$32,666	$38,339	8,729	3,509	2.49	0.9%	1.5%
64	Spalding	$19,607	$41,100	$49,640	64,073	23,565	2.72	0.7%	1.2%
88	Stephens	$18,285	$34,938	$41,768	26,175	10,289	2.54	0.9%	1.4%
140	Stewart	$15,612	$30,954	$41,673	6,058	1,862	3.25	1.0%	1.6%
104	Sumter	$17,436	$32,430	$41,371	32,819	12,123	2.71	0.9%	1.5%
92	Talbot	$18,007	$33,873	$43,694	6,865	2,832	2.42	0.9%	1.5%
151	Taliaferro	$13,955	$22,188	$29,375	1,717	759	2.26	1.4%	2.3%
116	Tattnall	$16,742	$38,522	$45,601	25,520	8,210	3.11	0.8%	1.3%
149	Taylor	$14,693	$25,237	$35,819	8,906	3,522	2.53	1.2%	2.0%
153	Telfair	$13,420	$23,876	$36,109	16,500	5,543	2.98	1.3%	2.1%
141	Terrell	$15,553	$27,909	$35,663	9,315	3,519	2.65	1.1%	1.8%
43	Thomas	$21,261	$35,797	$46,333	44,720	17,573	2.54	0.8%	1.4%
82	Tift	$18,394	$36,847	$45,376	40,118	14,836	2.70	0.8%	1.4%
93	Toombs	$17,974	$31,635	$44,266	27,223	10,375	2.62	0.9%	1.6%
41	Towns	$21,527	$39,540	$48,020	10,471	4,510	2.32	0.8%	1.3%
117	Treutlen	$16,710	$36,467	$48,110	6,885	2,543	2.71	0.8%	1.4%
62	Troup	$19,699	$41,770	$50,625	67,044	24,828	2.70	0.7%	1.2%
135	Turner	$15,973	$30,763	$40,446	8,930	3,339	2.67	1.0%	1.6%
137	Twiggs	$15,904	$26,521	$31,324	9,023	3,634	2.48	1.1%	1.9%
24	Union	$24,182	$41,298	$50,772	21,356	9,116	2.34	0.7%	1.2%
105	Upson	$17,398	$34,509	$42,737	27,153	10,716	2.53	0.9%	1.4%
66	Walker	$19,440	$38,723	$46,307	68,756	26,497	2.59	0.8%	1.3%
32	Walton	$22,521	$51,721	$58,750	83,768	29,583	2.83	0.6%	1.0%
86	Ware	$18,295	$35,517	$47,609	36,312	13,654	2.66	0.8%	1.4%
134	Warren	$15,987	$31,043	$36,925	5,834	2,315	2.52	1.0%	1.6%
147	Washington	$15,033	$31,382	$41,055	21,187	7,547	2.81	1.0%	1.6%
83	Wayne	$18,393	$37,340	$45,649	30,099	10,562	2.85	0.8%	1.3%
127	Webster	$16,295	$25,708	$40,441	2,799	1,119	2.50	1.2%	1.9%
159	Wheeler	$10,043	$35,422	$45,042	7,421	2,152	3.45	0.8%	1.4%
26	White	$23,680	$41,756	$50,981	27,144	10,646	2.55	0.7%	1.2%
61	Whitfield	$19,780	$42,345	$48,991	102,599	35,180	2.92	0.7%	1.2%
156	Wilcox	$12,692	$30,784	$40,552	9,255	2,891	3.20	1.0%	1.6%
112	Wilkes	$16,993	$28,022	$39,109	10,593	4,263	2.48	1.1%	1.8%
94	Wilkinson	$17,929	$37,902	$49,138	9,563	3,666	2.61	0.8%	1.3%
84	Worth	$18,348	$38,670	$46,791	21,679	8,214	2.64	0.8%	1.3%

PEARSONS COUNTY	Ave Per Res	2019I
Atkinson	$ 134,287	0.0%
Banks	$ 2,666,646	0.0%
Barrow	$ 4,478,101	0.6%
Bartow	$ 14,795,026	19.2%
Bibb	$ 22,870,654	3.0%
Bulloch	$ 9,456,432	0.0%
Butts	$ 2,466,322	-13.8%
Camden	$ 2,674,801	5.4%
Candler	$ 1,655,791	0.0%
Carroll	$ 6,070,593	2.2%
Catoosa	$ 1,991,305	0.0%
Charlton	$ 2,135,721	1.5%
Cherokee	$ 53,503,978	4.9%
Clarke	$ 17,916,620	18.4%
Clayton	$ 48,362,375	-5.9%
Clinch	$ 1,168,693	0.0%
Cobb	$ 132,907,669	11.1%
Colquitt	$ 7,514,195	0.0%
Columbia	$ 28,553,342	0.0%
Coweta	$ 25,843,588	0.0%
Crawford	$ 931,765	-12.6%
Crisp	$ 5,476,968	0.0%
Dade	$ 1,995,971	0.0%
Dawson	$ 5,395,794	0.0%
De Kalb	$ 46,958,000	0.0%
Dooly	$ 3,029,906	0.0%
Dougherty	$ 5,177,218	0.0%
Douglas	$ 13,727,676	0.0%
Early	$ 1,869,176	11.7%
Effingham	$ 17,159,881	0.0%
Emanuel	$ 2,192,006	15.7%
Fannin	$ 5,923,433	0.0%
Fayette	$ 15,247,061	0.0%
Floyd	$ 14,586,006	0.0%
Fulton	$ 80,999,000	5.0%
Glynn	$ 4,894,561	13.7%
Gordon	$ 2,605,848	32.8%
Grady	$ 479,322	5.4%
Greene	$ 797,622	0.0%
Gwinnett	$ 330,907,000	-2.4%
Habersham	$ 10,072,883	1.9%
Hall	$ 9,938,624	81.9%
Harris	$ 2,146,359	0.0%
Henry	$ 6,236,649	0.0%
Houston	$ 5,954,628	0.0%
Jackson	$ 1,910,916	2.3%
Jasper	$ 1,369,885	0.0%
Jefferson	$ 2,115,421	0.0%
Jones	$ 2,439,588	9.2%
Lamar	$ 3,517,082	0.0%
Laurens	$ 15,474,792	8.6%
Lee	$ 128,721	0.0%
Lincoln	$ 747,734	11.3%
Lumpkin	$ 4,301,110	0.0%
Macon	$ 484,538	-48.9%
Marion	$ 1,806,998	0.0%
McDuffie	$ 2,054,351	6.9%
Monroe	$ 3,370,346	0.0%
Montgomery	$ 2,898,065	0.0%
Morgan	$ 2,913,817	0.0%
Murray	$ 2,443,170	127.5%
Muscogee	$ 35,443,686	145.9%
Newton	$ 2,137,414	0.0%
Oconee	$ 38,096,503	0.8%
Paulding	$ 22,967,670	7.7%
Peach	$ 720,611	0.0%
Pickens	$ 4,081,852	0.0%
Putnam	$ 6,210,264	8.9%
Quitman	$ 416,783	-31.0%
Rabun	$ 5,207,081	0.0%
Seminole	$ 1,525,996	0.0%
Spalding	$ 4,471,243	0.0%
Stephens	$ 1,267,429	0.0%
Talbot	$ 1,090,139	0.0%
Telfair	$ 1,873,710	0.0%
Terrell	$ 686,176	0.0%
Thomas	$ 2,499,972	6.9%
Tift	$ 3,388,249	0.0%
Towns	$ 463,361	0.0%
Troup	$ 428,911	0.0%
Union	$ 1,416,691	0.0%
Upson	$ 1,405,325	0.0%
Walker	$ 6,534,403	9.9%
Walton	$ 7,346,234	0.0%
Warren	$ 700,348	5.6%
Wayne	$ 18,499,929	1.0%
White	$ 3,761,837	3.7%
Whitfield	$ 10,702,386	0.1%
Wilkes	$ 1,777,592	0.0%
Worth	$ 2,748,269	0.0%

Coeffecient (r):	0.02928	
N:	90	
T Statistic:	t = (r x (SQRT (n-2))) / (SQRT (1-rSQ))	
T Statistic:	0.274791	
DF:	N-2	90-2
Pvalue:	TDIST(Tstatistic,DF,2)	
Pvalue:	0.784121	

PEARSONS							
COUNTY	Ave Per Res	2019		Coefficient (r):	-0.000334		
Oglethorpe	$ 890,358	22.7%		N:	120.0		
Stewart	$ 646,681	-20.5%		T Statistic:	t = (r x (SQRT (n-2))) / (SQRT (1-rsQ))		
Gordon	$ 3,453,909	-20.1%		T Statistic:	-0.1015		
Screven	$ 1,790,306	-16.2%		DF:	N-2	118.0	
McDuffie	$ 3,195,734	-15.5%		Pvalue:	TDIST(Tstatistic,DF,2)		
Madison	$ 665,206	-13.8%		Pvalue:	#NUM!		
Pulaski	$ 344,396	-11.9%					
Upson	$ 3,604,795	-8.0%					
Elbert	$ 1,042,412	-5.8%					
Camden	$ 2,429,404	-5.1%					
Macon	$ 428,661	-4.8%					
Lee	$ 44,982,572	-2.9%					
Monroe	$ 808,585	-1.1%					
Schley	$ 17,620	0.0%					
Turner	$ 263,212	0.0%					
Washington	$ 273,590	0.0%					
Quitman	$ 370,147	0.0%					
Talbot	$ 408,810	0.0%					
Taliaferro	$ 435,122	0.0%					
Peach	$ 473,800	0.0%					
Clinch	$ 484,843	0.0%					
Towns	$ 527,374	0.0%					
Haralson	$ 636,286	0.0%					
Hancock	$ 734,188	0.0%					
Telfair	$ 736,348	0.0%					
Lamar	$ 760,000	0.0%					
Jeff Davis	$ 788,744	0.0%					
Atkinson	$ 824,989	0.0%					
Morgan	$ 844,857	0.0%					
Mitchell	$ 864,212	0.0%					
Lincoln	$ 916,033	0.0%					
Glascock	$ 952,445	0.0%					
Webster	$ 1,072,513	0.0%					
Worth	$ 1,078,103	0.0%					
Toombs	$ 1,170,376	0.0%					
Grady	$ 1,185,242	0.0%					
Franklin	$ 1,432,986	0.0%					
Crawford	$ 1,456,618	0.0%					
Pike	$ 1,525,439	0.0%					
Jasper	$ 1,527,127	0.0%					
Seminole	$ 1,663,876	0.0%					
Dade	$ 1,669,498	0.0%					
Putnam	$ 1,690,452	0.0%					
Rabun	$ 1,764,413	0.0%					
White	$ 1,766,558	0.0%					
Gilmer	$ 1,785,993	0.0%					
Candler	$ 1,980,743	0.0%					
Pickens	$ 2,062,525	0.0%					
Warren	$ 2,078,270	0.0%					
Tattnall	$ 2,410,635	0.0%					
Union	$ 2,452,110	0.0%					
Jackson	$ 2,927,568	0.0%					
Jefferson	$ 2,951,666	0.0%					
Newton	$ 3,241,190	0.0%					
Ware	$ 3,334,675	0.0%					
Troup	$ 3,516,797	0.0%					
Dawson	$ 3,532,593	0.0%					
Greene	$ 3,602,922	0.0%					
Lumpkin	$ 3,998,220	0.0%					
Catoosa	$ 4,343,988	0.0%					
Effingham	$ 4,367,933	0.0%					
Tift	$ 4,418,317	0.0%					
Crisp	$ 4,609,634	0.0%					
Laurens	$ 4,757,066	0.0%					
Carroll	$ 5,069,007	0.0%					
Colquitt	$ 6,303,960	0.0%					
Fayette	$ 7,168,557	0.0%					
Spalding	$ 7,540,224	0.0%					
Walton	$ 7,971,913	0.0%					
Floyd	$ 12,046,893	0.0%					
Harris	$ 12,400,556	0.0%					
Rockdale	$ 12,676,472	0.0%					
Houston	$ 13,828,871	0.0%					
Bulloch	$ 14,090,314	0.0%					
Columbia	$ 21,668,132	0.0%					
Coweta	$ 25,298,711	0.0%					
De Kalb	$ 32,124,000	0.0%					
Clayton	$ 34,964,224	0.0%					
Glynn	$ 40,221,445	0.0%					
Cherokee	$ 48,106,846	0.0%					
Forsyth	$ 64,679,111	0.0%					
Richmond	$ 133,404,748	0.0%					
Cobb	$ 731,063,383	0.0%					
Wayne	$ 3,760,605	0.3%					
Chatham	$ 30,267,930	0.9%					
Lowndes	$ 7,366,179	1.1%					
Oconee	$ 10,285,996	1.7%					
Douglas	$ 6,459,876	1.9%					
Dougherty	$ 3,883,657	2.0%					
Henry	$ 16,008,449	2.1%					
Hall	$ 8,167,445	2.4%					
Wilkes	$ 3,863,239	2.6%					
Stephens	$ 912,752	2.6%					
Bryan	$ 5,350,713	2.8%					
Clarke	$ 143,836,655	2.9%					
Bibb	$ 35,651,000	3.1%					
Jones	$ 5,144,751	3.3%					
Gwinnett	$ 204,528,000	3.8%					
Habersham	$ 3,375,444	4.0%					
Walker	$ 970,271	4.2%					
Banks	$ 1,341,185	4.4%					
Polk	$ 4,211,828	4.5%					
Muscogee	$ 17,209,489	4.6%					
Fulton	$ 79,165,000	4.9%					
Murray	$ 843,647	5.0%					
Pierce	$ 2,884,839	5.3%					
Paulding	$ 41,987,390	6.1%					
Thomas	$ 3,668,868	7.1%					
Brantley	$ 1,805,330	9.6%					
Bartow	$ 14,539,775	10.6%					
Dooly	$ 2,453,583	11.6%					
Sumter	$ 1,920,432	12.6%					
Marion	$ 1,028,806	13.6%					
Baldwin	$ 2,813,985	14.1%					
Butts	$ 2,616,054	14.2%					
Decatur	$ 4,813,129	16.4%					
Charlton	$ 928,963	18.5%					
Barrow	$ 10,300,456	19.9%					
Brooks	$ 2,369,015	25.7%					
Bleckley	$ 891,121	42.6%					

PEARSONS							
COUNTY	2017C	2017I					
Miller	$ 150,134	-22.2%		Coeffecient (r):	-0.03801		
Marion	$ 1,006,671	-21.9%		N:	114.0		
Clayton	$ 20,624,534	-9.1%		T Statistic:	t = (r x (SQRT (n-2))) / (SQRT (1-rSQ))		
Barrow	$ 5,284,455	-8.7%		T Statistic:	-0.40257		
Polk	$ 1,826,553	-7.8%		DF:	N-2	112.0	
Monroe	$ 1,066,042	-5.5%		Pvalue:	TDIST(Tstatistic,DF,2)		
Oconee	$ 23,237,327	-3.3%		Pvalue:	#NUM!		
Elbert	$ 1,126,351	0.0%					
Lanier	$ 79,065	0.0%					
Atkinson	$ 211,096	0.0%					
Randolph	$ 262,105	0.0%					
Terrell	$ 286,232	0.0%					
Sumter	$ 298,125	0.0%					
Schley	$ 331,380	0.0%					
Webster	$ 352,497	0.0%					
Wilkinson	$ 578,248	0.0%					
Pike	$ 657,957	0.0%					
Taliaferro	$ 684,191	0.0%					
Stephens	$ 685,806	0.0%					
Wheeler	$ 715,052	0.0%					
Telfair	$ 1,040,301	0.0%					
Hancock	$ 1,053,205	0.0%					
Jones	$ 1,112,777	0.0%					
Catoosa	$ 1,171,410	0.0%					
Jeff Davis	$ 1,273,222	0.0%					
Morgan	$ 1,494,745	0.0%					
Mitchell	$ 1,628,347	0.0%					
Tift	$ 1,747,980	0.0%					
Upson	$ 1,818,945	0.0%					
Lee	$ 2,112,873	0.0%					
Worth	$ 2,114,140	0.0%					
Dade	$ 2,121,687	0.0%					
Bleckley	$ 2,211,457	0.0%					
Union	$ 2,274,671	0.0%					
Turner	$ 2,406,712	0.0%					
Rabun	$ 2,582,629	0.0%					
Seminole	$ 2,597,548	0.0%					
Towns	$ 2,685,613	0.0%					
Effingham	$ 2,729,509	0.0%					
Troup	$ 3,353,866	0.0%					
Wilkes	$ 3,434,597	0.0%					
White	$ 3,845,067	0.0%					
Floyd	$ 4,312,639	0.0%					
Lumpkin	$ 4,390,427	0.0%					
Colquitt	$ 4,823,155	0.0%					
Houston	$ 6,243,133	0.0%					
Haralson	$ 6,734,670	0.0%					
Crisp	$ 7,094,362	0.0%					
Harris	$ 9,303,086	0.0%					
Greene	$ 9,491,085	0.0%					
Rockdale	$ 10,892,280	0.0%					
Spalding	$ 16,896,054	0.0%					
Coweta	$ 17,117,730	0.0%					
Fayette	$ 24,010,785	0.0%					
De Kalb	$ 24,590,000	0.0%					
Cherokee	$ 26,498,393	0.0%					
Columbia	$ 58,815,317	0.0%					
Forsyth	$ 167,925,622	0.0%					
Cobb	$ 689,708,220	0.0%					
Butts	$ 1,660,301	0.0%					
Madison	$ 366,845	0.1%					
Bryan	$ 5,395,292	0.1%					
Wayne	$ 3,366,060	0.3%					
Jasper	$ 626,861	1.1%					
Warren	$ 1,651,069	1.1%					
Gwinnett	$ 302,676,000	1.2%					
Newton	$ 1,993,572	1.4%					
Pickens	$ 1,562,910	1.4%					
Henry	$ 45,170,025	1.4%					
Brooks	$ 3,229,469	1.5%					
Ware	$ 3,172,279	1.5%					
Charlton	$ 1,334,296	1.5%					
Fulton	$ 24,284,000	1.6%					
Lowndes	$ 10,783,955	1.9%					
Glascock	$ 492,743	2.0%					
Carroll	$ 12,709,725	2.2%					
Banks	$ 1,464,848	2.5%					
Gordon	$ 1,487,191	2.5%					
Jackson	$ 4,330,650	2.5%					
Jefferson	$ 2,792,811	3.0%					
Richmond	$ 30,832,763	3.0%					
Douglas	$ 8,269,223	3.1%					
Bibb	$ 12,736,845	3.2%					
Walton	$ 6,451,094	3.2%					
Putnam	$ 3,267,284	3.7%					
Pierce	$ 2,350,184	4.1%					
Decatur	$ 1,843,134	4.3%					
Muscogee	$ 60,396,008	4.4%					
Bulloch	$ 3,938,483	4.5%					
Bartow	$ 21,134,775	4.6%					
Peach	$ 2,556,812	4.7%					
Candler	$ 1,708,303	4.7%					
Dougherty	$ 3,222,460	5.0%					
Lincoln	$ 1,456,613	5.5%					
Jenkins	$ 5,773,688	5.7%					
Evans	$ 2,682,159	7.3%					
Laurens	$ 9,787,927	8.0%					
Baldwin	$ 8,679,973	8.0%					
Lamar	$ 727,000	8.3%					
Grady	$ 1,902,595	8.4%					
Paulding	$ 31,212,212	8.8%					
Habersham	$ 21,943,452	8.8%					
Pulaski	$ 331,684	9.8%					
Calhoun	$ 171,644	10.6%					
Murray	$ 1,128,375	11.2%					
Clinch	$ 1,004,297	12.5%					
Franklin	$ 831,802	14.2%					
Dawson	$ 8,095,543	14.3%					
Crawford	$ 603,628	14.4%					
Brantley	$ 1,876,511	15.5%					
Washington	$ 945,722	26.1%					
Talbot	$ 98,176	49.9%					
Walker	$ 1,710,602	57.9%					
Quitman	$ 312,286	218.0%					

PEARSONS							
COUNTY	2016C	2016I					
Douglas	$ 5,666,488	-90.1%		Coeffecient (r):	-0.0209		
Mitchell	$ 364,347	-39.8%		N:	114.0		
Banks	$ 5,180,649	-25.9%		T Statistic:	t = (r * (SQRT (n-2))) / (SQRT (1-rSQ))		
Brantley	$ 1,499,877	-15.9%		T Statistic:	-0.22122		
Crawford	$ 753,549	-12.6%		DF:	N-2	112.0	
Walker	$ 10,968,445	-10.9%		Pvalue:	TDIST(Tstatistic,DF,2)		
Colquitt	$ 1,701,792	-10.1%		Pvalue:	#NUM!		
Elbert	$ 543,829	-5.5%					
Brooks	$ 2,158,298	-2.0%					
Quitman	$ 98,280	0.0%					
Pulaski	$ 115,887	0.0%					
Webster	$ 149,040	0.0%					
Terrell	$ 181,018	0.0%					
Calhoun	$ 210,000	0.0%					
Dodge	$ 241,760	0.0%					
Jenkins	$ 337,695	0.0%					
Wheeler	$ 379,720	0.0%					
Haralson	$ 468,580	0.0%					
McIntosh	$ 526,625	0.0%					
Early	$ 554,652	0.0%					
Franklin	$ 583,016	0.0%					
Schley	$ 645,076	0.0%					
Wilkinson	$ 648,215	0.0%					
Twiggs	$ 658,082	0.0%					
Lanier	$ 763,402	0.0%					
Hancock	$ 765,763	0.0%					
Taliaferro	$ 774,547	0.0%					
Jasper	$ 813,504	0.0%					
Pickens	$ 859,502	0.0%					
Clinch	$ 946,942	0.0%					
Worth	$ 964,745	0.0%					
Dade	$ 983,360	0.0%					
Lamar	$ 999,000	0.0%					
Lee	$ 1,083,546	0.0%					
Greene	$ 1,154,482	0.0%					
Glascock	$ 1,373,160	0.0%					
Harris	$ 1,566,586	0.0%					
Bleckley	$ 1,579,529	0.0%					
Catoosa	$ 1,818,105	0.0%					
Heard	$ 1,874,531	0.0%					
Stephens	$ 1,948,930	0.0%					
Wilkes	$ 2,340,900	0.0%					
Murray	$ 2,443,170	0.0%					
Telfair	$ 2,518,011	0.0%					
Jackson	$ 2,730,202	0.0%					
Wayne	$ 2,821,220	0.0%					
Union	$ 3,021,643	0.0%					
Candler	$ 3,081,821	0.0%					
Lumpkin	$ 3,283,541	0.0%					
Ware	$ 3,984,454	0.0%					
Habersham	$ 4,596,881	0.0%					
Dawson	$ 4,728,565	0.0%					
Rockdale	$ 5,881,524	0.0%					
Henry	$ 6,969,170	0.0%					
Tattnall	$ 7,279,608	0.0%					
Effingham	$ 7,315,232	0.0%					
Floyd	$ 11,226,089	0.0%					
Bulloch	$ 12,574,419	0.0%					
Tift	$ 13,016,754	0.0%					
Coweta	$ 18,810,750	0.0%					
De Kalb	$ 27,809,000	0.0%					
Houston	$ 29,223,142	0.0%					
Cherokee	$ 37,289,535	0.0%					
Walton	$ 50,299,818	0.0%					
Fulton	$ 62,988,000	0.0%					
Forsyth	$ 79,182,720	0.0%					
Cobb	$ 173,399,655	0.0%					
Gwinnett	$ 302,884,000	0.0%					
Talbot	$ 181,613	0.1%					
Warren	$ 1,167,806	1.1%					
Troup	$ 2,642,452	1.2%					
Oconee	$ 6,855,551	1.5%					
Charlton	$ 1,426,001	1.6%					
Dougherty	$ 9,170,659	1.7%					
Newton	$ 4,312,579	1.7%					
Columbia	$ 35,269,617	1.8%					
Putnam	$ 3,428,176	1.9%					
White	$ 2,245,491	2.0%					
Laurens	$ 6,073,222	2.7%					
Gordon	$ 6,613,433	2.9%					
Carroll	$ 5,888,524	3.4%					
Spalding	$ 2,629,477	3.4%					
Paulding	$ 18,942,512	3.7%					
Muscogee	$ 44,176,484	4.6%					
Montgomery	$ 471,941	4.6%					
Madison	$ 3,998,439	4.7%					
Peach	$ 14,436,824	5.1%					
Bibb	$ 43,429,965	5.2%					
Sumter	$ 3,895,394	5.8%					
Richmond	$ 24,195,184	6.0%					
Butts	$ 3,586,821	6.5%					
Whitfield	$ 12,227,205	6.6%					
Crisp	$ 2,244,978	6.7%					
Towns	$ 806,393	7.3%					
Jones	$ 2,083,733	8.1%					
Grady	$ 2,342,775	9.1%					
Decatur	$ 7,274,545	10.5%					
Monroe	$ 7,286,110	10.8%					
Irwin	$ 262,882	12.7%					
Lincoln	$ 363,135	13.4%					
Fayette	$ 11,788,409	14.0%					
Jefferson	$ 1,588,267	14.5%					
Turner	$ 2,287,366	16.5%					
Pike	$ 1,114,654	16.8%					
Clayton	$ 27,765,707	19.3%					
Baldwin	$ 5,299,059	21.0%					
Atkinson	$ 2,168,895	21.4%					
Polk	$ 2,751,412	23.5%					
Miller	$ 720,230	24.2%					
Upson	$ 2,613,934	29.9%					
Morgan	$ 377,594	34.9%					
Bartow	$ 22,502,758	68.4%					
Barrow	$ 12,607,466	76.8%					
Bacon	$ 1,310,191	248.0%					

PEARSONS							
COUNTY	Ave Per Res	2019R					
Tift	$ 157.33	$ 16.26		Coeffecient (r):	0.043971		
Houston	$ 104.09	$ 16.97		N:	111.0		
Mitchell	$ 43.56	$ 19.25		T Statistic:	t = (r x (SQRT (n-2))) / (SQRT (1-rSQ))		
Camden	$ 60.02	$ 19.68		T Statistic:	0.459516		
Macon	$ 41.13	$ 19.75		DF:	N-2	109.0	
Webster	$ 201.26	$ 20.00		PValue:	TDIST(Tstatistic,DF,2)		
Telfair	$ 90.26	$ 20.65		PValue:	0.646779		
Wayne	$ 110.80	$ 21.80					
Dougherty	$ 61.69	$ 22.09					
Clinch	$ 122.70	$ 22.50					
De Kalb	$ 37.11	$ 22.58					
Candler	$ 208.92	$ 22.82					
Bulloch	$ 128.14	$ 23.25					
Brantley	$ 90.39	$ 23.68					
Whitfield	$ 133.16	$ 23.78					
Montgomery	$ 90.91	$ 24.75					
Turner	$ 206.94	$ 24.75					
Quitman	$ 113.20	$ 25.02					
Glascock	$ 316.21	$ 26.00					
Dooly	$ 109.08	$ 26.15					
Jeff Davis	$ 106.53	$ 26.25					
Glynn	$ 297.47	$ 26.47					
Pulaski	$ 23.70	$ 26.53					
Sumter	$ 69.03	$ 26.58					
Columbia	$ 246.21	$ 26.63					
Ware	$ 97.87	$ 26.65					
Grady	$ 73.49	$ 27.30					
Fulton	$ 52.15	$ 27.52					
Effingham	$ 74.72	$ 27.52					
Gordon	$ 66.45	$ 27.60					
Hancock	$ 100.63	$ 28.00					
Colquitt	$ 93.78	$ 29.00					
Evans	$ 255.13	$ 29.40					
Emanuel	$ 64.88	$ 30.15					
Union	$ 105.37	$ 30.50					
Laurens	$ 144.55	$ 30.95					
Worth	$ 68.44	$ 31.21					
Brooks	$ 167.28	$ 31.55					
Cobb	$ 699.07	$ 31.84					
Bibb	$ 199.83	$ 32.10					
Butts	$ 105.11	$ 32.76					
Catoosa	$ 36.17	$ 33.08					
Decatur	$ 175.87	$ 33.48					
Bleckley	$ 121.24	$ 33.50					
Richmond	$ 310.15	$ 33.50					
Floyd	$ 93.35	$ 33.60					
Lee	$ 535.46	$ 33.75					
Jefferson	$ 159.11	$ 34.50					
Fayette	$ 125.17	$ 34.63					
Forsyth	$ 425.50	$ 34.65					
Troup	$ 45.35	$ 34.98					
Gilmer	$ 76.60	$ 35.17					
Dade	$ 98.75	$ 36.45					
Clayton	$ 95.07	$ 37.54					
Elbert	$ 47.11	$ 37.75					
Charlton	$ 91.83	$ 38.10					
Monroe	$ 110.73	$ 38.20					
Lamar	$ 43.44	$ 39.00					
Habersham	$ 219.99	$ 39.23					
Cherokee	$ 144.14	$ 39.30					
Stephens	$ 45.61	$ 39.50					
Jones	$ 96.76	$ 40.87					
Gwinnett	$ 288.42	$ 40.95					
Taliaferro	$ 410.73	$ 41.10					
Peach	$ 211.37	$ 41.17					
Franklin	$ 40.66	$ 42.35					
Schley	$ 63.03	$ 43.00					
Rockdale	$ 108.00	$ 43.89					
Madison	$ 56.12	$ 44.00					
Harris	$ 220.14	$ 44.56					
Warren	$ 310.69	$ 44.93					
Crawford	$ 75.62	$ 45.00					
Marion	$ 86.86	$ 45.30					
Thomas	$ 97.98	$ 45.63					
McDuffie	$ 142.84	$ 45.63					
Newton	$ 28.48	$ 46.25					
Douglas	$ 46.46	$ 47.07					
Dawson	$ 208.83	$ 47.10					
Carroll	$ 65.75	$ 47.15					
Crisp	$ 207.83	$ 47.50					
Jasper	$ 69.57	$ 47.60					
Wilkes	$ 328.62	$ 48.20					
Henry	$ 96.84	$ 48.49					
Baldwin	$ 124.70	$ 48.60					
Morgan	$ 46.99	$ 48.70					
Walker	$ 65.22	$ 51.55					
Upson	$ 101.79	$ 51.75					
Oconee	$ 334.15	$ 52.36					
Polk	$ 68.83	$ 52.75					
Oglethorpe	$ 61.26	$ 53.00					
Banks	$ 138.41	$ 53.20					
Coweta	$ 137.43	$ 54.59					
Muscogee	$ 207.36	$ 55.16					
White	$ 85.04	$ 55.63					
Talbot	$ 37.05	$ 58.09					
Towns	$ 111.31	$ 59.00					
Greene	$ 259.20	$ 59.28					
Walton	$ 228.07	$ 59.35					
Putnam	$ 126.38	$ 60.35					
Jackson	$ 45.62	$ 60.68					
Bartow	$ 180.00	$ 61.49					
Barrow	$ 112.90	$ 62.25					
Rabun	$ 104.94	$ 63.00					
Spalding	$ 135.26	$ 65.30					
Paulding	$ 182.10	$ 68.53					
Murray	$ 36.71	$ 68.93					
Lincoln	$ 115.13	$ 71.22					
Pickens	$ 45.87	$ 72.00					
Hall	$ 60.28	$ 76.29					
Clarke	$ 557.16	$ 78.98					
Lumpkin	$ 115.76	$ 90.50					

PEARSONS						
COUNTY	Ave Per Res	2018R				
Tift	$ 157.33	$ 16.26		Coeffecient (r):	0.027649	
Houston	$ 104.09	$ 16.97		N:	114.0	
Camden	$ 60.02	$ 18.68		T Statistic:	t = (r x (SQRT (n-2))) / (SQRT (1-rSQ))	
Mitchell	$ 43.56	$ 19.25		T Statistic:	0.292721	
Webster	$ 201.26	$ 20.00		DF:	N-2	112.0
Telfair	$ 90.26	$ 20.65		Pvalue:	TDIST(Tstatistic,DF,2)	
Gordon	$ 66.45	$ 20.79		Pvalue:	0.770277	
Pulaski	$ 23.70	$ 21.00				
Chatham	$ 99.87	$ 21.36				
Wayne	$ 110.80	$ 21.59				
Dougherty	$ 61.69	$ 22.09				
Muscogee	$ 207.36	$ 22.43				
Clinch	$ 122.70	$ 22.50				
De Kalb	$ 37.11	$ 22.58				
Candler	$ 208.92	$ 22.82				
Bulloch	$ 128.14	$ 23.25				
Glynn	$ 297.47	$ 23.29				
Brantley	$ 90.39	$ 23.68				
Whitfield	$ 133.16	$ 23.76				
Montgomery	$ 90.91	$ 24.75				
Turner	$ 206.94	$ 24.75				
Grady	$ 73.49	$ 25.90				
Glascock	$ 316.21	$ 26.00				
Emanuel	$ 64.88	$ 26.06				
Dooly	$ 109.08	$ 26.15				
Fulton	$ 52.15	$ 26.21				
Jeff Davis	$ 106.53	$ 26.25				
Columbia	$ 246.21	$ 26.63				
Ware	$ 97.87	$ 26.65				
Elbert	$ 47.11	$ 26.90				
Effingham	$ 74.72	$ 27.52				
Laurens	$ 144.55	$ 28.50				
Cobb	$ 699.07	$ 28.67				
Sumter	$ 69.03	$ 28.81				
Colquitt	$ 93.78	$ 29.00				
Murray	$ 36.71	$ 30.30				
Union	$ 105.37	$ 30.50				
Bibb	$ 199.83	$ 31.16				
Worth	$ 68.44	$ 31.21				
Brooks	$ 167.28	$ 31.46				
Catoosa	$ 36.17	$ 33.08				
Burke	$ 275.75	$ 33.29				
Decatur	$ 175.87	$ 33.36				
Richmond	$ 310.15	$ 33.46				
Bleckley	$ 121.24	$ 33.50				
Forsyth	$ 425.50	$ 33.53				
Floyd	$ 93.35	$ 33.60				
Lee	$ 535.46	$ 33.75				
Jefferson	$ 159.11	$ 34.50				
Gilmer	$ 76.60	$ 34.62				
Fayette	$ 125.17	$ 34.63				
Troup	$ 45.35	$ 34.98				
Haralson	$ 87.71	$ 35.57				
Quitman	$ 113.20	$ 36.25				
Dade	$ 98.75	$ 36.45				
Jones	$ 96.76	$ 37.41				
Cherokee	$ 144.14	$ 37.45				
Charlton	$ 91.83	$ 37.54				
Butts	$ 105.11	$ 38.00				
Monroe	$ 110.73	$ 38.20				
Habersham	$ 219.99	$ 38.48				
Macon	$ 41.13	$ 38.66				
Oglethorpe	$ 61.26	$ 38.66				
Lamar	$ 43.44	$ 39.00				
Stephens	$ 45.61	$ 39.50				
Clayton	$ 95.07	$ 39.88				
Rockdale	$ 108.00	$ 40.66				
Taliaferro	$ 410.73	$ 41.10				
Peach	$ 211.37	$ 41.17				
Hall	$ 60.28	$ 41.94				
Gwinnett	$ 288.42	$ 41.94				
Franklin	$ 40.66	$ 42.35				
Warren	$ 310.69	$ 42.54				
Thomas	$ 97.98	$ 42.69				
McDuffie	$ 142.84	$ 42.69				
Hancock	$ 100.63	$ 42.75				
Schley	$ 63.03	$ 43.00				
Madison	$ 56.12	$ 44.00				
Harris	$ 220.14	$ 44.56				
Marion	$ 86.86	$ 45.30				
Carroll	$ 65.75	$ 46.15				
Newton	$ 28.48	$ 46.25				
Walker	$ 65.22	$ 46.90				
Polk	$ 68.83	$ 46.94				
Douglas	$ 46.46	$ 47.07				
Dawson	$ 208.83	$ 47.10				
Crisp	$ 207.83	$ 47.50				
Jasper	$ 69.57	$ 47.60				
Wilkes	$ 328.62	$ 48.20				
Henry	$ 96.84	$ 48.51				
Baldwin	$ 124.70	$ 48.60				
Morgan	$ 46.99	$ 48.70				
Crawford	$ 75.62	$ 51.50				
Bartow	$ 180.00	$ 51.60				
Upson	$ 101.79	$ 51.75				
Oconee	$ 334.15	$ 51.94				
Banks	$ 138.41	$ 53.20				
White	$ 85.04	$ 53.63				
Coweta	$ 137.43	$ 54.59				
Putnam	$ 126.38	$ 55.44				
Talbot	$ 37.05	$ 58.09				
Towns	$ 111.31	$ 59.00				
Greene	$ 259.20	$ 59.28				
Jackson	$ 45.62	$ 59.29				
Walton	$ 228.07	$ 59.35				
Barrow	$ 112.90	$ 61.85				
Rabun	$ 104.94	$ 63.00				
Paulding	$ 182.10	$ 63.61				
Lincoln	$ 115.13	$ 64.01				
Spalding	$ 135.26	$ 65.30				
Clarke	$ 557.16	$ 66.72				
Pike	$ 57.98	$ 69.50				
Pickens	$ 45.87	$ 72.00				
Lumpkin	$ 115.76	$ 90.50				

PEARSONS							
COUNTY	Ave Per Res	2017R					
Tift	$ 157.33	$ 16.26		Coeffecient (r):	0.005168		
Houston	$ 104.09	$ 16.97		N:	111.0		
Mitchell	$ 43.56	$ 19.25		T Statistic:	t = (r x (SQRT (n-2))) / (SQRT (1-rSQ))		
Camden	$ 60.02	$ 19.68		T Statistic:	0.053951		
Webster	$ 201.26	$ 20.00		DF:	N-2	109.0	
Telfair	$ 90.26	$ 20.65		Pvalue:	TDIST(Tstatistic,DF,2)		
Chatham	$ 99.87	$ 21.16		Pvalue:	0.957073		
Muscogee	$ 207.36	$ 21.45					
Wayne	$ 110.80	$ 21.52					
Brantley	$ 90.39	$ 21.60					
Dougherty	$ 61.69	$ 21.65					
Clinch	$ 122.70	$ 22.50					
De Kalb	$ 37.11	$ 22.58					
Candler	$ 208.92	$ 22.82					
Bulloch	$ 128.14	$ 23.25					
Glynn	$ 297.47	$ 23.29					
Dooly	$ 109.08	$ 23.43					
Bleckley	$ 121.24	$ 23.50					
Pulaski	$ 23.70	$ 23.83					
Turner	$ 206.94	$ 24.75					
Fulton	$ 52.15	$ 24.98					
Brooks	$ 167.28	$ 25.02					
Sumter	$ 69.03	$ 25.58					
Grady	$ 73.49	$ 25.90					
Glascock	$ 316.21	$ 26.00					
Gordon	$ 66.45	$ 26.01					
Jeff Davis	$ 106.53	$ 26.25					
Columbia	$ 246.21	$ 26.63					
Ware	$ 97.87	$ 26.65					
Effingham	$ 74.72	$ 27.52					
Laurens	$ 144.55	$ 28.50					
Elbert	$ 47.11	$ 28.55					
Decatur	$ 175.87	$ 28.67					
Cobb	$ 699.07	$ 28.67					
Murray	$ 36.71	$ 28.85					
Colquitt	$ 93.78	$ 29.00					
Evans	$ 255.13	$ 29.40					
Bibb	$ 199.83	$ 30.22					
Union	$ 105.37	$ 30.50					
Worth	$ 68.44	$ 31.21					
Charlton	$ 91.83	$ 31.68					
Catoosa	$ 36.17	$ 33.08					
Butts	$ 105.11	$ 33.29					
Richmond	$ 310.15	$ 33.46					
Forsyth	$ 425.50	$ 33.53					
Floyd	$ 93.35	$ 33.60					
Jefferson	$ 159.11	$ 34.50					
Gilmer	$ 76.60	$ 34.62					
Fayette	$ 125.17	$ 34.63					
Lee	$ 535.46	$ 34.75					
Troup	$ 45.35	$ 34.98					
Haralson	$ 87.71	$ 35.57					
Jones	$ 96.76	$ 36.20					
Quitman	$ 113.20	$ 36.25					
Dade	$ 98.75	$ 36.45					
Habersham	$ 219.99	$ 37.00					
Cherokee	$ 144.14	$ 37.45					
Stephens	$ 45.61	$ 38.50					
Monroe	$ 110.73	$ 38.64					
Lamar	$ 43.44	$ 39.00					
Marion	$ 86.86	$ 39.86					
Thomas	$ 97.98	$ 39.86					
Clayton	$ 95.07	$ 39.88					
Gwinnett	$ 288.42	$ 40.39					
Macon	$ 41.13	$ 40.59					
Rockdale	$ 108.00	$ 40.66					
Hall	$ 60.28	$ 40.94					
Taliaferro	$ 410.73	$ 41.10					
Peach	$ 211.37	$ 41.17					
Franklin	$ 40.66	$ 42.35					
Warren	$ 310.69	$ 42.54					
Baldwin	$ 124.70	$ 42.60					
Hancock	$ 100.63	$ 42.75					
Schley	$ 63.03	$ 43.00					
Harris	$ 220.14	$ 44.56					
Polk	$ 68.83	$ 44.94					
Walker	$ 65.22	$ 45.00					
Carroll	$ 65.75	$ 46.15					
Douglas	$ 46.46	$ 46.18					
Newton	$ 28.48	$ 46.25					
Bartow	$ 180.00	$ 46.67					
Wilkes	$ 328.62	$ 47.00					
Dawson	$ 208.83	$ 47.10					
Crisp	$ 207.83	$ 47.50					
Henry	$ 96.84	$ 47.51					
Jasper	$ 69.57	$ 47.60					
Morgan	$ 46.99	$ 48.70					
Oglethorpe	$ 61.26	$ 50.00					
McDuffie	$ 142.84	$ 50.50					
Banks	$ 138.41	$ 50.95					
Madison	$ 56.12	$ 51.05					
Oconee	$ 334.15	$ 51.07					
Crawford	$ 75.62	$ 51.50					
Barrow	$ 112.90	$ 51.60					
White	$ 85.04	$ 53.63					
Coweta	$ 137.43	$ 54.59					
Putnam	$ 126.38	$ 55.44					
Upson	$ 101.79	$ 56.25					
Talbot	$ 37.05	$ 58.09					
Towns	$ 111.31	$ 59.00					
Greene	$ 259.20	$ 59.28					
Jackson	$ 45.62	$ 59.29					
Walton	$ 228.07	$ 59.35					
Paulding	$ 182.10	$ 59.97					
Rabun	$ 104.94	$ 63.00					
Lincoln	$ 115.13	$ 64.01					
Clarke	$ 557.16	$ 64.81					
Spalding	$ 135.26	$ 65.30					
Pike	$ 57.98	$ 69.50					
Pickens	$ 45.87	$ 72.00					
Lumpkin	$ 115.76	$ 90.50					

PEARSONS							
COUNTY	Ave Per Res	2016R					
Quitman	$ 113.20	$ 11.40		Coeffecient (r):	-0.02887		
Tift	$ 157.33	$ 16.26		N:	102.0		
Houston	$ 104.09	$ 16.97		T Statistic:	t = (r x (SQRT (n-2))) / (SQRT (1-rSQ))		
Brantley	$ 90.39	$ 18.70		T Statistic:	-0.28882		
Mitchell	$ 43.56	$ 19.25		DF:	N-2	100.0	
Clinch	$ 122.70	$ 20.00		Pvalue:	TDIST(Tstatistic,DF,2)		
Webster	$ 201.26	$ 20.00		Pvalue:	#NUM!		
Muscogee	$ 207.36	$ 20.54					
Dougherty	$ 61.69	$ 20.62					
Telfair	$ 90.26	$ 20.65					
Wayne	$ 110.80	$ 21.45					
Pulaski	$ 23.70	$ 21.70					
Candler	$ 208.92	$ 21.80					
Bulloch	$ 128.14	$ 22.25					
Whitfield	$ 133.16	$ 22.54					
De Kalb	$ 37.11	$ 22.58					
Montgomery	$ 90.91	$ 22.75					
Bleckley	$ 121.24	$ 23.50					
Grady	$ 73.49	$ 23.90					
Fulton	$ 52.15	$ 24.59					
Brooks	$ 167.28	$ 24.65					
Turner	$ 206.94	$ 24.75					
Gordon	$ 66.45	$ 25.37					
Glascock	$ 316.21	$ 25.50					
Sumter	$ 69.03	$ 25.58					
Murray	$ 36.71	$ 25.95					
Ware	$ 97.87	$ 26.25					
Jeff Davis	$ 106.53	$ 26.25					
Laurens	$ 144.55	$ 26.40					
Columbia	$ 246.21	$ 26.63					
Evans	$ 255.13	$ 27.40					
Decatur	$ 175.87	$ 27.49					
Effingham	$ 74.72	$ 27.52					
Walker	$ 65.22	$ 28.50					
Elbert	$ 47.11	$ 28.55					
Cobb	$ 699.07	$ 28.67					
Colquitt	$ 93.78	$ 29.00					
Bibb	$ 199.83	$ 29.29					
Union	$ 105.37	$ 30.50					
Charlton	$ 91.83	$ 31.20					
Worth	$ 68.44	$ 31.21					
Richmond	$ 310.15	$ 32.49					
Catoosa	$ 36.17	$ 33.08					
Butts	$ 105.11	$ 33.28					
Jefferson	$ 159.11	$ 33.50					
Forsyth	$ 425.50	$ 33.53					
Floyd	$ 93.35	$ 33.60					
Habersham	$ 219.99	$ 34.00					
Fayette	$ 125.17	$ 34.63					
Lee	$ 535.46	$ 34.75					
Troup	$ 45.35	$ 34.98					
Haralson	$ 87.71	$ 35.57					
Lamar	$ 43.44	$ 36.00					
Jones	$ 96.76	$ 36.20					
Dade	$ 98.75	$ 36.45					
Franklin	$ 40.66	$ 37.10					
Cherokee	$ 144.14	$ 37.45					
Stephens	$ 45.61	$ 38.50					
Talbot	$ 37.05	$ 38.76					
Peach	$ 211.37	$ 39.34					
Baldwin	$ 124.70	$ 39.45					
Gwinnett	$ 288.42	$ 39.90					
Rockdale	$ 108.00	$ 40.66					
Monroe	$ 110.73	$ 40.88					
Taliaferro	$ 410.73	$ 41.10					
Dawson	$ 208.83	$ 41.20					
Warren	$ 310.69	$ 42.08					
Hancock	$ 100.63	$ 42.75					
Schley	$ 63.03	$ 43.00					
Clayton	$ 95.07	$ 43.85					
Harris	$ 220.14	$ 44.56					
Bartow	$ 180.00	$ 44.63					
Douglas	$ 46.46	$ 44.80					
Crawford	$ 75.62	$ 45.00					
Carroll	$ 65.75	$ 45.15					
Newton	$ 28.48	$ 45.62					
Henry	$ 96.84	$ 46.84					
Wilkes	$ 328.62	$ 47.00					
Jasper	$ 69.57	$ 47.10					
Crisp	$ 207.83	$ 47.50					
Morgan	$ 46.99	$ 48.70					
Polk	$ 68.83	$ 48.76					
Banks	$ 138.41	$ 49.70					
Madison	$ 56.12	$ 51.00					
Marion	$ 86.86	$ 51.05					
Oconee	$ 334.15	$ 52.79					
Putnam	$ 126.38	$ 53.44					
White	$ 85.04	$ 53.63					
Coweta	$ 137.43	$ 54.59					
Paulding	$ 182.10	$ 55.12					
Upson	$ 101.79	$ 56.25					
Barrow	$ 112.90	$ 56.50					
Walton	$ 228.07	$ 57.50					
Jackson	$ 45.62	$ 57.82					
Towns	$ 111.31	$ 59.00					
Greene	$ 259.20	$ 59.28					
Lincoln	$ 115.13	$ 60.67					
Rabun	$ 104.94	$ 63.00					
Spalding	$ 135.26	$ 65.30					
Pike	$ 57.98	$ 69.50					
Pickens	$ 45.87	$ 71.00					
Lumpkin	$ 115.76	$ 90.50					

PEARSONS							
COUNTY	Ave Per Res	2015R					
Quitman	$ 113.20	$ 11.40		Coeffeclent (r):	-0.0656		
Macon	$ 41.13	$ 16.25		N:	106.0		
Oglethorpe	$ 61.26	$ 16.25		T Statistic:	t = (r x (SQRT (n-2))) / (SQRT (1-rsQ))		
Tift	$ 157.33	$ 16.26		T Statistic:	-0.67046		
Houston	$ 104.09	$ 16.97		DF:	N-2	104.0	
Muscogee	$ 207.36	$ 19.64		Pvalue:	TDIST(Tstatistic,DF,2)		
Camden	$ 60.02	$ 19.68		Pvalue:	#NUM!		
Clinch	$ 122.70	$ 20.00					
Webster	$ 201.26	$ 20.00					
Dougherty	$ 61.69	$ 20.28					
Telfair	$ 90.26	$ 20.65					
Whitfield	$ 133.16	$ 21.14					
Turner	$ 206.94	$ 21.25					
Wayne	$ 110.80	$ 21.45					
Pulaski	$ 23.70	$ 21.70					
Montgomery	$ 90.91	$ 21.75					
Candler	$ 208.92	$ 21.80					
Grady	$ 73.49	$ 21.90					
Brantley	$ 90.39	$ 22.23					
Bulloch	$ 128.14	$ 22.25					
De Kalb	$ 37.11	$ 22.58					
Bleckley	$ 121.24	$ 23.50					
Emanuel	$ 64.88	$ 23.70					
Sumter	$ 69.03	$ 24.18					
Fulton	$ 52.15	$ 24.59					
Gordon	$ 66.45	$ 24.66					
Decatur	$ 175.87	$ 24.87					
Brooks	$ 167.28	$ 25.15					
Dooly	$ 109.08	$ 25.43					
Glascock	$ 316.21	$ 25.50					
Laurens	$ 144.55	$ 25.70					
Murray	$ 36.71	$ 25.95					
Columbia	$ 246.21	$ 26.15					
Ware	$ 97.87	$ 26.25					
Bartow	$ 180.00	$ 26.50					
Effingham	$ 74.72	$ 27.52					
Bibb	$ 199.83	$ 27.85					
Cobb	$ 699.07	$ 28.67					
Jefferson	$ 159.11	$ 29.25					
Elbert	$ 47.11	$ 30.20					
Fayette	$ 125.17	$ 30.39					
Union	$ 105.37	$ 30.50					
Richmond	$ 310.15	$ 30.66					
Charlton	$ 91.83	$ 30.71					
Worth	$ 68.44	$ 31.21					
Butts	$ 105.11	$ 31.26					
Barrow	$ 112.90	$ 31.95					
Mitchell	$ 43.56	$ 32.00					
Walker	$ 65.22	$ 32.00					
Colquitt	$ 93.78	$ 32.25					
Baldwin	$ 124.70	$ 32.60					
Catoosa	$ 36.17	$ 33.08					
Jones	$ 96.76	$ 33.50					
Forsyth	$ 425.50	$ 33.53					
Floyd	$ 93.35	$ 33.60					
Habersham	$ 219.99	$ 34.00					
Clarke	$ 557.16	$ 34.00					
Troup	$ 45.35	$ 34.56					
Lee	$ 535.46	$ 34.75					
Thomas	$ 97.98	$ 34.85					
Haralson	$ 87.71	$ 35.57					
Lamar	$ 43.44	$ 36.00					
Morgan	$ 46.99	$ 36.10					
Dade	$ 98.75	$ 36.45					
Clayton	$ 95.07	$ 36.77					
Monroe	$ 110.73	$ 36.90					
Franklin	$ 40.66	$ 37.10					
Peach	$ 211.37	$ 37.42					
Cherokee	$ 144.14	$ 37.45					
Stephens	$ 45.61	$ 38.50					
Talbot	$ 37.05	$ 38.73					
Chatham	$ 99.87	$ 39.14					
Polk	$ 68.83	$ 39.49					
Gwinnett	$ 288.42	$ 39.90					
Rockdale	$ 108.00	$ 40.66					
Taliaferro	$ 410.73	$ 41.10					
Dawson	$ 208.83	$ 41.20					
Warren	$ 310.69	$ 41.62					
Hancock	$ 100.63	$ 42.75					
Schley	$ 63.03	$ 43.00					
Upson	$ 101.79	$ 43.30					
Carroll	$ 65.75	$ 43.65					
Crisp	$ 207.83	$ 44.50					
Harris	$ 220.14	$ 44.56					
Newton	$ 28.48	$ 44.84					
Henry	$ 96.84	$ 46.84					
Wilkes	$ 328.62	$ 47.00					
Jasper	$ 69.57	$ 47.10					
Madison	$ 56.12	$ 48.70					
Crawford	$ 75.62	$ 51.50					
Oconee	$ 334.15	$ 52.02					
Putnam	$ 126.38	$ 52.44					
White	$ 85.04	$ 52.60					
Paulding	$ 182.10	$ 53.16					
Lincoln	$ 115.13	$ 53.50					
Coweta	$ 137.43	$ 54.59					
Towns	$ 111.31	$ 55.00					
Walton	$ 228.07	$ 57.50					
Jackson	$ 45.62	$ 57.82					
Greene	$ 259.20	$ 59.28					
Pike	$ 57.98	$ 59.50					
Spalding	$ 135.26	$ 63.13					
Banks	$ 138.41	$ 67.10					
Pickens	$ 45.87	$ 71.00					
Lumpkin	$ 115.76	$ 90.50					
Douglas	$ 46.46	$ 453.53					

County	2019 Capital	2018 Capital	2017 Capital	2016 Capital	2015 Capital	Ave. Spending	2019 Rates	2018 Rates	2017 Rates	2016 Rates	2015 Rates
Quitman	416,783	370,147	312,286	98,280	122,097	113	25	36	36	11	11
Douglas	5,954,628	13,828,871	6,243,133	29,223,142	11,176,569	104	17	17	17	17	17
Laurens	35,443,686	17,209,489	60,396,008	44,176,484	34,109,453	207	55	22	21	21	20
Macon	1,168,693	484,843	1,004,297	946,942	876,429	123	23	23	23	20	20
White	5,177,218	3,883,657	3,222,460	9,170,659	10,938,689	62	22	22	22	21	20
Warren	1,873,710	736,348	1,040,301	2,518,011	1,229,528	90	21	21	21	21	21
Tift	18,499,929	3,760,605	3,366,060	2,821,220	3,756,680	111	22	22	22	21	21
McDuffie	1,655,791	1,980,743	1,708,303	3,081,821	1,167,657	209	23	23	23	22	22
Candler	479,322	1,185,242	1,902,595	2,342,775	776,844	73	27	26	26	24	22
Floyd	9,456,432	14,090,314	3,938,483	12,574,419	9,562,225	128	23	23	23	22	22
Bibb	46,958,000	32,124,000	24,590,000	27,809,000	42,202,000	37	23	23	23	23	23
Chatham	80,999,000	79,165,000	24,284,000	62,988,000	88,709,000	52	28	26	25	25	25
Camden	2,605,848	3,453,909	1,487,191	6,613,433	3,493,677	66	28	21	26	25	25
Rabun	15,474,792	4,757,066	9,787,927	6,073,222	6,045,764	145	31	29	29	26	26
Talbot	2,443,170	843,647	1,128,375	2,443,170	2,109,406	37	69	30	29	26	26
Effingham	28,553,342	21,668,132	58,815,317	35,269,617	22,991,805	246	27	27	27	27	26
Bartow	14,795,026	14,539,775	21,134,775	22,502,758	20,808,960	180	61	52	47	45	27
Spalding	17,159,881	4,367,933	2,729,509	7,315,232	32,109,204	75	28	28	28	28	28
Coweta	22,870,654	35,651,000	12,736,845	43,429,965	11,235,550	200	32	31	30	29	28
Cherokee	132,907,669	731,063,383	689,708,220	173,399,655	191,954,277	699	32	29	29	29	29
Butts	2,115,421	2,951,666	2,792,811	1,588,267	3,214,571	159	35	35	35	34	29
Putnam	15,247,061	7,168,557	24,010,785	11,788,409	9,208,947	125	35	35	35	35	30
Harris	1,416,691	2,452,110	2,274,671	3,021,643	1,407,238	105	31	31	31	31	31
Jasper	2,135,721	928,963	1,334,296	1,426,001	3,052,449	92	38	38	32	31	31
Seminole	2,748,269	1,078,103	2,114,140	964,745	1,195,716	68	31	31	31	31	31
Jones	2,466,322	2,616,054	1,660,301	3,586,821	1,574,600	105	33	38	33	33	31
Hall	4,478,101	10,300,466	5,284,455	12,607,466	2,910,017	113	62	62	52	57	32
Upson	6,534,403	970,271	1,710,602	10,968,445	3,190,834	65	52	47	45	29	32
Houston	7,514,195	6,303,960	4,823,155	1,701,792	1,572,923	94	29	29	29	29	32
Lumpkin	1,991,305	4,343,988	1,171,410	1,818,105	3,913,179	36	33	33	33	33	33
Fannin	2,439,588	5,144,751	1,112,777	2,083,733	1,348,991	97	41	37	36	36	34
Habersham	14,586,006	12,046,893	4,312,639	11,226,089	9,257,349	93	34	34	34	34	34
Banks	10,072,883	3,375,444	21,943,452	4,596,881	39,469,886	220	39	38	37	34	34
Worth	428,911	3,516,797	3,353,866	2,642,452	9,738,311	45	35	35	35	35	35
Muscogee	128,721	44,982,572	2,112,873	1,083,546	482,973	535	34	34	35	35	35
Lincoln	3,517,082	760,000	727,000	999,000	2,178,500	43	39	39	39	36	36
Clinch	2,913,817	844,857	1,494,745	377,594	515,003	47	49	49	49	49	36
Telfair	1,995,971	1,669,498	2,121,687	983,360	452,118	99	36	36	36	36	36
Paulding	48,362,375	34,964,224	20,624,534	27,765,707	73,316,934	95	38	40	40	44	37
Greene	3,370,346	808,585	1,066,042	7,286,110	3,463,801	111	38	38	39	41	37
Grady	720,611	473,800	2,556,812	14,436,824	2,459,717	211	41	41	41	39	37
Oconee	53,503,978	48,106,846	26,498,393	37,289,535	21,272,811	144	39	37	37	37	37
Stephens	1,267,429	912,752	685,806	1,948,930	3,410,132	46	40	40	39	39	39
Haralson	1,090,139	408,810	98,176	181,613	529,596	37	58	58	58	39	39
Clayton	330,907,000	204,528,000	302,676,000	302,884,000	187,008,000	288	41	42	40	40	40
Montgomery	5,395,794	3,532,593	8,095,543	4,728,565	1,147,071	209	47	47	47	41	41
Charlton	700,348	2,078,270	1,651,069	1,167,806	1,963,669	311	45	43	43	42	42
Dooly	1,405,325	3,604,795	1,818,945	2,613,934	1,141,000	102	52	52	56	56	43
Crisp	6,070,593	5,069,007	12,709,725	5,888,524	5,397,450	66	47	46	46	45	44
Glynn	5,476,968	4,609,634	7,094,362	2,244,978	5,557,376	208	48	48	48	48	45
Whitfield	2,146,359	12,400,556	9,303,086	1,566,586	4,871,144	220	45	45	45	45	45
Gordon	2,137,414	3,241,190	1,993,572	4,312,579	4,681,593	28	46	46	46	46	45
Fayette	6,236,649	16,008,449	45,170,025	6,969,170	6,364,406	97	48	49	48	47	47
Lamar	1,777,592	3,863,239	3,434,597	2,340,900	874,756	329	48	48	47	47	47
Evans	1,369,885	1,527,127	626,861	813,504	1,127,042	70	48	48	48	47	47
Marion	931,765	1,456,618	603,628	753,549	1,780,837	76	45	52	52	45	52
Bulloch	38,096,503	10,285,996	23,237,327	6,855,551	5,002,441	334	52	52	51	53	52
Jackson	6,210,264	1,690,452	3,267,284	3,428,176	1,719,813	126	60	55	55	53	52
Dade	3,761,837	1,766,558	3,845,067	2,245,491	1,951,743	85	56	54	54	54	53
Burke	22,967,670	41,987,390	31,212,212	18,942,512	18,097,581	182	69	64	60	55	53
Atkinson	747,734	916,033	1,456,613	363,135	613,323	115	71	64	64	61	54
Clarke	25,843,588	25,298,711	17,117,730	18,810,750	10,271,697	137	55	55	55	55	55
Walker	7,346,234	7,971,913	6,451,094	50,299,818	2,270,234	228	59	59	59	58	58
Murray	1,910,916	2,927,568	4,330,650	2,730,202	10,859,286	46	61	59	59	58	58
Morgan	797,622	3,602,922	9,491,085	1,154,482	1,388,469	259	59	59	59	59	59
Henry	4,471,243	7,540,224	16,896,054	2,629,477	3,085,941	135	65	65	65	65	63
Wilkes	2,666,646	1,341,185	1,464,848	5,180,649	2,272,547	138	53	53	51	50	67
Jefferson	4,081,852	2,062,525	1,562,910	859,502	2,794,633	46	72	72	72	71	71
Pickens	4,301,110	3,998,220	4,390,427	3,283,541	3,084,821	116	91	91	91	91	91
Carroll	13,727,676	6,459,876	8,269,223	5,666,488	4,736,374	46	47	47	46	45	454

COUNTY	2019C	2018C	2017C	2019R	2019I
Macon	$ 484,538	$ 428,661	$ 385,246	$ 19.75	-48.9%
Quitman	$ 416,783	$ 370,147	$ 312,286	$ 25.02	-31.0%
Butts	$ 2,466,322	$ 2,616,054	$ 1,660,301	$ 32.76	-13.8%
Crawford	$ 931,765	$ 1,456,618	$ 603,628	$ 45.00	-12.6%
Clayton	$ 48,362,375	$ 34,964,224	$ 20,624,534	$ 37.54	-5.9%
Gwinnett	$ 330,907,000	$ 204,528,000	$ 302,676,000	$ 40.95	-2.4%
Henry	$ 6,236,649	$ 16,008,449	$ 45,170,025	$ 48.49	0.0%
Tift	$ 3,388,249	$ 4,418,317	$ 1,747,980	$ 16.26	0.0%
Houston	$ 5,954,628	$ 13,828,871	$ 6,243,133	$ 16.97	0.0%
Telfair	$ 1,873,710	$ 736,348	$ 1,040,301	$ 20.65	0.0%
Dougherty	$ 5,177,218	$ 3,883,657	$ 3,222,460	$ 22.09	0.0%
Clinch	$ 1,168,693	$ 484,843	$ 1,004,297	$ 22.50	0.0%
De Kalb	$ 46,958,000	$ 32,124,000	$ 24,590,000	$ 22.58	0.0%
Candler	$ 1,655,791	$ 1,980,743	$ 1,708,303	$ 22.82	0.0%
Bulloch	$ 9,456,432	$ 14,090,314	$ 3,938,483	$ 23.25	0.0%
Montgomery	$ 2,898,065	$ 753,998	$ 1,275,612	$ 24.75	0.0%
Dooly	$ 3,029,906	$ 2,453,583	$ 1,628,865	$ 26.15	0.0%
Columbia	$ 28,553,342	$ 21,668,132	$ 58,815,317	$ 26.63	0.0%
Effingham	$ 17,159,881	$ 4,367,933	$ 2,729,509	$ 27.52	0.0%
Seminole	$ 1,525,996	$ 1,663,876	$ 2,597,548	$ 27.54	0.0%
Colquitt	$ 7,514,195	$ 6,303,960	$ 4,823,155	$ 29.00	0.0%
Atkinson	$ 1,342,871	$ 824,989	$ 211,096	$ 30.36	0.0%
Union	$ 1,416,691	$ 2,452,110	$ 2,274,671	$ 30.50	0.0%
Worth	$ 2,748,269	$ 1,078,103	$ 2,114,140	$ 31.21	0.0%
Catoosa	$ 1,991,305	$ 4,343,988	$ 1,171,410	$ 33.08	0.0%
Floyd	$ 14,586,006	$ 12,046,893	$ 4,312,639	$ 33.60	0.0%
Lee	$ 128,721	$ 44,982,572	$ 2,112,873	$ 33.75	0.0%
Jefferson	$ 2,115,421	$ 2,951,666	$ 2,792,811	$ 34.50	0.0%
Fayette	$ 15,247,061	$ 7,168,557	$ 24,010,785	$ 34.63	0.0%
Troup	$ 428,911	$ 3,516,797	$ 3,353,866	$ 34.98	0.0%
Dade	$ 1,995,971	$ 1,669,498	$ 2,121,687	$ 36.45	0.0%
Monroe	$ 3,370,346	$ 808,585	$ 1,066,042	$ 38.20	0.0%
Lamar	$ 3,517,082	$ 760,000	$ 727,000	$ 39.00	0.0%
Stephens	$ 1,267,429	$ 912,752	$ 685,806	$ 39.50	0.0%
Peach	$ 720,611	$ 473,800	$ 2,556,812	$ 41.17	0.0%
Harris	$ 2,146,359	$ 12,400,556	$ 9,303,086	$ 44.56	0.0%
Marion	$ 1,806,998	$ 1,028,806	$ 1,006,671	$ 45.30	0.0%
Newton	$ 2,137,414	$ 3,241,190	$ 1,993,572	$ 46.25	0.0%
Douglas	$ 13,727,676	$ 6,459,876	$ 8,269,223	$ 47.07	0.0%
Dawson	$ 5,395,794	$ 3,532,593	$ 8,095,543	$ 47.10	0.0%
Crisp	$ 5,476,968	$ 4,609,634	$ 7,094,362	$ 47.50	0.0%
Jasper	$ 1,369,885	$ 1,527,127	$ 626,861	$ 47.60	0.0%
Wilkes	$ 1,777,592	$ 3,863,239	$ 3,434,597	$ 48.20	0.0%
Morgan	$ 2,913,817	$ 844,857	$ 1,494,745	$ 48.70	0.0%
Upson	$ 1,405,325	$ 3,604,795	$ 1,818,945	$ 51.75	0.0%
Banks	$ 2,666,646	$ 1,341,185	$ 1,464,848	$ 53.20	0.0%
Coweta	$ 25,843,588	$ 25,298,711	$ 17,117,730	$ 54.59	0.0%
Talbot	$ 1,090,139	$ 408,810	$ 98,176	$ 58.09	0.0%
Towns	$ 463,361	$ 527,374	$ 2,685,613	$ 59.00	0.0%
Greene	$ 797,622	$ 3,602,922	$ 9,491,085	$ 59.28	0.0%
Walton	$ 7,346,234	$ 7,971,913	$ 6,451,094	$ 59.35	0.0%
Rabun	$ 5,207,081	$ 1,764,413	$ 2,582,629	$ 63.00	0.0%
Spalding	$ 4,471,243	$ 7,540,224	$ 16,896,054	$ 65.30	0.0%
Pickens	$ 4,081,852	$ 2,062,525	$ 1,562,910	$ 72.00	0.0%
Lumpkin	$ 4,301,110	$ 3,998,220	$ 4,390,427	$ 90.50	0.0%
Whitfield	$ 10,702,386	$ 4,948,073	$ 24,620,084	$ 23.78	0.1%
Barrow	$ 4,478,101	$ 10,300,466	$ 5,284,455	$ 62.25	0.6%
Oconee	$ 38,096,503	$ 10,285,996	$ 23,237,327	$ 52.36	0.8%
Wayne	$ 18,499,929	$ 3,760,605	$ 3,366,060	$ 21.80	1.0%
Charlton	$ 2,135,721	$ 928,963	$ 1,334,296	$ 38.10	1.5%
Habersham	$ 10,072,883	$ 3,375,444	$ 21,943,452	$ 39.23	1.9%
Carroll	$ 6,070,593	$ 5,069,007	$ 12,709,725	$ 47.15	2.2%
Jackson	$ 1,910,916	$ 2,927,568	$ 4,330,650	$ 60.68	2.3%
Bibb	$ 22,870,654	$ 35,651,000	$ 12,736,845	$ 32.10	3.0%
White	$ 3,761,837	$ 1,766,558	$ 3,845,067	$ 55.63	3.7%
Cherokee	$ 53,503,978	$ 48,106,846	$ 26,498,393	$ 39.30	4.9%
Fulton	$ 80,999,000	$ 79,165,000	$ 24,284,000	$ 27.52	5.0%
Camden	$ 2,674,801	$ 2,429,404	$ 4,626,118	$ 19.68	5.4%
Grady	$ 479,322	$ 1,185,242	$ 1,902,595	$ 27.30	5.4%
Warren	$ 700,348	$ 2,078,270	$ 1,651,069	$ 44.93	5.6%
McDuffie	$ 2,054,351	$ 3,195,734	$ 2,155,977	$ 45.63	6.9%
Thomas	$ 2,499,972	$ 3,668,868	$ 2,962,852	$ 45.63	6.9%
Paulding	$ 22,967,670	$ 41,987,390	$ 31,212,212	$ 68.53	7.7%
Laurens	$ 15,474,792	$ 4,757,066	$ 9,787,927	$ 30.95	8.6%
Putnam	$ 6,210,264	$ 1,690,452	$ 3,267,284	$ 60.35	8.9%
Jones	$ 2,439,588	$ 5,144,751	$ 1,112,777	$ 40.87	9.2%
Walker	$ 6,534,403	$ 970,271	$ 1,710,602	$ 51.55	9.9%
Cobb	$ 132,907,669	$ 731,063,383	$ 689,708,220	$ 31.84	11.1%
Lincoln	$ 747,734	$ 916,033	$ 1,456,613	$ 71.22	11.3%
Glynn	$ 4,894,561	$ 40,221,445	$ 22,247,323	$ 26.47	13.7%
Emanuel	$ 2,192,006	$ 349,995	$ 947,777	$ 30.15	15.7%
Clarke	$ 17,916,620	$ 143,836,655	$ 18,537,260	$ 78.98	18.4%
Bartow	$ 14,795,026	$ 14,539,775	$ 21,134,775	$ 61.49	19.2%
Gordon	$ 2,605,848	$ 3,453,909	$ 1,487,191	$ 27.60	32.8%
Hall	$ 9,938,624	$ 8,167,445	$ 24,519,959	$ 76.29	81.9%
Murray	$ 2,443,170	$ 843,647	$ 1,128,375	$ 68.93	127.5%
Muscogee	$ 35,443,686	$ 17,209,489	$ 60,396,008	$ 55.16	145.9%

Appendix B

Definitions and Terms

The terms, definitions and acronyms used in this research paper are widely used in the water utility industry and have been defined for the reader in this section.

ASCE: American Society of Civil Engineers – a professional body founded in 1852 to represent civil engineers worldwide.

AWWA: American Water Works Association – an international non-profit, scientific and educational association founded to improve water quality and supply, founded in 1881 and currently with 50,000 members.

Capital Investment: Spending by local Georgia county governments on all infrastructure within a county.

Consumer Price Index (CPI): The consumer price index is a measure of inflation, a measurement of the average change in price over a period that US consumers pay for goods and services.

EPA: The Environmental Protection Agency of the United States Federal Government. The agency tasked with monitoring and holding water utilities accountable for following federal regulations regarding the clean water act and other federal regulations regarding the natural environment of the United States including waters of the United States.

EPD: The Environmental Protection Department of the State of Georgia. A state agency with similar regulatory oversight as the EPA but limited to state enforcement and oversight for many environmental regulations related to the Federal Clean Water Act of 1972.

GAWP: Georgia Association of Water Professionals – Georgia State Association comprised of hundreds of Georgia water professionals and member utilities primarily, but not limited to, the geographic region of Georgia.

Infrastructure: Means of drinking water production including treatment plants, reservoirs, elevated and ground tanks, and distribution pipes and infrastructure.

NACWA: National Association of Clean Water Agencies – a national association of publicly owned utilities that act in the interests of member utilities and the public.

Net Position: In governmental accounting represents the difference between assets of the government and liabilities of the government.

Rate Payer: a customer of a water utility that pays for water services based on a fixed and/or variable rate per gallon of water.