What Drives the Florida Economy?

Sarah Crafton
Santiago Marrou
Victoria Roberts
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EXECUTIVE SUMMARY

BACKGROUND & PURPOSE

Though many organizations, political groups, and corporations attempt to claim that their favored industries and sectors are driving the economy, there is little objective agreement as to what drives the Florida economy. For the purpose of this report, we will examine different economic sectors from both GDP and employment perspectives in their size, growth, and influence to determine whether they are driving overall growth. Even if there had been some previous consensus as to what has driven the state’s economy in the past, various shifts in the last decades may have significantly altered the composition of the economy. In our analysis, we will attempt to discover which sectors are truly driving economic growth in Florida and how the economy has changed over time. We will also make suggestions as to how these results can be best utilized in the future.

PROCEDURE & ANALYSIS

In the past, various methods used to examine economic drivers may have been looking at summary statistics related to GDP and employment alone to determine what drives a state or nation’s economy. While we have engaged in this method of more traditional analysis, we are also exploring in our analysis a new method that will allow us to measure how much each sector is influenced by other sectors in the economy.

The traditional examination of our sectors will consist of a breakdown of how each of them has changed over time in both GDP and in employment. Our GDP analysis begins in 1997 and goes through 2017, while our employment analysis begins in 1990. Our analysis of employment and GDP will generally follow the same pattern. Because one of our measures of a driver is size, we will conduct an analysis of each sector’s share of total employment and total GDP over time. This analysis will allow us to determine how sectors have been trending over the most recent years and can tell us which sectors are most critical to the state’s economy. One of our most interesting findings regarding size differences in employment and GDP was in the Financial Activities. This sector only employs about 6 percent of workers yet makes up almost a quarter of the state’s GDP.
Beyond analyzing size, we will conduct a thorough analysis of year-over-year growth rates for both measures and compare them against growth rates of the state’s overall employment and overall GDP. This comparison will allow us to measure whether a sector is growing above or below average. If a sector is growing at a rate that is consistently above average, the sector is clearly strengthening the overall growth of the economy. Since the end of the Great Recession, we found that the Professional and Business Services sector has had the highest average growth rate in employment among our sectors. Despite the large losses it took during the housing crisis, the Construction sector has actually been the fastest growing sector in GDP since the end of the last recession. The sector remains somewhat small in terms of overall GDP, however.

The final piece of our report is the analysis of each sector’s influence. The new method that we mentioned previously consists of a generalized vector autoregression (VARg). This form of regression analysis allows us to decompose the variance of each sector to determine what percentage of that variance is caused by other sectors. In short, the variance decomposition tells us how much a sector is influenced by the other sectors in our analysis. When conducting this variance decomposition using the past 10 years of employment data, we found that the largest influencers are the Financial Activities sector, Trade, Transportation, and Utilities sector, and the Professional and Business Services sector. As these coincide with the potential drivers found during the initial analysis on size and growth, we ultimate conclude that these sectors are the current drivers of the Florida economy.
Our report focuses on historical data at state and national levels. We can therefore see how the economy has changed in the past and the trend that it is currently on. Over the past 30 years, the Florida economy has become significantly more interconnected.

The key takeaway from this report is that growth in a specific sector does not necessarily translate into growth that spills over into the overall economy. There is always a possibility that the sector may retain growth within itself. Examining the variance decomposition results show us how growth in a specific sector impacts growth across the whole economy. We recommend that this method be used to help the state make smarter and more impactful investments into its economy by focusing on those sectors that are most influential.
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1 BACKGROUND AND PURPOSE

When most individuals think of Florida, they think of the expansive coastline, favorable weather conditions for outdoor activities, and amusement parks. To many of us, Florida is home; to even more, it is a vacation spot. With a population estimate of over 20 million people and almost 5 times that in the number of visitors it receives each year, it is understandable why Florida has gained the reputation for being the vacation spot that it is.

In addition to the growing number of tourists that visit each year, Florida is also seeing a remarkable inflow of new residents, regularly ranking high among all states both on level terms and in percentage growth both domestically and internationally for migration.

Florida is also notorious for its involvement in the agricultural sector. There has been substantial debate over the importance of the agricultural sector to the Florida economy. In this report, one of the aspects we seek to understand is whether the argument of agriculture’s cruciality to Florida’s stability holds true, or if it is potentially Florida’s imperative role in the subsistence of the United States agricultural industry that fuels this notion. In other words, we seek to understand if this beneficial relationship runs both ways, or if it is primarily one directional.

These preconceptions, or concepts, are often accepted by most tasked with future planning and are used as a basis for policy and legislative undertaking. We seek to understand the mechanics of the Florida economy on a more quantitative and comprehensive level to provide a more current and accurate view for these purposes.

The question of what drives the Florida economy is a broad one. For this report, we will be focusing solely on the specific sectors that drive the economy and how different sectors interact with one another. In order to understand this, and in turn which sectors should be invested in to harbor substantial economic stability and growth, we must first understand how the Florida economy compares to the rest of the nation.
In its early years, Florida experienced a delayed emergence into the business world as it had minimal industrial and commercial activity as compared to the rest of the country. In the mid-1930s, Florida began to seek growth and expansion in the areas of business and commerce, and legislators and politicians were soon pressed to prioritize the development of a system similarly provided by other states that would foster this economic growth. As we will see, it appears that Florida’s numbers have routinely come in lower than the other states of its population caliber, namely California, New York, and Texas. We hope that our determination of Florida’s most prominent sectors may shed light in the effort to understand why this may be and if this is impactful to the overall economy’s ability to perform compared to other states.

In examining the economic markers for Florida along with its more comparatively populous states, we notice that Florida has regularly performed at a lower rate. In Figure 1, we see that Florida has routinely produced a lower real GDP per capita than the other comparable states. Some possible explanations for this may be that Florida has a lower cost of living than other states and is highly involved in low-cost service industries such as retail trade and food and accommodation services. Because of this, we do not profess that this means that Florida is underperforming; it could have a different mechanism behind its economic success due to its uniqueness. This idea of conceptual mechanical differences will not be examined in detail in this report for its validity, rather is remarked upon as a suggestion for further exploration.
When looking at both Figure 1 and Figure 2, we see that Florida seemed to experience substantial improvement in unemployment rates and real GDP per capita in the time building up to the Great Recession, and then seemed to experience greater negative effects of the recession in these numbers. Examining the Great Recession closely will prove particularly interesting for the purposes of this report, as the interconnectedness of the economy drastically increased following the Great Recession in not only Florida, but in the nation. The Great Recession was understood to impact both the finance and housing markets the most severely. Because of this, we will pay close attention to see if these markets played a significant role in widening the divide between Florida and the nation in how each was shaken by the recession.
It appears that in the years following the Great Recession, Florida sidled back up to the national trend in unemployment rates and has followed it closely since with the past couple of years remaining minimally below the national average.

We also understand that because Florida seemed to experience the Great Recession more harshly than other states, the mechanism on which Florida’s economy is understood to succeed by may have shifted drastically. For this reason, we will closely examine multiple time windows in the years leading up to the Great Recession, as well as time windows up to current day, through various lenses and sector markers. The idea behind this is to understand if the driving sectors are still the same, or boldly, if they ever were as crucial to that healthy growth as we believed.

1.1 UNDERSTANDING THE IDEA OF A DRIVING SECTOR

As there are many ways of defining a driving sector, we strive here to standardize the means by which we will be classifying a “key” sector in the economy. For the purposes of this report, we will be using the standard methods of quantifying this, such as the share or size of each sector.
both in terms of employment and GDP as well as the growth of each sector in these same forms. We will also be utilizing a newer technique that will allow us to solidify these findings and theories by showing which sectors are contributing substantially to the overall stability, or volatility, of the economy by performing a variance decomposition following a vector autoregression. In essence, we will focus on each sector’s size, the growth each exhibits, and the influence of each sector on all others. Sectors that hold a large share of employment or GDP, are growing substantially and with stability, and influence many other sectors will be determined to be a driving sector. Scaling for these measures will be based on comparative analysis of the other sectors’ results. The various techniques we plan to use will be explored further and in more technical detail in the next section of the report.

2 METHODOLOGY

2.1 ACCESSING THE DATA

In order to carry out our analysis, we required four main sets of data that were broken down by NAICS sectors: quarterly GDP data for Florida, quarterly GDP data for the United States, monthly labor data for Florida, and monthly labor data for the United States. Quarterly GDP data for both the United States and Florida broken down by NAICS sectors was easily accessed at the website of the Bureau of Economic Analysis (BEA). Quarterly GDP data can only be acquired back to the first quarter of 2005. Annual data broken down by NAICS sectors goes as far back as 1997, but this will give us even fewer data points to use compared to quarterly data from 2005. Annual data prior to 1997 is available, however the GDP contributions are broken down into SIC codes, the coding system that preceded NAICS.

The annual GDP data accessed at the BEA will be used in the analysis done prior to the generalized vector autoregression model (gVAR) to be discussed further later. We will use this primarily to look at the growth and size of each sector. Although the quarterly data will also allow us to execute our analysis using a rolling window that demonstrates the changing interconnectedness of the economy over time, it may prove to be less accurate compared to the analysis which uses employment data simply due to the disparity in observations. While the rolling window may be less accurate, we can still find the overall interconnectedness of the economy in
the fourth quarter of 2017 and display it in a table. U.S. and Florida GDP are measured in millions of 2018 dollars. The adjustments for inflation and seasonality are conducted by the BEA.

Seasonally adjusted U.S. non-farm employment data was relatively simple to find and can be accessed and aggregated by NAICS sectors at the Federal Reserve’s Economic Data (FRED) website. Seasonally adjusted Florida non-farm employment data was easily found and accessed as well and can be downloaded from the website of the Florida Department of Economic Opportunity (DEO). Although these datasets were downloaded from different sources, both originate from the Bureau of Labor Statistics’s Current Employment Statistics (CES) program. This program produces detailed industry estimates of nonfarm employment, hours, and earnings of workers on payrolls.

Because CES data and U.S. labor data in general is collected and displayed as nonfarm, finding agricultural data was the greatest challenge surrounding our data-gathering process. In order to find agricultural data, we had to turn to a different set of data from the Bureau of Labor Statistics (BLS) - the Quarterly Census of Employment and Wages (QCEW). This program publishes a quarterly count of employment and average wages reported by employers and covers over 95 percent of U.S. jobs.

Although it’s called the Quarterly Census, the datafiles available from the BLS contain employment numbers for the three individual months within each quarter. This allowed us to use our monthly labor data obtained from the DEO in conjunction with the QCEW data. The agriculture data collected from the QCEW represent the number of employees reported on private farms in both the U.S. and Florida, which means that employees from any publicly-owned agricultural establishments are excluded. Because the data gathered from the DEO and FRED are seasonally adjusted, while QCEW data is not, we had to adjust the national and state agricultural data. The adjustment was done using the ‘seasonal’ package in R. This package applies the X-13 ARIMA-SEATS method for deseasonalization developed by the U.S. Census Bureau and the Bank of Spain. U.S. data extracted from FRED is measured in thousands, while the employment data gathered from the DEO is rounded to the hundreds.
2.2 NAICS CODES

BRIEF HISTORY OF THE NORTH AMERICAN INDUSTRIAL CLASSIFICATION SYSTEM

In order to accurately measure the importance and the effects of any given industry, it is imperative that we classify employees, corporations, and all major economic contributors under separate and meaningful labels. The North American Industrial Classification System (NAICS) aims to fulfill this goal and allow the for the statistical and economic analysis of data that is collected by various governmental agencies. In 1992, the Office of Management and Budget (OMB) created the Economic Classification Policy Committee (ECPC) in order to improve upon and replace the existing industrial classification system at the time, known as the Standard Industrial Classification (SIC). NAICS was created with the cooperation of Mexico’s National Institute of Statistics and Geography, Statistics Canada, and the ECPC and replaced the industrial classification systems of all three countries. NAICS was first implemented by US statistical programs in 1997 (NAICS Manual, 13). NAICS is updated every five years to ensure that the classification system remains relevant and accurate in a shifting global economy with rapidly developing technologies.

HOW NAICS CODES WORK

While the above provides a brief history of NAICS, it is important to understand the method of classification and how the system uses numeric codes to separate industries and sectors. Establishments are grouped together into industries based on the similarity of their production processes. An establishment is defined as the smallest entity for which records can be obtained that provide information on the cost of resources used to produce units of output (NAICS Manual, 19).

It is important to note that a single company may consist of multiple establishments that can be grouped into separate NAICS industries. Establishments are classified in an industry when their primary activity meets the industry definition. Of course, it is common for establishments to perform multiple activities, in which case it is critical to determine the primary activity by
identifying the principal good or service through its relative share of production costs and capital investment. Other variables such as revenue, shipment, or employment can also be used to determine the primary activity of an establishment and therefore assign it the proper industry code.

NAICS is a complex and comprehensive system that covers all economic activity and consists of 20 sectors and 1,057 industries as of the 2017 revision of the system (NAICS Manual, 14). It uses a six-digit method of coding to identify industries and place them in the hierarchical structure of the classification system. The first two digits of a code represent the sector, the third designates the subsector, the fourth digit identifies the industry group, the fifth designates the NAICS industry, and, finally, the sixth digit designates the national industry (NAICS Manual, 18). Because the system is used across the continent, the national industry code and NAICS industry code may differ slightly. When the sixth digit in a given NAICS code is a zero, this generally signifies that the NAICS industry and the national U.S. industry are the same.

2.3 SECTOR SELECTION

In order to reveal which sectors are driving the Florida economy, we must include the most critical components of the state’s economy and a comprehensive representation of the economy as a whole. The selection of these components will allow us to measure how much each contributes to the Florida economy in relative terms and it will allow us to measure the interconnectedness of sectors. The ten sectors we have chosen for our analysis include: Agriculture, Manufacturing, Construction, Information, Financial Activities, Professional and Business Services, Health Care and Social Assistance, Leisure and Hospitality, Government, and Trade, Transportation, and Utilities.

As will be explained below, not all of these are comprised of individual two-digit NAICS sectors but are based on groupings used by the Bureau of Labor Statistics (BLS). The selected sectors contain the sectors that are of the highest interest to the Florida Chamber of Commerce and include sectors that we believe will be the most critical drivers of the Floridian economy. As of December 2017, the selected economic sectors combined to employ approximately 94 percent of workers in Florida and account for about 96 percent of Florida GDP. In the same period, these
sectors employed roughly 91 percent of all workers in the United States and constituted approximately 95 percent of the country’s total GDP. We attempted to capture as much of the labor market and state and national GDP as possible while also keeping our listed narrowed on the most critical sectors for analysis. Below, we will provide descriptions of the chosen sectors and explain which industries are included in each one.

NAICS groups all agricultural activity together into a sector officially called “Agriculture, Forestry, Fishing, and Hunting”. Agriculture is commonly argued to be one of Florida’s most important industries. The state is one of the largest citrus producers in the world and has a climate favorable for growing many other types of crops as well. The two-digit code for this sector is 11, which means that all NAICS codes for the subsectors, industry groups, and industries in this sector will begin with these two digits. The establishments in this sector are generally engaged in growing crops, harvesting timber, raising animals, and harvesting fish or other animals from farms or their natural habitats. Establishments in this sector include farms, dairies, ranches, orchards, greenhouses, and nurseries. Two overall activities are distinguished by this sector: agricultural production and agricultural support activities, which include establishments that perform activities associated with farm operation. For example, soil preparation, planting, or harvesting would fall under agricultural support activities. It is critical that we also underline establishments that do not fall under the umbrella of this sector as well. Establishments that are engaged in agricultural research and establishments that administer programs for the regulation and conservation of land, mineral, wildlife, and forest use are not included in the Agriculture, Forestry, Fishing, and Hunting sector (NAICS Manual, 21).

Construction is another sector that is believed to be a critical component of the Florida economy due to its inclusion of residential housing construction. Florida is a state famous for its ability to attract people from all over the country and the world, and the success of its housing market has reflected this. When considering the constant need for new homes and buildings and greater infrastructure investment, it is preliminarily believable that Construction would play an important role in driving the growth of the Florida economy.
The two-digit code for the Construction sector is 23, meaning all establishments that fall under it will have NAICS codes beginning with 23. Establishments within this sector include those primarily engaged in the construction of building or engineering projects, those that engage in the preparation of sites for new construction, and those that primarily engage in subdividing land for sale as building sites. This sector is divided into three subsectors that highlight the great degree of variation in the skills, equipment, and knowledge that fall under the Construction sector. These subsectors are Construction of Buildings, Heavy and Civil Engineering Construction, and Specialty Trade Contractors. While the subsectors Construction of Buildings and Heavy and Civil Engineering Construction may be self-explanatory, the Specialty Trade Contractors subsector is not obvious in its definition.

Establishments in the Specialty Trade Contractors subsector are primarily engaged in activities to produce a specific component of a construction project, such as masonry, painting, or electrical work. One important exclusion to note in this sector is the installation, repair, and maintenance of telecommunications or utility networks, unless such work is completed by an independent contractor. In all other cases the work falls under telecommunications or utility activities. This sector also excludes force account construction, which occurs when the employees of an enterprise that is not primarily engaged in construction are used for construction work for the enterprise (NAICS Manual, 123).

While Florida is not typically thought of as a state that relies on manufacturing, this sector is still critical to analyze, and it may have a larger impact than it appears. About 4 percent of Florida workers have jobs in Manufacturing and the sector contributes about 5 percent to the state’s total GDP. The sector may be small, but its overall influence may be larger than expected, which is why it should be included in this analysis.

The sector’s two-digit numerical codes range from 31-33. Manufacturing establishments are engaged in the chemical, mechanical, or physical transformation of materials or components into new and different products. Manufacturing includes establishments such as plants, mills, or factories, but this sector also includes establishments that convert materials or substances in the same premises from which they are sold. In this respect, bakeries, candy stores, tailors, and other
such establishments would be included in the Manufacturing sector. Virtually all manufacturing will have some captive administrative or research and development operations. These operations will be classified under the Manufacturing sector as long as they are not performed by separate establishments. Manufacturing in NAICS does not include logging, beneficiating ores or other materials, packaging or bottling products, or printing information (NAICS Manual, 143-144).

The grouping that we will refer to as Trade, Transportation, and Utilities is composed of multiple NAICS sectors. These NAICS sectors are Utilities, Wholesale Trade, Retail Trade, and Transportation and Warehousing. This grouping of sectors is used by the Bureau of Labor Statistics (BLS) and we believe it will help us reduce the complexity of the model we are using for analysis while not losing any significant information about critical sectors. The establishments that occupy the Utilities sector are those that engage in the provision of electric power, natural gas, steam supply, water supply, and sewage removal. This sector does not include waste management services. NAICS codes for those industries and establishments in the Utilities sector will begin with the number 22 (NAICS Manual, 119).

The two-digit NAICS code for the Wholesale Trade sector is 42. This sector’s establishments engage in the wholesaling of merchandise that can include the outputs of agriculture, mining, manufacturing, and information industries. There are two main types of wholesalers in this sector: those that sell goods on their own account and brokers or agents that arrange sales and purchases for others for a fee. Wholesaling generally implies the sale of a large quantity of goods, but single unit purchases of capital or durable non-consumer goods used for production are also included in this sector (NAICS Manual, 313).

All NAICS codes for those establishments that fall within the Retail Trade sector will begin with either the number 44 or the number 45. The establishments in this sector engage in retailing merchandise, usually without performing any alterations, and rendering services incidental to the sale of this merchandise. Retailers in this sector are split into two main groups: store retailers that operate at a fixed point of sale and non-store retailers that sell from portable stalls, online, by phone, or through other non-traditional methods (NAICS Manual, 345).
The final sector in this grouping is the Transportation and Warehousing sector, which has two two-digit NAICS codes: 48 and 49. This sector includes industries that provide transportation to both passengers and cargo, warehousing and storage of goods, and scenic and sightseeing transportation. The modes of transportation are water, road, rail, air, and pipeline. The sector also includes the support activities that are related to these various modes of transportation. Three main types of activities are outlined in this Transportation and Warehousing: subsectors for different modes of transportation, a warehousing and storage subsector, and a subsector that contains the establishments providing support activities. In an important distinction from the Wholesale Trade sector, warehousing establishments in Transportation and Warehousing simply store goods without involvement in selling them. This sector also excludes establishments that primarily provide travel agent services and establishments that engage in leasing transportation equipment without an operator (NAICS Manual, 379).

The Information sector comprises a small part of both the Florida and United States economies, but it is still worth analyzing how this sector that is made up of virtually all media sources affects the economy. This sector’s two-digit NAICS code is 51. Establishments in the Information sector are primarily engaged in producing and distributing information and cultural products, providing the means to transmit or distribute these products (as well as data and communications), and processing data. This sector includes publishing industries, movie and sound recording industries, broadcasting and telecommunications industries, as well as online search engines and data processing industries. The Information sector is unique amongst other NAICS sectors the value of the informational and cultural products is somewhat intangible and the reproduction of these products is often protected through copyright law. In any case, this sector may not contribute as much to GDP or employment as other sectors, but its general influence is undeniable due to the fact that most media and entertainment originates in this sector (NAICS Manual, 409).

The next grouping of sectors that we will refer to as Financial Activities contains two different NAICS sectors: (1) Finance and Insurance and (2) Real Estate and Rental and Leasing. This is another grouping that is used by the BLS and other U.S. statistical agencies to aggregate employment numbers. The two-digit NAICS codes for Finance and Insurance and Real Estate,
Rental, and Leasing are 52 and 53 respectively. The Finance and Insurance sector contains establishments that are primarily engaged in financial transactions or engaged in the facilitation of financial transactions.

There are three major types of activities defined in this sector. The first is financial intermediation, which involves raising funds through the acceptance of deposits or issuance of securities and incurring liabilities. The funds that are raised are then used to acquire financial assets. The second activity involves underwriting insurance and annuities in order to pool risk. These establishments collect fees or insurance premiums that vary based on expected risk and expected return on investment. The final activity simply involves the provision of specialized services to facilitate or support financial intermediation, insurance, or employment benefit programs. Monetary authorities charged with monetary control are also included in this sector (NAICS Manual, 429).

The establishments in the Real Estate and Rental and Leasing sector engage in two primary activities. There are those that rent, lease, or otherwise allow the use of tangible or intangible assets and there are those that manage, sell, buy, rent, or appraise real estate for others. The three main industry types in this sector are real estate lessors, equipment lessors, and the lessors of intangible assets that are not financial or copyrighted. Excluded from Real Estate and Rental and Leasing is the leasing of equipment with an equipment operator; these types of leases can be attributed to industries across many different NAICS sectors depending on the type of equipment (NAICS Manual, 449).

The third grouping of sectors we will use in our analysis will be referred to as the Professional and Business Services sector. This grouping is also used by the BLS and contains three different NAICS sectors that are closely related to one another. These sectors are (1) Professional, Scientific, and Technical Services, (2) Management of Companies and Enterprises, and (3) Administrative and Support and Waste Management and Remediation. The two-digit NAICS codes for these sectors are 54, 55, and 56 respectively.
The Professional, Scientific, and Technical Services sector is made up of establishments that specialize in performing professional, scientific, and technical activities for others. These establishments engage in services that require a high degree of training and expertise. Such services include legal representation, architectural design, computer and software design, accounting, and many others (NAICS Manual, 469).

Within the Management of Companies and Enterprises sector, there are two main types of establishments: (1) those that hold the securities of a company in order to hold a controlling interest or influence management decisions and (2) those that administer or oversee the establishments of an enterprise and normally take on a decision-making role. Government establishments that take on a similar role to establishments in this sector are excluded from this sector and instead classified in the Public Administration sector (NAICS Manual, 485).

The establishments in the Administrative and Support and Waste Management and Remediation sector generally perform the day-to-day support activities needed for the operation of other establishments. Some examples of services these establishments provide include office administration, hiring of new employees, clerical services, cleaning, and waste disposal. These activities may be performed by contractors or they may be carried out by establishments within a particular company (NAICS Manual, 489).

Due to the relatively high proportion of elderly individuals in the state, health care is expected to be a large and important part of the Florida economy. Florida’s population of those 65 years of age or older comprises about 20 percent of the state’s total population, while this group only makes up approximately 15 percent of the total population in the United States (QuickFacts, 2017). This significant difference may result in finding that health care is more important in Florida than in the rest of the country. The NAICS sector we will use to analyze health care is called Health Care and Social Assistance and has the two-digit code of 62. As is apparent by the its title, this sector is comprised of establishments that provide individuals with health care and social assistance, and it does not attempt to split the two activities because of the ill-defined boundary between them. Important exclusions from this sector include establishments that provide aerobic classes and non-medical diet and weight reducing centers. They may sometimes be viewed as
health services, but they are generally not delivered by health care practitioners (NAICS Manual, 523).

The fourth and final grouping of sectors we will use in our analysis will be referred to as the Leisure and Hospitality sector. As with the previous three groups, this grouping of sectors is also used by the BLS. Florida is a state known for its ability to attract millions of people from around the country and the world. Just as it is believed that this ability to attract people provides a boost to the state’s housing market and housing construction, many think that it also provides a significant boost to the Florida economy through its effect on tourism. Though the effect of tourism on employment and GDP is difficult to capture with complete accuracy, we can attempt to measure it by using industries that rely heavily on tourism as proxies. In the following analysis, the two sectors in the Leisure and Hospitality grouping will be used as a proxy to measure the effect of tourism on the Florida and U.S. economies. The two sectors are (1) Art, Entertainment, and Recreation and (2) Accommodation and Food Services, which have the two-digit NAICS codes of 71 and 72 respectively.

Establishments in the Art, Entertainment, and Recreation sector provide services or operate facilities to meet the various entertainment and recreational interests of their customers. There are three main types of establishments in this sector: (1) establishments that produce, promote, or participate in live performances or events for public viewing, (2) establishments that preserve and exhibit items of historical or educational interest, and (3) establishments that operate facilities or provide services that allow patrons to engage in recreational activities or pursue amusement (NAICS Manual, 543). Because these types of establishments tend to attract tourists and become dependent on tourism, this sector should prove to be a good proxy for tourism.

The Accommodation and Food Services sector also caters heavily to tourists. Establishments in this sector provide lodging and preparation of meals, snacks, or beverages for immediate consumption (info from Manual p. 557). Importantly, this does not include the preparation of frozen foods or food that will be preserved. Hotels, restaurants, and other food and lodging providers cater heavily to tourists, which is why it makes sense to group this sector with
the Art, Entertainment, and Recreation sector in order to measure the effects and contributions of tourism.

The final sector to be included in our analysis will likely have little to do with driving the economy and economic growth, but it still represents a large proportion of the economy and employs many people. This sector is Public Administration, or Government, and its two-digit NAICS code is 92. The establishments of this sector consist of federal, state, and local government agencies that regulate, oversee, and administer public programs. Government-owned establishments that produce goods and provide services equivalent to private sector goods and services are classified in the same industry and sector as private establishments engaged in similar activities. Some government-owned establishments that are placed into other sectors include schools, hospitals, and utility operation establishments.

2.4 SEASONALLY ADJUSTED VS. NOT SEASONALLY ADJUSTED DATA

Prior to proceeding with the analysis, we conceptually explored whether seasonally adjusted or not seasonally adjusted would be preferred and contemplated which would prove to be most beneficial to the purposes of this report. Because we would be performing a vector autoregression in order to then perform a forecast error variance decomposition, a lack of seasonality would prove to be crucial. Sectors that exhibit substantial seasonality could potentially be misinterpreted as being highly correlated with one another and highly affecting to other sectors. In order to avoid this, we utilized seasonally adjusted data to find the most accurate effects of a shock to one sector on other surrounding sectors.

After discussing, we decided to run a generalized vector autoregression (gVAR), to be discussed further in the next section, using Florida year-over-year job growth by sector with both seasonally adjusted and not seasonally adjusted data for comparison purposes. Looking at the average spillover table, shown in Appendix A, we see that when the data is deseasonalized the average interconnectedness within the whole economy over the entire dataset dropped around 20 percent.
For various additional reasons that will be discussed more in detail in the analysis portion of this report, we concluded that the seasonally adjusted data gave us the most accurate results for our purposes and we used that for the rest of our report. We were able to find seasonally adjusted data from as previously discussed for all the sectors except agriculture. We deseasonalized the Florida agriculture employment data by using the X13 package in R, shown in Appendix B.

2.5 EVALUATING INFLUENCE

VECTOR AUTOREGRESSION

While it is useful to look at summary statistics and growth trends for each sector in discussing the importance of each to the economy, this is just one perspective. For example, one sector may comprise a large proportion of Florida’s GDP and therefore be comparatively important in that facet, but shocks to that sector, both good and bad, may not affect other sectors in the economy. It is important to not only understand the size of each sector, but also its interconnectedness or “multiplier effect” so that any investment in these sectors can have a significant affect through time and on the economy as a whole.

For the influence portion of this report, we are interested in exploring how fluctuations in each sector during a specified time period affect itself and other sectors during later time periods. We decided that a generalized vector autoregression (gVAR) would be the best model for exploring this. With a vector autoregression, a system of equations is produced where each variable (here, a sector) is a function of lagged values of itself and lagged values of the other variables (other sectors included).

As this report is aiming to reveal the key sectors in the economy in an unbiased and a-theoretical way, a model that is invariant to variable ordering was crucial. That is to say that we would need a version of the vector autoregression model that would not have varying results depending upon the way we chose to order our variables in inputting them into the regression. A standard vector autoregression is dependent on variable ordering; when specifying the model one
must first make certain economic assumptions as to severity of affectation each variable (or sector) on the others. Because of this, we used the generalized vector autoregression model discovered by Diebold and Yilmaz. The use of the generalized VAR model allows us to prohibit preconceived notions from affecting our results.

The code utilized for the purposes of the gVAR can be found in Appendix C along with a brief explanation for how we smoothed our data using a three-month moving average in order to achieve the most accurate results.

FORECAST ERROR VARIANCE DECOMPOSITION

We retrieve the results of the forecast error variance decomposition (FEVD) once we run the vector autoregression model; these results comprise the spillover table. The FEVD shows the amount of movement in each variable is due to exogenous shocks to other variables. Future reference of this idea will be described as a “spillover effect,” as the fluctuations in a single sector can be observed to “spillover” into the other sectors at varying degrees. For a visual representation, explanation, and example of a spillover table with explanations of each cell, see Appendix D.

ROLLING WINDOW

In order to get a better idea of where the economy stands today, how it has evolved over time, and potentially the trend it may follow in the future we must perform forecast error variance decompositions at specific points in time. When conducting the rolling window, a gVAR is performed over several “windows” containing 10 years of data. The first bucket begins with the first data point of the data series and extends out 10 years from that point. The number of observations included in the regression is dependent upon the frequency of the data (quarterly or annually). Once the first window is captured and regressed, a spillover table is produced with the regression results, the dataset jumps forward one observation point and performs a new regression of the new window of 10 years. What results from this is a scrolling series of snapshots whereby each regression has all but one observation point in common. This may seem
tedious, but once completed, we are able to pull data exhibiting the way the full interconnectedness of the economy has changed over time. We are also able to then retrieve specific spillover tables from various points in time to examine specifically which sectors were driving the economy during that time. For our purposes, we elected to retrieve the distinct spillover tables representing our first window from 2000, the pre-Great Recession economy of 2003, the Great Recession economy of 2009, and the most recent window from 2017.

3 EXAMINING SHARE AND GROWTH

Examining how the sectors have changed over time in terms of GDP and employment growth rates, size of employment share, and in GDP contributions will allow us to create a more comprehensive picture of the Florida economy. It is critical to understand where the economy currently stands and which sectors are most important to its growth using the most recently available data. Looking also at changes over time may provide insight into how the sectors will behave in the future. In this section, we will analyze the Florida economy using a simpler methodology and will compare the state against the nation as a whole to provide additional context to significant changes we may see in Florida’s economy. Such comparisons provide us a tool to see if the changes and growth we see in Florida match national trends or if the state’s economy is evolving in a more unique way. This analysis may also help us determine which sectors are key drivers in the economy and should therefore be promoted, protected, subsidized, or otherwise supported.

3.1 CONSTRUCTION

The Construction sector is believed to be one of the most critical to the Florida economy as it encompasses not only the construction of infrastructure and commercial buildings but also residential construction. Florida is widely known to have a strong housing market and the state is a lucrative place to live, but this perception does not necessarily mean that Construction is one of
the sectors that drives growth in the Florida economy. In order to determine the importance of Construction we can analyze its share of employment and employment growth and how these compare against its share of GDP and its GDP growth.

Figure 3: Construction Employment


In Figure 3, we can see the year-over-year growth rate of the Construction sector in both Florida and the United States. The gray bars in this graph and the following graphs represent recessions. The growth rates at the state and national level were roughly similar up until the decline that began prior to the recession that began in March 2001 and ended in November of the same year. While both U.S. and Florida growth rates decline at this time, Florida’s growth manages to remain consistently above the U.S. growth rate and remains slightly positive through this period of decline. Florida’s Construction growth remains above U.S. growth up until the decline that began prior to the Great Recession. In the case of both recessions, we can see that
Construction growth slows noticeably prior to the official start of a recession. In the case of the Great Recession, the sector’s growth in Florida and the country took a sharp decline and even became negative prior to the start of the recession. By the time the recession started in December of 2007, Florida’s Construction sector had already shed over 13 percent of its employees compared to one year before. Once the recession begins, the state continues to lose Construction jobs, with the trough occurring in September 2009, which had approximately -24.3 percent year-over-year growth. While this graph tells us little about the effect of Construction on the Florida economy, it demonstrates that periods of growth in Construction generally tend to be stronger in Florida compared to the nation. It also shows that although the housing market crash had an immense effect on Construction all over the country, the crash was felt even more strongly in Florida.

Figure 4: Construction and Overall Florida Employment

Figure 4 demonstrates Florida’s overall employment growth against employment growth in the Construction sector. Here it is important to note that this is the employment growth rate of all jobs in Florida, including those outside our ten selected sectors. At the start of our data we see that Construction growth and overall growth are rising after a recession and grow at a similar rate up until the start of the 2001 recession. From January 1991 to February 2001, overall employment grew at an average of about 2.8 percent while Construction employment grew slightly slower at 2.4 percent on average. We can see a larger divergence in growth rates between the 2001 recession and the Great Recession; between these two periods Construction had much stronger average growth of about 4.2 percent, while overall employment only grew at 1.93 percent on average. This is despite the Construction sector taking heavy losses prior to the start of the recession. Construction also had stronger growth after the recession. The sector’s employment grew at approximately 1.78 percent on average compared to an average growth of 1.69 percent in overall employment. When we exclude recessions, the Construction sector’s year-over-year growth averaged 2.64 percent while overall employment averaged 2.2 percent growth over the analysis period. This may not seem like a large difference, but it represents a sector growing at a rate 20 percent higher than that of the overall economy. Construction growth and overall employment growth also have a relatively strong correlation coefficient of 0.92. A correlation this strong between the two growth rates over a nearly 30-year period suggests that Construction and overall employment growth will continue to move similarly in the future. However, even with all this in mind, it is difficult to draw any concrete conclusions about Construction as a key driver of the economy. We cannot say with certainty whether the economy is doing well or poorly because of Construction or whether Construction is growing well or poorly because of the overall economy.
While its growth is significantly stronger than that of overall employment, we can see in Figure 5 that Construction is a relatively small piece of total employment, never employing more than 9 percent of workers over the analysis period. It has also failed to recover and attain the share of total employment it had prior to the recession. At its peak, the sector employed roughly 8.5 percent of Florida’s workers, but that number has fallen to less than 6 percent today. Although the sector has grown faster than overall employment outside of recessions, its losses during recessions have been the reason its share of employment has not increased since 1990. Construction in Florida has consistently employed a larger share of workers than Construction in the nation since 1990, however the gap narrowed significantly after the housing market crash. Though the sector’s growth has been slightly above average since the recession and its share of employment is increasing, it is difficult to classify it as a current driver of the economy. There is no doubt that Construction was driving growth heavily prior to the Great Recession, but until it returns to shares of those levels and such high growth rates, we cannot classify it as a driver.
In order to paint a more complete picture of the Construction sector in Florida, we must look at its GDP contributions as well as its employment data. In Figure 6, we see that Florida’s and the nation’s Construction sectors have had wide fluctuations in year-over-year GDP growth. Despite these fluctuations, they appear to move together and we see a similar pattern to employment. Periods of growth in the sector tend to be stronger in Florida, while periods of decline are worse in the state. Both the state and the country saw their worst losses in this sector during the recession, but Florida’s losses were much more significant. In 2008, Florida’s Construction sector GDP growth fell to its lowest point, almost -22.5 percent growth from the previous year. At the national level, the lowest growth we see is only about -11.6 percent, or about half the worst loss that Florida sees. Again, we don’t learn very much about the relationship between the sector and the Florida economy from this graph, but it is important to note that the Construction sector seems to fluctuate more wildly in the state than it does on a national level. This could suggest that the sector’s growth is influenced more by the overall economic climate in Florida than in the nation.
In Figure 7, Florida’s year-over-year GDP growth is measured against the growth of the Construction sector in the state. Prior to the housing market crash, the Construction sector exhibited significantly higher growth than the overall economy, however, the overall economy grew faster in the seven years following that crash. As the economy recovered, so did the sector. Construction finally saw positive year-over-year GDP growth in 2014 after several years of losses. As we saw with employment, the sector’s GDP losses due to the crash and subsequent recession were much more severe than those faced by the overall economy. Overall growth and Construction growth have a relatively strong correlation coefficient of about 0.9. As we saw with employment, it appears that GDP growth in the sector is also highly correlated with the state’s overall growth. While this may suggest that Construction is a key driver, it is still too difficult to say which of the two is having a driving effect on the other. A strong overall economy may be contributing to strong Construction growth, or perhaps powerful Construction growth is driving solid growth in the overall economy. It is difficult to find out what is occurring from this simple analysis but using the gVAR will allow us to at least determine if Construction is having a strong effect on other sectors and in turn spurring economic growth.
The Construction sector’s share of Florida’s total GDP peaked at about 8.5 percent just as it did with employment. Figure 8 shows this similarity and others between GDP and employment. While the sector has consistently contributed a larger share of GDP in Florida than in the country, we see that the gap has shrunk since the housing market crash and the Great Recession. The graph also demonstrates how the sector has failed to fully recover from the crash in terms of share of GDP; it currently only contributes approximately 5.3 percent to Florida’s GDP. Although the relative share of GDP that Construction contributes is small, its employment and GDP growth are highly correlated with that of the state overall. In Florida, the sector also contributes a larger share to overall employment and GDP than in the nation. Despite growing GDP share and above average growth since the recession, the sector remains too small in terms of GDP and employment share to be classified as a driver. Smaller sectors tend to grow faster than larger ones, and this is what we are seeing in the Construction sector. If the sector is able to maintain the stable growth it has seen in the past seven years and it continues to increase its employment and GDP shares, we will definitely be able to consider it a driver.
3.2 MANUFACTURING

While the manufacturing sector is not generally considered to be critical to the Florida economy as it is in places such as Michigan, Ohio, and Pennsylvania, it is important to analyze the sector. Its historical importance to the country makes it worth analyzing and we must also determine if the perception of this sector in Florida is based in any truth.

![Figure 9: Manufacturing Employment](chart)


Figure 9 above plots the year-over-year growth rates of the Manufacturing sectors in Florida and the U.S. While there are some periods of positive growth in the sector, the first thing that we can see from this graph is that Manufacturing has had many periods of low or negative growth both in the state and the country. Prior to 2000, it seems that while the sector grew in the entire country, it shrunk in the state and vice versa. This pattern changes in 1999 when the growth rates appear begin following a more similar pattern to one another. We can see, however,
that in the nation, the sector never really recovered from the 2001 recession. Its growth remained either negative or near zero from 2001 until around 2011, when it finally saw some periods of growth in the U.S. In Florida, the Manufacturing sector did manage to grow positively between the two recessions, but it was a short period of growth between periods of heavy losses in employment. Since beginning to grow again after the Great Recession, it seems that Manufacturing has managed continuous growth through 2017. While this sustained growth is a good sign for the sector, the national and state trends have shown a long and steady decline in the sector that is likely to hold.

**Figure 10: Manufacturing and Overall Florida Employment**

In order to understand how employment in Florida’s Manufacturing sector measures against overall employment in the state, we can measure their growth rates against one another. In Figure 10, we can see that the Manufacturing sector has consistently grown at a lower rate than the overall Florida economy. When we exclude recessions over the analysis period, Florida employment grows at an average rate of 2.2 percent while Manufacturing actually has a negative average growth rate of -0.55 percent. Up until the recovery that occurs after the Great Recession, the sector’s employment never grows faster than overall employment. Even with this in consideration, the average growth rate of overall employment in the period following recession is over two times higher than the average growth rate of Manufacturing (1.68 percent to 0.64 percent). The two growth rates are relatively highly correlated with a correlation coefficient of 0.87, but this correlation is weaker than the one witnessed with the Construction sector. With this employment data in mind, it seems clear that Manufacturing is not driving the Florida economy and in fact, the state has been moving away from this sector since 1991.

**Figure 11: Manufacturing Share of Total Employment**

Examining how the Manufacturing sector’s share of total employment has changed over time adds more evidence of decline on both the state level and the national level. We see this evidence in Figure 11. In the U.S., the share of Manufacturing employment has nearly halved since 1990, going from 16.1 percent of employment to 8.4 percent. In Florida, the numbers are no better. Since 1990, the sector has gone from employing 9.5 percent of employees in the state to just 4.2 percent. When examining these trends, there seems to be no evidence that Manufacturing is a key sector or a driving sector in the Florida economy. Though the sector has continued losing its share of employees and has seen many periods of negative year-over-year growth, the Florida economy has continued to grow at a strong pace.

One interesting thing to note is that the sector’s share of employment has remained steady at about 4.2 percent since the end of the recession. Seven years at this same share of employment may mean that the Manufacturing sector’s share has bottomed out, and it may continue to grow enough to sustain this share of employment and prevent further decline. The sector’s low share of employment and employment growth consistently below that of the state indicates that it is not likely a driving sector of the economy in terms of employment.
From an employment perspective, Manufacturing appears to be in steady decline with very few periods of growth. Despite this, the sector’s GDP contributions tell a completely different story. The steady decline of Manufacturing employment is not matched by a steady decline in its GDP contributions at either the state or the national level. In the 20 years of data available, the sector only had four years of negative year-over-year growth at the national level and only five years of negative growth at the state level. As we can see from Figure 12, these dips seem to be caused by recessions and not by some overall trend against the sector. With the employment data, we saw that Manufacturing had persistent low or negative growth, regardless of the economic climate. The GDP data shows that the sector is still growing well in periods of overall economic growth at both the state and national levels.
Although the Manufacturing sector’s GDP growth in Florida has been strong relative to its employment growth, this growth isn’t very impressive compared to the state’s overall GDP growth. If we exclude years with recessions between 1998 and 2017, Manufacturing GDP grew at roughly 4.1 percent on average while Florida GDP grew at a rate of about 5.5 percent on average. In Figure 13, we can see that the growth rates move relatively independently of each other. The correlation coefficient of about 0.6 further demonstrates that there is not an overly strong relationship between Manufacturing growth and overall growth. Though it is true that the sector has grown at a slower pace over the entire period, Manufacturing has actually grown faster than Florida’s overall growth since 2010. The sector has grown at about 4.2 percent on average and Florida GDP has grown at approximately 3.7 percent on average in this period. It remains to be seen whether this strong, above average growth will continue over time or if Florida’s growth will return to previous levels that will allow its GDP to increase faster than that of the Manufacturing sector.
From 1990 to 2017, we saw a steep drop in the share of Manufacturing employment with the sector currently employing about half the share of total workers it did in 1990 in Florida and the U.S. Though the sector has seen solid average growth from 1997 to 2017, it has not grown fast enough to maintain its share of GDP contributions. The decline in GDP share has not been nearly as severe as the decline in employment, but we can see in Figure 14 that the sector has seen a steady decline at the national level and a slower decline at the state level. The interesting thing about this graph is that it seems to show that while Manufacturing has seen a relative decline since 1997, the share of GDP seems to be holding nearly level in Florida. For the past 15 years, the sector has hovered around a GDP contribution of approximately 5 percent. While this percentage has wavered slightly from year to year, it hasn’t seen significant changed since 2002. This may provide additional evidence that the Manufacturing sector has bottomed out in terms of GDP share, just as it may have done in employment share. The sector appears to have grown
steadily and strongly enough to maintain the same share of GDP over the past decade and a half. This analysis of the sector does not seem to indicate that Manufacturing would be a driving force in the Florida economy due to its overall trend of below average growth and its small GDP share.

3.3 TRADE, TRANSPORTATION, AND UTILITIES

The Trade, Transportation, and Utilities sector is the largest sector in our analysis in terms of employment. It employs approximately 20 percent of all workers in Florida and the U.S. The vast majority of the jobs in this grouping are in retail and wholesale trade. This enormous sector is not one that is traditionally thought about when considering an economy’s key sectors, but its size should be expected as it includes all those who work in retail stores and those that operate in wholesale trade as well. The growth and variations in this sector are likely to correlate strongly with that of the overall economy due to its sheer size.
The sector’s growth rates over time in Florida and the U.S. have been similar since 1991, with the sector having a tendency to grow slightly faster at the state level than the national level outside economic downturns. The Florida and U.S. growth rates are plotted in Figure 15 above. As we observed with the Manufacturing and Construction sectors, the Trade, Transportation, and Utilities sector suffered more in Florida than the country during the Great Recession. Overall the two growth rates do not differ significantly from each other and both demonstrate that the sector has generally enjoyed consistent positive growth outside of economic downturns.
In Figure 16 above, we see the year-over-year growth rate of the Trade, Transportation, and Utilities sector compared against that of Florida. As expected the two match each other very closely and share a very high correlation coefficient of 0.95. With a correlation this high over such a long period, we can say with some certainty that these growth rates will probably continue to move together in the future. This is to be expected though as trade, which makes up the largest portion of the sector, is always going to be heavily dependent on the health and growth of the overall economy. As long as others in the economy continue to make and spend money during period of economic growth, trade is expected to flourish and grow with the economy. When there is a downturn or recession, trade also falls due to the lack of disposable income. Despite this high correlation, the Trade, Transportation, and Utilities sector has shown below average employment growth through time and since the Great Recession. It’s average growth since the
end of the last recession was 1.5 percent compared to about 1.7 percent average growth for overall Florida employment.

**Figure 17: Trade, Transportation, and Utilities Share of Total Employment**

The preceding graph in Figure 17 illustrates the Trade, Transportation, and Utilities sector’s share of total employment in Florida and the U.S. The sector’s activity in Florida seems to be following the national trend, but the state does employ relatively more people than on the national level. There has been relatively little movement at both levels, with each showing a slow decline, yet still employing about one fifth of all workers. The sector’s share of employment is on the decline, but it remains the largest employment sector in the economy. Though this makes the sector critical to the state economy, its below average growth seems to suggest that the sector’s importance is on the decline. Despite this, as long as it employs about one-fifth of workers we cannot discount it as a driver.
The Trade, Transportation, and Utilities sector has enjoyed strong GDP growth since 1997 at both the state and national levels. In Figure 18 above, we can see that there have been very few periods of negative growth in the sector in Florida and the U.S. The sector only sees one period of negative year-over-year growth in the nation in 2009. In Florida, there are only two periods of negative growth over the 20-year period, and both occurred during the Great Recession. While employment growth for the sector dropped to nearly -8 percent in the state during the recession, the worst losses by its GDP growth were only about -4 percent. GDP growth losses for the sector on the national level were also better for the sector than employment losses. In any case, it is clear that GDP growth quickly recovered for the sector once the recession ended. Trade, Transportation, and Utilities saw positive growth starting in 2010, which is an interesting contrast from both the Construction and Manufacturing sectors. The other sectors took significantly more time to return to positive growth after taking heavy losses in the recession.
Similarly to employment, we can see in the preceding graph in Figure 19 that the Trade, Transportation, and Utilities sector’s GDP growth follows Florida’s GDP growth relatively closely. While the correlation coefficient is 0.86, which is weaker than that of the employment growth rates, it is still a strong correlation. As previously stated, it seems that the sector is particularly susceptible to recessions when compared against the overall economy. When we look at the effect of the 2001 recession on both growth rates, we see the Florida rate decline very slightly but it remains stable and strongly positive at about 6 percent growth. Despite this, we see the growth rate of the sector drop significantly during the downturn, with its year-over-year growth slipping under 2 percent in 2002 from about 6 percent in 2000. The growth remains positive during, but we can see that the recession had a significantly higher effect on Trade, Transportation, and Utilities than it did on the overall Florida economy. When we exclude years with recessions, Florida’s GDP has grown slightly faster at a 5.5 percent average year-over-year growth rate compared to the sector’s 5.2 percent average. Despite this, since 2010 the sector has actually had a slightly higher growth rate of 3.9 percent compared to the state’s 3.7 percent.
Figure 20: Trade, Transportation, and Utilities Share of Total GDP

![Graph showing the share of total GDP contributed by the Trade, Transportation, and Utilities sector from 1997 to 2017 for Florida and the US. The graph indicates a overall trend of a slowly decreasing share of employment by the sector, which crosses over into GDP contributions as well.](https://www.bea.gov/)

Data Source: https://www.bea.gov/

It seems from Figure 20 that the overall trend of a slowly decreasing share of employment by the Trade, Transportation, and Utilities sector crosses over into GDP contributions as well. Though the sector’s share of GDP has declined in the past 20 years, the fall has been very slow and inconsistent. In Florida, it employs roughly 19 percent of workers, which is only down 2 percent from 1997. At the national level the Trade, Transportation, and Utilities GDP share has also only dropped about 2 percent from approximately 18 percent to 16 percent since 1997. While the sector has grown faster on average than Florida GDP since the end of the most recent recession, it appears in Figure 19 that Florida’s growth has again overtaken the sector’s growth which may indicate that its slow decline in GDP share will continue. The Trade, Transportation, and Utilities sector has shown above-average growth since the recession and though its share of GDP is declining, it is still nearly one-fifth of total GDP. This combined with our analysis of the sector’s employment suggests that it is currently a driver of the Florida economy.
3.4 INFORMATION

Establishments in the Information sector generally produce informational or cultural products or provide the means to distribute or transmit these products. While the United States as a whole is known for its cultural dominance and cultural exports, the state of Florida is not as heavily involved in this sector as a state like California, for example. Though this may be true, it is still important to analyze this sector as it still employs a notable amount of workers and makes significant contributions to GDP.

In Figure 21, we see the Information sector’s year-over-year growth rate in employment in Florida measured against its growth in the U.S. Prior to the 2001 recession, the sector was growing strongly, with the Florida rate even reaching over 10 percent growth in early 1999. Once the recession begins in 2001, the sector drops steeply in both the state and nation and fails...
to truly recover from this drop off. The growth rates in both the state and nation remain negative or near zero from 2001 to about 2013. Even though there has been some growth in the past four years, it has been very modest. Similar to the Trade, Transportation, and Utilities sector, the Information sector’s growth rate in Florida follows the national trend closely. The two growth rates share a strong correlation coefficient of 0.9 over the analysis period.

![Figure 22: Information and Overall Florida Employment](image)


While the state and national Information growth trends seem to follow each other closely, this does not hold true between the sector’s state growth and the overall employment growth in Florida. The correlation coefficient between the sector’s growth in the state and the state’s overall growth is just 0.69. This isn’t an overly weak correlation, but it isn’t a strong correlation between the two. Though it is difficult to tell from Figure 22, there is actually a rather large disparity in average growth rates between Florida GDP and the Information sector’s GDP. When
we exclude recessions from the analysis period, Florida’s average year-over-year growth stands at 2.2 percent while the sector’s average is just 0.66 percent. The sector did grow faster on prior to the 2001 recession, with an average growth rate of 3.7 percent to Florida’s 2.8 percent in the period. However, between the 2001 and Great Recession and since the end of the Great recession, Information has averaged negative year-over-year growth in employment.

![Figure 23: Information Share of Total Employment](image)

The Information sector’s share of total employment in the U.S. and Florida is shown in the following graph. From Figure 23, we can see that Information has never employed a very large share of workers in the state or the nation. The sector’s share of employment peaks at under 3 percent at both levels and has been declining steadily since the start of the 2001 recession. We can see that Florida has consistently employed relatively less people in the sector than the U.S. and the gap has widened somewhat in recent years. Currently the sector only employs about 1.5 percent of workers in Florida and almost 2 percent of workers in the U.S. Due to the persistent
decline in the Information sector’s share of employment, its lack of positive average growth over the past years, and its lack of correlation with overall employment growth, we believe that the sector is not a driving force in the Florida economy from an employment perspective.

**Figure 24: Information GDP**

![Graph showing year-over-year GDP growth rates in Florida and the US](https://www.bea.gov/)

Data Source: https://www.bea.gov/

Although the Information sector does not appear to be a driving sector from an employment perspective, its GDP may tell a different story. Figure 24 shows the sector’s year-over-year GDP growth rates in Florida and the U.S. There doesn’t seem to be as strong of a correlation on the state and national levels in GDP as there was in employment. The correlation coefficient of just 0.53 between these growth rates proves that to be true. Information seems to have had extremely high growth in Florida from 1997 to 1998 and while that growth did not last long at those levels, the sector managed to continue growing through the 2001 recession. This is a notable difference from the sharp decline we saw in employment due to the recession. Though
its GDP growth manages to remain positive longer, the sector again sees negative and low growth for an extended period in Florida from 2004 to 2013. In the past few years, it seems that the state and national growth rates have begun following one another more closely.

Figure 25: Information and Overall Florida GDP

![Graph showing the growth rate of Information and Total Florida GDP from 1998 to 2017.](https://www.bea.gov/)

Data Source: https://www.bea.gov/

We saw that Florida’s overall employment growth and the Information sector’s employment growth did not have a high correlation. When we examine GDP growth in Figure 25, we see a similar lack of strong correlation. The correlation coefficient between these two lines is just 0.36, much weaker than the correlation between the two employment lines and a weak correlation in general. The sector’s average GDP growth over this period is significantly larger than the growth seen in employment. Outside of years with recessions, Information’s year-over-year growth averaged 4.1 percent compared to Florida’s 5.5 percent. Despite this, that average is brought up significantly by the growth that occurs prior to the 2001 recession. Average growth prior to the recession was an extremely high 15.2 percent while the sector has only seen average growth between 1 percent and 2 percent since that time. In general,
Information has grown much more slowly than the Florida economy since booming in the late 1990s.

**Figure 26: Information Share of Total GDP**

![Graph showing the share of Information in Total GDP for Florida and the US, with a data source link to the BEA website.]

Data Source: https://www.bea.gov/

Though Information employs only about 1.5 percent of Florida’s workers, it appears to contribute over double that to the state’s GDP. Though its contribution is still relatively small, it is interesting that the sector contributes much more to GDP share than it does to employment share. We can also see that though it only currently contributes about 4 percent, its contributions reached nearly 6.5 percent in 2002. Also interesting is the relative volatility of the sector’s GDP share in Florida when compared against the much more stable share we see at the national level. Information has consistently made up about 4.5 percent to 5 percent of U.S. GDP over the time period while we see a much wider range in the sector’s Florida GDP share. A consistent decline in GDP share since 2002, below average growth for the past 15 years, and a weak correlation between overall GDP growth and sector GDP growth suggest that Information is not a driving
sector from a GDP perspective. This matches our finding from analyzing the sector’s employment.

3.5 FINANCIAL ACTIVITIES

The Financial Activities sector contains establishments involved in financial transactions, insurance, trading securities, real estate, renting, leasing, and many other such activities. Though not generally considered as critical in Florida, we believe that this is a misconception. It is true that Florida does hold many bank headquarters or a stock exchange, but it is one of the largest economies in the country and in the world. This simple fact necessitates a Financial Activities sector that is involved and there to handle all of the money flowing between entities in the state. The following analysis will seek to shed light on its importance to the state’s economy.

Figure 27: Financial Activities Employment

Over this period, one of the first things we can notice about the growth in employment of the Financial Activities sector in both Florida and the U.S. is that it grows at a relatively strong rate outside of the losses of the Great Recession. We can tell from Figure 27 that during the last recession, Florida took more relative losses than the U.S., but it seems that the sector has grown at a higher rate in the state over the periods outside of this dip. The sector has not seen any periods of extreme employment growth at either level. The strongest growth in Financial Activities seems to have occurred prior to the 2001 recession, but the sector also saw significant growth in Florida between the 2001 recession and Great Recession. In the years after the last recession, employment in the sector has grown at a more modest rate.

Figure 28 shows the year-over-year employment growth rate of the Financial Activities sector plotted against the overall employment growth rate in Florida. From this we can see just how closely the sector and state growth rates move together. The correlation coefficient between the two is very high at 0.93, demonstrating that these two growth rates have mimicked each other closely over a long period of time and will likely continue to do so. While the sector took relatively higher employment losses in the Great Recession, the difference is not great. In Figure 28, we also see that Financial Activities takes a slightly lesser hit to growth in 2001 compared to Florida overall. Over this entire period, the state employment growth rate and sector growth rate in the state have averaged a close growth rate outside when we exclude recessions. The average year-over-year growth of Financial Activities has been 2.1 percent and Florida’s overall growth rate has averaged 2.2 percent. While average overall growth has been higher throughout most of the analysis period, Financial Activities did grow at a slightly higher pace between the 2001 recession and Great Recession.

Figure 29: Financial Activities Share of Total Employment

As the Financial Activities sector in Florida has grown slightly slower than the overall employment growth rate over time, we would expect its share of employment to slowly decrease as well. In the preceding graph, we see this slow drop occur, though it seems that the decline is not a prevailing trend that has been occurring since the start of our analysis period. In fact, the Financial Activities sector’s share of employment increased slightly from 1990 to about 2006, and it has since been on the decline. Despite this, the change from 1990 to 2017 has been very minimal with the share remaining around 6.5 percent of workers in the Florida economy. This is higher than the national share of Financial activities workers which stood at 6 percent in 1990 but has fallen to approximately 5.7 percent in 2017. From an employment perspective, it is difficult to tell if the Financial Activities sector is a driver in the Florida economy. Its average growth has been only slightly lower over the analysis period and its share has declined very slightly as well, but the correlation between Financial Activities growth and Florida growth has remained strong. The GDP analysis may give more insight into the sector.

Figure 30: Financial Activities GDP

Data Source: https://www.bea.gov/
The Financial Activities sector in Florida has seen relatively significant growth compared to its performance in the U.S. The sector’s GDP contributions grew at a much higher rate from the 2001 recession up until the Great Recession, even hitting a year-over-year growth rate of higher than 15 percent in the period. While the Financial Activities sector’s U.S. growth bounced back relatively quickly after the last recession, it was hit harder and took a longer time to recover in the state. Since 2012, the sector has grown at a somewhat steady and similar rate at both the state and national levels.

Figure 31: Financial Activities and Overall Florida GDP

We can see from Figure 31 that the sector’s growth has followed that of the overall Florida GDP growth closely from 1998 to 2017. While it had grown slightly faster between the 2001 recession and Great Recession, growing at an average year-over-year growth rate of 8.5 percent to Florida’s 7.1 percent average in the period, the two rates have a closer average rate over the entire 20-year period. Florida has averaged 5.5 percent growth over the 20-year period outside of recession years while the Financial Activities sector’s growth is about 5.9 percent on
average. Beyond their similar growth rates, the correlation coefficient of approximately 0.89 
between the two growth rates is also strong.

![Figure 32: Financial Activities Share of Total GDP]

Data Source: https://www.bea.gov/

While the sector’s employment data and GDP growth rate may have hinted to the 
Financial Activities sector’s importance, the preceding graph in Figure 32 confirms it. While 
only employing approximately 6.5 percent of Florida’s workers, the Financial Activities sector 
currently contributes over 22 percent to the state’s GDP. This is not only a huge contribution and 
the largest among our sectors, but it is also very surprising given the share of employment. While 
the Trade, Transportation, and Utilities sector contributes a larger share of GDP as well, that 
sector’s employment share is about three times the size of the Financial Activities sector. It is 
also somewhat surprising that not only is the sector’s share of Florida’s GDP larger than its share 
in the nation, but the share has actually been growing for the past 20 years. At both the national 
and state levels, Financial Activities has grown about 2 percent in GDP share since 1997. The
sector manages to have the largest share of GDP while remaining in the bottom half of our ten sectors in terms of its share of workers. While the employment in the Financial Activities sector is somewhat steady and has not seen huge growth in recent years, it is clear from the sector’s GDP growth and GDP share that it is a driving sector in the Florida economy.

3.6 PROFESSIONAL AND BUSINESS SERVICES

The Professional and Business Services sector holds a wide range of establishments and employees. While those in this sector may hold jobs that require little training or education, such as waste management and basic administrative tasks, the sector also includes establishments that require the most technical training available and high degrees of education. Because many such establishments comprise this sector, we would expect it to grow significantly over time as the average education level in the state and country has increased dramatically over the past decades. The following analysis will examine whether that expectation has merit and if this sector is a driver of the Florida economy.
The preceding graph in Figure 33 plots the year-over-year growth of the Professional and Business Services sector in Florida and in the United States. From this graph we can see that growth in this sector really exploded in the 1990s in Florida while it remained somewhat steady at around 5 percent for the U.S. in the same period. Both growth rates took a steep drop during the 2001 recession and neither was able to recreate previously seen growth in the period between recessions, but the sector took longer to recover at the national level. During the Great Recession, the Professional and Business Services sector again saw a steep drop in growth and took relatively more losses at the state level. Since the end of the recession, growth has been more stable and has been at similar rates in Florida and the U.S.
Similarly to Figure 33, we see another large disparity between the sector’s growth rate and Florida’s overall employment growth rate in Figure 34 above. In the period before the 2001 recession, employment in the Professional and Business Services sector grows at a ridiculous average of 9.5 percent year-over-year growth compared to just 2.8 percent average growth for the state’s overall employment during the period. In the following years there is no longer such a drastic difference, but the sector’s growth remains significantly higher even since the end of the last recession. Since the end of the Great Recession, the Professional and Business Services sector has grown at an average rate of approximately 3 percent compared to about 1.7 percent employment growth in Florida. Though it seems like a small difference, the sector is growing roughly 76 percent faster than the state’s overall employment rate, which is clearly a significant difference.
As we would expect due to a growth rate that is well above the state average, the Professional and Business Services sector’s share of employment has grown significantly since 1990. At the start of this analysis period, the sector only employed about 10 percent of workers in the country and less than 7 percent of workers in Florida. From Figure 35, we can see that the share has not only more than doubled, but it has grown so fast that it has become a larger share of employment in Florida than in the U.S. This is despite the fact that the sector’s share of employment has been growing steadily on a national level as well as in the state. Should the trend continue, the sector will soon overtake the Trade, Transportation, and Utilities sector as the largest employment sector in Florida. Clearly something in the state drove enormous growth in the sector in the 1990s and the sector continues to grow at a pace well above average. This analysis of employment seems to strongly suggest that the Professional and Business Services sector is a driver of growth in the Florida economy.
Figure 36 above shows the year-over-year GDP growth rates for the sector since 1998 in Florida and the United States. Similarly to its employment growth, the GDP growth of the Professional and Business Services sector was very high prior to the 2001 recession, both for Florida and the U.S. After this period, growth remained strong but seemed to be at a lower level. The sector seems to have taken similar losses in GDP growth due to the Great Recession but quickly bounced back at both levels. GDP growth in the Professional and Business Services sector since the recession has also been similar to that of employment growth in the sector, with growth remaining somewhat steady at both national and state levels, though it has not reached the high growth rates seen in previous periods.
While employment growth in the Professional and Business Services sector was significantly higher than that of the overall state from 1990 to 2017, we do not see such a large disparity in GDP growth from 1998 to 2017 in the preceding graph from Figure 37. Prior to the 2001 recession, the sector did grow significantly faster on average, but from 2002 to 2007 and from 2009 to 2017, the growth rates appear to be very similar. The correlation coefficient between the two lines is fairly high at 0.91 and the gap between average growth rates is not as large as it was with employment. Average GDP growth in the Professional and Business Services sector has been 4.7 percent since the end of the last recession compared to Florida’s GDP growth rate of 3.7 percent. This represents a sector that is growing 27 percent faster on average than the state. While the gap is still large, it is much smaller than the gap we saw in employment growth between the two in the same period.
The Professional and Business Services sector share of GDP in the U.S. and Florida is shown above in Figure 38. One of the most interesting things about this graph is that Florida’s employment share in the sector didn’t surpass the share in the U.S. until mid-1999, but here we can see that the sector’s GDP share was already larger in 1997. The gap in shares increased up until the Great Recession when there was very little difference between the two. Since the end of the recession though, the gap in the sector’s GDP share between the state and nation seems to be increasing again. While it seems that GDP growth in the sector has not matched the growth of employment, the upward trend of GDP share of the Professional and Business Services sector is clear and seems to be continuing. While it may soon become the largest employer in the state, it may also overtake Trade, Transportation, and Utilities as the second-largest sector in terms of GDP share. The sector’s above average growth in employment and GDP combined with its rising share of both measures over time indicate that the Professional and Business Services sector is likely a driver of the Florida economy.
Health Care and Social Assistance is a particularly interesting sector among our group of sectors because health care alone is a unique service or good that one purchases. Because health care is a necessity for all people, demand for it will generally be inelastic. This means that the demand for health care is not as susceptible to economic booms or busts as other goods and services. People will require health care regardless of the state of the economy and regardless of the state of their income. This may result in our finding that this sector is much less prone than others to sharp decreases or increases in growth caused by recessionary or expansionary periods.

In the preceding graph from Figure 39, we see the growth rates of the Health Care and Social Assistance sector in the U.S. and Florida. We notice immediately that there have been no...
periods of negative year-over-year growth in employment in this sector since 1991. This is truly unique among the sectors in our analysis, but it is not entirely surprising. As previously stated, health care services will always be required and growth in the sector is likely to continue increasing due to the nation’s aging population. It appears that the sector’s growth rate in Florida is much more volatile than in the U.S. which has seen consistent growth, though that growth appears to be much lower than it was in the early 1990s. Florida’s growth was similarly high in the early 1990’s but has appears to have settled at lower growth rates since then.

The graph in Figure 40 above further demonstrates the resiliency of the Health Care and Social Assistance sector. At the very start of the analysis period we can see that the overall employment growth was negative after a recession, but the sector was having some of the highest growth we can see. We also see that the Great Recession hardly had an effect on the sector compared to the large losses we see in Florida’s overall employment. We only see a weak
correlation of 0.22 between the two growth rates, demonstrating that the growth in the Health Care and Social Assistance sector won’t follow the same trend as overall employment growth. In one sense, the sector helps to drive growth because it is always growing positively. Unlike growth in other sectors though, this growth may not have a strong effect on the health of the overall economy.

In Figure 41 above, we see the employment share of the Health Care and Social Assistance Sector in the U.S. and Florida. The state has a significantly higher share of its workers employed in the sector, but the sector’s share of employment has grown at both levels. Interestingly, we see the share spike with every recession. This is likely because employment growth in the sector manages to remain positive, while all other sectors will generally see significant losses. Though the sector’s share of employment has grown over time, it is difficult to tell if this trend will continue. We tend to only see large jumps in its share during recessions, and
the share has remained stable at 13 percent in Florida since the end of the most recent recession. The sector’s resilience against recessions has allowed it to grow unabated for almost the past 30 years. This continuous growth shows no sign of stopping, even if the sector’s share of employment has remained relatively constant since the Great Recession. It’s large employment share and above average growth in this measure indicate that the Health Care and Social Assistance sector is a driver in Florida.

Just as we saw with employment, we can see in Figure 42 that GDP growth in the Health Care and Social Assistance sector is consistently positive. GDP growth at the state and national level seems to slow in the sector following a recession, but it remains positive. As we mentioned when analyzing this sector’s employment growth, an aging population will likely only lead to

![Figure 42: Health Care and Social Assistance GDP](https://www.bea.gov/)

Data Source: https://www.bea.gov/
continued growth for the Health Care and Social Assistance sector. As Americans age, health complications will arise and more money and employment will flow into this sector.

Again, when we compare sector and state year-over-year growth rates in Figure 43, there is no clear strong relationship between the two. The correlation coefficient between these two is just approximately 0.3, which is slightly stronger than what we saw with employment, but is still a weak correlation. Despite the fact that the Health Care and Social Assistance sector’s growth has remained positive throughout this period while Florida GDP growth has not, the sector has not significantly outgrown the state’s GDP on average. Prior to the 2001 recession and between recession years, the state’s growth rate was higher than that of the sector. The end of the Great Recession has however seen the sector’s GDP growing faster than Florida GDP. It is important to note though that this higher growth is only modestly higher. The sector has grown at an
average year-over-year rate of 3.8 percent compared to state GDP growth averaging 3.7 percent in this period.

**Figure 44: Health Care and Social Assistance Share of Total GDP**

The trends we see in the Health Care and Social Assistance sector’s GDP share in Figure 44 match those seen in its employment share. As recessions occur, the share seems to spike and stay at a higher level than pre-recession, but between recessions the share holds relatively steady. We can also see that the sector is a smaller contributor to GDP share than it is to employment share. Though the sector’s GDP share has grown since 1997, that growth has been by less than 2 percent and much of it seems to have occurred during the last recession. This tells us that the sector did not truly gain a larger share because of its own growth but likely because of the negative growth by other sectors. GDP growth has not been significantly higher than that of the state and the sector’s increase in GDP share has been relatively small. Despite this, growth is still above average since the Great Recession in both GDP and employment, and the trends since the 1990s seem to indicate that the sector will continue its growth in GDP and employment share.
This suggests that the Health Care and Social Assistance sector is a driver of the Florida economy.

3.8 LEISURE AND HOSPITALITY

While there is no perfect way to capture the effects of tourism, we believe that the Leisure and Hospitality sector will act as a sufficient proxy for tourism. If we accept this to be true, then we can attempt to measure just how important tourism is for the state of Florida. It is often claimed that tourism is significant to the economy and that it drives growth. We can attempt to measure if there is truth in this preconception by analyzing the Leisure and Hospitality sector as we have our previous sectors.

Figure 45: Leisure and Hospitality Employment

The preceding graph in Figure 45 shows the year-over-year employment growth rates of the Leisure and Hospitality sector at the state and national levels. We can see that during recessions, the sector seems to take greater losses in Florida than in the U.S. In the beginning of the period, the growth rate in Florida is much lower coming off a recession, and during the 2001 recession and Great Recession, growth drops further in the state than in the country. Despite this, throughout most of this period, the growth rates are somewhat similar. It seems that the sector may be growing at a higher rate in Florida since the end of the last recession, but the rates are still following each other closely.

Figure 46: Leisure and Hospitality and Overall Florida Employment


From Figure 46 above, we can see that while the sector seems to have a more volatile employment growth rate compared to the state, it follows the state’s growth somewhat closely. Over the analysis period the two share a correlation coefficient of about 0.84, which is not
among the strongest in our sectors, but is still a relatively high correlation. Interestingly, while the sector has seemed to take slightly worse losses during recessions than the state, the opposite occurred during the most recent recession. The sector did not see negative growth as low as the state’s and managed to reach positive growth slightly faster. Though the state grew significantly faster prior to the 2001 recession, the Leisure and Hospitality sector has grown faster ever since then. Since the end of the Great Recession, the sector’s average year-over-year employment growth has been 2.9 percent and the state’s average has been just 1.7 percent in this time. This represents the sector growing at an average rate that is 71 percent higher than the state’s overall employment growth average since mid-2009. The average growth rates of the two over the entire period (excluding recessions) is similar, but the most recent period shows significantly stronger growth in the Leisure and Hospitality sector.

Figure 47: Leisure and Hospitality Share of Total Employment

Though the Leisure and Hospitality sector seemed to be on the decline in Florida, a turnaround began around 2007 that saw the sector begin to gain employment share. This seems to have been unique to Florida because we can see from Figure 47 that the sector has consistently gained employment share at the national level since 1990. Also apparent in this graph is that Florida employs a larger chunk of its workers in this sector compared to the U.S.; this would make sense if the sector is a driver in the economy. From our analysis of the sector’s employment, we can conclude that it is an economic driver from this perspective. Its recent growth is significantly stronger than that of overall employment, the sector employs about 14 percent of all Florida workers, and that share appears to be growing well since 2007.

From Figure 48 above, we can see that the Leisure and Hospitality sector’s GDP growth has been strong since 1997; this is especially the case in Florida. While growth at both levels has been strong and positive for almost the entire period, the highest year-over-year growth is seen at
the state level. GDP growth reached over 14 percent higher from the previous year in 2004. At both levels, the only time we see negative growth occur is during the Great Recession. Since the end of the last recession, the sector has seen more stable growth at the national level, but the highest year-over-year growth has occurred in the state.

The preceding graph from Figure 49 allows us to measure the Leisure and Hospitality sector’s year-over-year GDP growth against that of Florida overall. Though employment growth for the sector and state correlated slightly strongly, GDP growth between the two does not. There is a correlation coefficient of about 0.66 in GDP growth rates, but this is not strong compared to other sectors we have analyzed. While it may be difficult to tell from the graph above, the Leisure and Hospitality sector has grown at a higher average rate than overall Florida GDP in each period we can see separated by recessions. The largest gap between the two has occurred since the end of the Great Recession. Over this time the sector has seen average year-over-year growth of approximately 4.8 percent which is almost 30 percent higher than the average Florida GDP growth.
GDP growth of about 3.7 percent during the same period. This sustained growth that has averaged higher than the state’s growth suggests that the sector is an economic driver.

![Figure 50: Leisure and Hospitality Share of Total GDP](image)

The preceding graph in Figure 50 illustrates the share of GDP from the Leisure and Hospitality sector over time in the U.S. and Florida. We can quickly notice that the sector comprises much more of Florida’s GDP than of the U.S. GDP. Despite this, both GDP shares are small, especially when we consider that the sector employs over 10 percent of workers at both levels. In Florida the sector employs nearly 14 percent of employees, yet its GDP share is less than half of that at only about 6.25 percent. Though the sector’s share of total GDP has risen in Florida in the U.S., it has only risen less than 1 percent over the past 20 years. Though it appears the sector is an economic driver from its employment trends and growth, we cannot say the same when analyzing the GDP data for the Leisure and Hospitality sector. The sector’s Florida GDP growth has been consistently above that of the state, but its share of GDP has not even risen a full percentage point since 1997. While the sector seems to be driving job growth, it
does not appear to be as critical to Florida’s overall GDP. This may change over time as it seems
the sector is gaining a larger GDP share, but this change is happening extremely slowly.

3.9 GOVERNMENT

While we have noted that some sectors are unique and different among our group, the
Government sector is undoubtedly the most unique. It is not made up of privately controlled
establishments as other sectors are and it tends to be more stable and predictable in its spending
and employment than other industries. Government will generally not be a driving economic
sector simply because the goal of government is not to seek continuous profit growth and greater
market share but to provide public goods and services and to regulate industries. Though this is
true, the Government sector still may have a slight driving effect due simply to the extensive
amount of people employed and the large amounts of money spent by the government.
As previously stated, Government sector employment tends to be more stable than in other sectors. Despite the large spikes we see in Figure 55, this seems to hold true. The sector’s employment growth rate in the state is much more volatile than at the national level, likely because the national level data is averaged out by government hiring activity over all 50 states. The year-over-year growth rate at the national level seems to hold steady at around 2 percent up until the Great Recession. After the recession, we see many consecutive months of negative growth at both levels and only start seeing positive growth again in about mid-2014. Such a prolonged period of job loss is seen nowhere else in this over this entire period and demonstrates that even government jobs are vulnerable to a bad recession. Though this is true, we still see losses in Government that pale in comparison to the losses faced by many of our other sectors during the Great Recession.
Though the employment growth rate of the Government sector seems more volatile than that of the state, the fluctuations are generally not very large. We can see from Figure 52 that the sector has a small range of values and very rarely exceeds a growth rate of 5 percent or falls below -5 percent. Over the whole period, we can see that Government isn’t strongly following trends set by the overall economy and the sector’s growth rate has a weak correlation coefficient of just 0.35 with state’s overall employment growth. This is fairly easy to tell from the graph; we don’t see Government growing strongly or dipping significantly when Florida employment does. Between recessionary periods, the sector’s average year-over-year growth never exceeds 1.75 percent, and since the recession the sector’s average growth has actually been negative. Over the entire analysis period and excluding recessions, the Government sector grows at an average rate of 1.04 percent compared to Florida’s average growth of 2.2 percent during the same period.
As we would expect due to the consistently below average growth rate of the sector, the Government’s share of total employment has declined over time at both the state level and the national level. Interestingly, we see spikes in share with each recession just as we saw with the Health Care and Social Assistance Sector. This is likely occurring for the same reason as it was in that sector as well. When recessions hit, the Government sector’s growth remains relatively stable while growth in many other sectors turns negative. Though the sector isn’t growing significantly higher than normal during these periods, its positive growth while other sectors are seeing negative growth means the share will increase. The Government sector does see losses due to recession, but the losses are delayed. This is visible in Figure 52 and we see the effects of that delayed negative growth in Figure 53 above. Once the other sectors begin recovering, Government begins to shed jobs which combines to result in a sharp drop in share following the Great Recession. Though Government still employs a large share of Florida’s workers, that share has been decreasing over time and the sector’s employment growth has consistently been low.
and below average. This leads us to conclude that Government is not one of Florida’s driving
sectors from an employment standpoint.

The preceding graph in Figure 54 shows the year-over-year growth rate of GDP in the
Government sector. Similarly to what we saw in employment, the sector’s growth is stable at the
national level but shows volatility more in Florida. We can also tell from this graph that the
sector’s growth declined significantly from pre-recession years, though it could potentially be on
the rise again. Also interesting on the national level is that the sector never has a period of
negative growth, similarly to the Health Care and Social Assistance sector. The sector only has
two periods of negative growth in Florida, but these dips aren’t very significant. This makes
sense because the Government will tend to create budgets that are very similar from year to year
in terms of money spent.
As with employment growth, it doesn’t appear as if there is a strong correlation between the GDP growth rate of the state and the GDP growth of the sector. In fact, the correlation of 0.19 between these two is even weaker than it was in employment. Though the average year-over-year GDP growth rate of the Government sector is clearly higher here than the average growth of employment in the sector, it is still low compared to the state. Excluding years with recessions, the average growth rate of Government is just 3.4 percent over this period compared to an average rate of 5.5 percent for the state’s GDP. Since the end of the last recession, the disparity has also been relatively large. The state’s GDP has grown at an average rate of approximately 3.7 percent compared to the Government sector’s average growth of about 1.5 percent.

Data Source: https://www.bea.gov/
Despite the consistently below average GDP growth of the Government sector, its share of GDP has only decreased slightly from 1997. As with employment, it appears that the sector’s share of GDP rises sharply during the Great Recession, likely for the same reason its employment share increases. During recessions, other sectors see significant losses in GDP, especially during the Great Recession. Despite this, Government GDP growth generally slows down after recessions and remains somewhat constant or at least positive during the recession period. This will cause its share to increase while all other sectors see losses in GDP share. After the recession and throughout time though it appears that Government’s GDP share is slowly decreasing. This slow decrease in GDP share and low GDP growth rates compared to the Florida’s overall GDP indicate that Government is not an economic driver in the Florida economy from a GDP perspective. This matches our findings from analyzing the sector’s employment data.
3.10 AGRICULTURE

The Agriculture sector is generally thought to be one of the sectors for which Florida has received the most notoriety. The state’s tropical climate, large size, and long growing season make it very friendly for farming many types of fruit and other crops. After all, one of the things Florida is most famous for is its production of oranges that go all over the country and the world. This analysis will seek to find Agriculture’s impact on the Florida economy as a whole.

**Figure 57: Agriculture Employment**

In Figure 57 above, the Agriculture sector’s year-over-year employment growth rate is shown at both the state and national level. The most noticeable feature of these growth rates is their extreme volatility. We have used year-over-year growth rates for the analysis of these sectors because they allow us to better analyze trends that are occurring over many months or
years. Month over month rates will tend to be much more volatile and look similarly to the graph above. This indicates that even seasonally adjusted employment growth in this sector is highly volatile and subject to drastic change from year to year. Beyond the volatility, there doesn’t seem to be a deeper trend to analyze in this sector. The rates fluctuate wildly regardless of whether the economy is booming or slowing. It seems that Agriculture employment is growing slightly faster and with more stability at the US level when compared against Florida.

**Figure 58: Agriculture and Overall Florida Employment**

Data Source: Florida: https://www.bls.gov/cew/datatoc.htm

While other sectors’ growth rates have moved relatively independently of the state’s overall growth, none have done so like Agriculture. There is almost no correlation at all between the year-over-year growth rates of Florida employment growth and the sector’s employment growth that we see in Figure 58 above. The correlation coefficient between these two growth rates is 0.06 which means virtually no correlation. Though Agriculture is volatile in all periods, we have found that growth is declining through time. Prior to the 2001 recession, Agriculture’s average employment growth was -0.8. Between the 2001 recession and Great Recession, average
growth fell further to -1.5 percent and has fallen to an even lower average rate of -2.4 percent. As we can see, not only has average employment growth been negative since 1990, but that negative growth seems to be accelerating. This is a phenomenon that we are not seeing in any other sector that we have analyzed and demonstrates that Agriculture will likely continue to employ fewer and fewer Floridians.

As we would expect due to the persistent average negative growth discussed previously, Agriculture’s share of total employment has been on a steady decline in Florida since the early 1990s. Interestingly, the sector’s share has been more stable on a national level, but it has still declined from its share in 1990. In Florida, the sector currently contributes less than half of the share of employment that it did in 1990. While the sector had been much more important in the state than the nation at the start of our analysis period, it currently contributes about the same
share at both the national and state levels. The analysis of Agriculture’s growth and share over this period demonstrate clearly that it is not an economic driver. It’s growth rate shares virtually no correlation with that of the state overall and has been increasingly negative over time, and the sector’s share of employment has halved since 1990.

As we saw with employment in the Agriculture sector, Figure 60 shows relatively volatile GDP growth in the sector as well. While most sectors we have looked at show less volatility on the national level, the opposite seems to be true for Agriculture. We see huge spikes and steep drops in national GDP growth in the sector over this period, and while there is some volatility in Florida as well, it is much more stable. It seems to be the case that from both a GDP and employment perspective, Agriculture is a volatile sector that can see both huge growth and large
losses in short periods of time. It is also interesting that these gains and losses seem to occur relatively independently of what is occurring in the economy overall.

![Figure 61: Agriculture and Overall Florida GDP](image)

Though the Agriculture sector’s volatility seems low at the state level when compared to the national level, it is still clearly much more volatile than Florida GDP growth. It appears that GDP growth in the sector has generally been below Florida GDP growth over the past 20 years with the exception of the Great Recession and large spike that occurred in 2010. Over this entire analysis period the sector’s average growth has been 1.7 percent outside recession years. The state has grown at an average rate that is over triple that, with Florida GDP growing at approximately 5.5 percent on average in the same period. The gap between the two has remained wide even in recent years. Since the end of the most recent recession, Agriculture’s average GDP growth has been about 0.7 percent. This is significantly lower than Florida’s 3.7 percent average growth rate during that time period.
Because the sector’s average growth has continuously remained below that of Florida’s average growth, it is not surprising that Agriculture’s share of GDP has decreased over time. It is important to note that the change we see is fairly small because the sector’s share was already very small to begin with. The sector had about a 1.3 percent share of GDP in 1997 compared to about 0.6 percent of total Florida GDP in 2017. This slow and steady decline in the state has not been matched at the national level, which has remained at about 1 percent of total GDP since 1997. Agriculture’s negligible and declining shares of GDP and employment combined with below-average growth in both measures confirm that the sector is not a driver of the Florida economy.
4 EXAMINING INFLUENCE THROUGH A GVAR

4.1 CORRELATION MATRICES - SEASONALLY ADJUSTED VS. NOT SEASONALLY ADJUSTED

FLORIDA

After running a gVAR on the 10 sectors, we produced a correlation matrix of the residuals using both unadjusted and seasonally adjusted Florida employment data to uncover how strongly correlated they are with one another and to again ensure which form of data represents our research question the best. These two correlation matrices can be found in the Appendix E.

Using unadjusted Florida job growth data, we see the highest correlation between the Leisure and Hospitality sector and the Manufacturing sector. The lowest correlation appeared to be between the Government and Trade Transportation and Utilities sectors. Overall, the Manufacturing sector was the most correlated with other sectors while Government was the least. The unadjusted data shows many more statistically significant correlations between sectors than the seasonally adjusted data does. This could be because seasonal trends were being recognized rather than true correlations between some sectors.

The seasonally adjusted Florida job growth data shows us a very different picture. Now we see that there is only one statistically significant relationship within the economy. After the seasonal adjustment, we see that the Leisure and Hospitality and the Construction sectors have the highest correlation. This is similar to what we saw from the unadjusted results. We can see that the deseasonalization removed a great deal of employment variation we recognized in the Florida economy prior to the adjustment. It appears that the Manufacturing and Trade Transportation and Utilities sectors have seasonal trends that were causing their correlations with the other sectors to appear higher than they are.

The Manufacturing sector has the overall highest absolute correlation with the other sectors in the Florida economy, while Construction still has a high overall correlation as well.
The Government and Health Care and Social Assistance sectors now have the lowest absolute value correlation. We still see that the Government sector is weakly correlated with the Trade Transportation and Utilities sector. The lowest correlated sector in absolute value is still Government.

**COMPARED TO THE U.S.**

Using seasonally adjusted job growth data for the United States we repeated the same analysis that we did for Florida so that we could compare how the interconnectedness of the Florida economy to that of the U.S. The United States employment correlation matrix of the residuals from the gVAR estimation can be seen in Appendix E. We see that the Information and Construction sectors have the highest correlation. This is not consistent with what we saw within the Florida economy. The Leisure and Hospitality and the Construction sectors are weakly correlated within the United States. Not one of the correlations between the 10 sectors is statistically significant, so even the “highest” correlations aren’t very strong. The Information sector overall is the most correlated with the other sectors in the United States economy. This is different than what we saw with Florida where the highest overall correlation with the other sectors was the Manufacturing sector. The Information sector in Florida does not have strong overall correlations with sectors within its economy. The Government and Trade Transportation and Utilities sectors now have the lowest absolute value correlation. In Florida, these two sectors do have a weak correlation, so this result is in line with Florida. The lowest correlated sector in absolute value is consistently Government between the two economies.

After examining which sectors are significantly correlated with one another, we then dug deeper by decomposing the variance of the residuals for each sector to uncover more causal, or directional, relationships within our data. The table produced from these results help us to understand exactly which sectors drive other sectors in the Florida economy, how influential each sectors volatility is to the rest of the economy, and how these weights have shifted over
time. These tables will hereafter be referred to as “spillover tables” and will tabulate a decomposed variance of each sector measuring how much of each sector’s variance is coming from and moving to other sectors.

4.2 SPILLOVER TABLES – SEASONALLY ADJUSTED VS. NOT SEASONALLY ADJUSTED

FLORIDA:

Figure 63: Spillover Table (Not Seasonally Adjusted FL Employment)

<table>
<thead>
<tr>
<th>Sector</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
<th>(9)</th>
<th>(10)</th>
<th>FROM</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Construction</td>
<td>30.46</td>
<td>15.4</td>
<td>9.96</td>
<td>2.05</td>
<td>10.55</td>
<td>5.32</td>
<td>6.44</td>
<td>14.09</td>
<td>2.24</td>
<td>3.48</td>
<td>69.54</td>
</tr>
<tr>
<td>(2) Manufacturing</td>
<td>15.13</td>
<td>27.45</td>
<td>10.28</td>
<td>3.87</td>
<td>8.75</td>
<td>6.18</td>
<td>9.32</td>
<td>13.76</td>
<td>1.55</td>
<td>3.7</td>
<td>72.55</td>
</tr>
<tr>
<td>(3) Trade Transportation Utilities</td>
<td>8.09</td>
<td>10.17</td>
<td>22.94</td>
<td>4.68</td>
<td>10.66</td>
<td>4.78</td>
<td>10.66</td>
<td>8.76</td>
<td>9.25</td>
<td>9.8</td>
<td>77.06</td>
</tr>
<tr>
<td>(4) Information</td>
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<td>10.57</td>
<td>8.69</td>
<td>33.96</td>
<td>7.55</td>
<td>4.62</td>
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<td>6.72</td>
<td>6.28</td>
<td>2.51</td>
<td>66.04</td>
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<tr>
<td>(7) Healthcare Social Assistance</td>
<td>8.09</td>
<td>11.07</td>
<td>12.68</td>
<td>4.22</td>
<td>7.01</td>
<td>3.22</td>
<td>8.41</td>
<td>18.89</td>
<td>0.36</td>
<td>14.44</td>
<td>81.1</td>
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<tr>
<td>(8) Leisure Hospitality</td>
<td>3.67</td>
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<td>5.9</td>
<td>5.99</td>
<td>13.9</td>
<td>4.48</td>
<td>5.88</td>
<td>7.15</td>
<td>4.22</td>
<td>2.15</td>
<td>56.34</td>
</tr>
<tr>
<td>(9) Government</td>
<td>3.72</td>
<td>3.75</td>
<td>6.48</td>
<td>4.24</td>
<td>3.88</td>
<td>4.69</td>
<td>2.91</td>
<td>14.95</td>
<td>13.95</td>
<td>41.54</td>
<td>58.46</td>
</tr>
<tr>
<td>TO</td>
<td>74.69</td>
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<td>93.68</td>
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<td>16.62</td>
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<td>1.72</td>
<td>8.71</td>
<td>-2.46</td>
<td>2.27</td>
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</tr>
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</table>

Figure 64: Spillover Table (Seasonally Adjusted FL Employment)

<table>
<thead>
<tr>
<th>Sector</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
<th>(9)</th>
<th>(10)</th>
<th>FROM</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Construction</td>
<td>49.36</td>
<td>12.07</td>
<td>10.47</td>
<td>1.57</td>
<td>12.47</td>
<td>3.19</td>
<td>1.29</td>
<td>7.48</td>
<td>0.43</td>
<td>1.66</td>
<td>50.64</td>
</tr>
<tr>
<td>(2) Manufacturing</td>
<td>27.58</td>
<td>31.23</td>
<td>17.15</td>
<td>3.24</td>
<td>7.94</td>
<td>2.47</td>
<td>3.18</td>
<td>6.03</td>
<td>0.08</td>
<td>1.11</td>
<td>68.77</td>
</tr>
<tr>
<td>(3) Trade Transportation Utilities</td>
<td>25.05</td>
<td>15.18</td>
<td>32.75</td>
<td>1.37</td>
<td>11.42</td>
<td>3.43</td>
<td>4.29</td>
<td>5.56</td>
<td>0.15</td>
<td>0.8</td>
<td>67.25</td>
</tr>
<tr>
<td>(4) Information</td>
<td>11.34</td>
<td>11.07</td>
<td>7.51</td>
<td>51.06</td>
<td>8.41</td>
<td>5.31</td>
<td>3.06</td>
<td>1.47</td>
<td>0.3</td>
<td>0.46</td>
<td>48.94</td>
</tr>
<tr>
<td>(5) Financial Activities</td>
<td>27.75</td>
<td>9.27</td>
<td>10.71</td>
<td>1.83</td>
<td>36.43</td>
<td>6.37</td>
<td>1.83</td>
<td>3.96</td>
<td>0.46</td>
<td>1.41</td>
<td>63.57</td>
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<tr>
<td>(6) Professional Business Services</td>
<td>19.33</td>
<td>9.16</td>
<td>9.51</td>
<td>3.98</td>
<td>11.33</td>
<td>40.13</td>
<td>2.87</td>
<td>2.79</td>
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<tr>
<td>(7) Healthcare Social Assistance</td>
<td>2.64</td>
<td>10.26</td>
<td>12.9</td>
<td>3.42</td>
<td>4.3</td>
<td>4.3</td>
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<td>0.36</td>
<td>1.24</td>
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<tr>
<td>(8) Leisure Hospitality</td>
<td>22.83</td>
<td>13.43</td>
<td>10.56</td>
<td>1.31</td>
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<td>2.24</td>
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<td>(9) Government</td>
<td>1.4</td>
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<td>1.87</td>
<td>0.87</td>
<td>1.11</td>
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<td>0.52</td>
<td>92.12</td>
<td>0.16</td>
<td>7.88</td>
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<tr>
<td>(10) Agriculture</td>
<td>0.54</td>
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<td>0.75</td>
<td>0.97</td>
<td>0.53</td>
<td>1.01</td>
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<td>0.27</td>
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<td>-17.46</td>
<td>-26.83</td>
<td>-5.57</td>
<td>-7.5</td>
<td></td>
</tr>
</tbody>
</table>

We ran a VARg using Florida year-over-year job growth data by sector to compare the results from the unadjusted and seasonally adjusted data. Looking at the average spillover tables, shown in Figures 63 and 64, we see that when the data is deseasonalized the average
interconnectedness within the whole economy over the entire dataset dropped around 20 percent. This is seen by comparing the dark blue cells from both spillover tables, which represent the overall interconnectedness of the economy. Again, help in understanding and reading the spillover tables can be found in Appendix D.

Upon analyzing these tables further, we saw some important differences. The results when using unadjusted data showed the Leisure and Hospitality sector, on average, as a high receiver from the other sectors; alternatively, this means we also saw low internally caused variation. This indicated that the Leisure and Hospitality sector was influenced heavily by the other sectors in the Florida economy. After deseasonalizing the data, it is clear that the Leisure and Hospitality sector’s appearance of reliance upon other sectors was due to in-common seasonal trends and fluctuations. The seasonally adjusted Florida job growth results shows the Leisure and Hospitality sector to be a low receiver of employment variation, responsible for about 80 percent of its own variance. This is a very different story - one that says that the Leisure and Hospitality sector is fairly independent when it comes to job growth. We see a similar happening with most of the other sectors, indicating that seasonality was to blame for a lot of the appearance of greater interconnectedness. After deseasonalizing, Information, Health Care and Social Assistance, Agriculture, and Government are responsible for more than 50 percent of their own employment variation.

As previously discussed, for conclusion purposes, we relied more heavily on the results produced after the deseasonalized of the data was performed given that we want our results to be indicative of the directional spillovers between sectors rather than the influence that seasonal trends have on the economy as a whole.

Using seasonally adjusted Florida job growth data, we produced an average spillover table for the entire dataset. We see that the highest receivers on average are the Manufacturing, Trade, Transportation, and Utilities, Financial Activities, and Leisure and Hospitality sectors. On average, these four sectors are responsible for the least amount of their own employment variation meaning that they are highly influenced by the other sectors. The Trade Transportation and Utilities, Manufacturing, and Financial Activities all contribute highly to each other and are
highly affected by one another, this makes them very volatile but also potential drivers for employment within the Florida economy.

**COMPARED TO THE U.S.**

Using seasonally adjusted United States job growth data, we produced an average spillover table for the entire dataset which can be found in Appendix F. The interconnectedness of the United States economy is less than 1 percent higher than that of Florida. We see that the highest receivers on average are the Manufacturing, Construction, Financial Activities, and Government sectors. On average, these four sectors also produce the least amount of their own employment variation. This shows that employment in these sectors is highly influenced by the others. The United States and Florida employment data are in agreement that the Manufacturing and Financial Activities sectors are highly influenced by the other sectors. The Information and Financial Services sectors contribute the most variation to the Manufacturing, Construction, and Financial Activities sectors. The Information sector also contributes highly to the employment within the Financial Activities sector. This means that the Financial Services sector is highly influenced while also being highly influential to the other sectors, making it arguably susceptible to outside volatility but also a driver of employment in other sectors. Information is highly influential and appears to be a driver of employment on average within the Florida economy. The Financial Services sector is a driver of employment to both the Florida and United States economies.
The Overall Employment Spillover graph for Florida above is a result of the rolling window analysis discussed in the Methodology section of this report. It shows the job growth interconnectedness of the entire economy throughout time. The graph tells us that sector employment within Florida has increased over time, while in the United States the interconnectedness has stayed relatively constant. During the Great Recession we see that the interconnectedness of the Florida economy spiked and stayed permanently higher. During the recession Florida converged with the United States trend and is currently slowly rising past it. After the moving window analysis, we retrieved multiple spillover tables from specific time periods to see how each individual sector grew in interconnectedness over time.
From Figure 66, we see that sector interconnectedness has increased across the board. Over this 17-year period these 10 sectors have been relying more on one another for variation in employment. Sectors such as Construction, Health Care and Social Assistance, and Information have increased two or three-fold in this respect.
From Figure 67 above, we see that outside sector influence in the United States has increased for all sectors but three over the past 17 years. The Information and Agriculture sectors saw decreases in dependency over time, while the Leisure and Hospitality sector dropped trifold in dependency. We can see that the United States has not seen sector interconnectedness growth through sector dependencies in the same way that Florida has.

To understand why each sector receives at the level they do, we plotted the FROM values from all 216 spillover tables produced from the rolling window to see how each sector’s interconnectedness has changed throughout time. The values plotted have a practical application once multiplied by 10; the graphs are produced using the original output results given by the software used (R), which naturally gives the practical results divided by 10. For comparison purposes, the same execution was performed on the United States and the results plotted on the same graph.
The graph above shows us that the Construction sector has steadily become more reliant on the other sectors throughout time, tripling in the amount of variation it receives from other sectors. Since the Great Recession, the Construction sector in Florida has reached towards the trend of the United States. Currently, the Construction sector in Florida produces only 12.4 percent of its own employment variation. The Financial Activities and Professional Business Services sectors contribute the most to the employment variance in the Construction sector. These two sectors together create an additional 44 percent to the Construction sectors variance. We find this to be very interesting as these two sectors were found to be potential drivers when examining each sector’s share of the economy and growth figures.
In Figure 69, we see that the Manufacturing sector in Florida has become more reliant on the other sectors employment variations over time. The United States and Florida have followed roughly the same pattern throughout time, with Florida Manufacturing seeing more fluctuation in the amount of variation it receives from other sectors. Currently, the Manufacturing sector in Florida currently creates about 12.52 percent of its own variation. The sectors that contribute to its employment variance the most are the Financial Activities and Professional and Business Services sectors. These two sectors together create an additional 46 percent to the Manufacturing sectors variance. This is consistent with what was seen with Construction and, again, is very interesting given that these two sectors were preliminarily determined to be drivers in the economy.
TRADE, TRANSPORTATION, AND UTILITIES

Figure 70: *FROM* Spillovers in Employment, Trade, Transportation, and Utilities, 2000 – 2017


Looking at the graph in Figure 70 above, we see that the Trade, Transportation, and Utilities sector’s dependency on the other sectors has greatly increased over time in Florida. The Great Recession caused this sector to become more reliant on the others and it continued to follow that path thereafter. It appears that the Trade, Transportation, and Utilities sector in the United States reacted much more strongly to the recession when it more than tripled in its reliance on the other sectors. Despite this, the overall U.S. sector came back to pre-recession levels around 2009 and has seen minimal decline in this measure ever since. Currently, the Trade, Transportation, and Utilities sector in Florida creates about 19 percent of its own employment variation. Introducing an apparent pattern in our findings, this is third reviewed sector that has seen Financial Activities and Professional and Business Services as being the top
contributors to its employment variation, accounting for 39 percent of the total variance of employment for Trade, Transportation, and Utilities.

Looking at Figure 71, we see that the Information sector in Florida more than doubled in the amount of variation it receives from other sectors in the economy over the past 17 years. During the Great Recession, it exhibited a spike upward, similarly to the U.S., and despite having fallen minimally, continues to grow in its reliance. The Information sector for the overall United States, however, only spiked during the recession, then declined towards pre-recession levels. Currently, the Information sector creates about 26 percent of its own employment variation within Florida. The Financial Activities and Professional and Business Services sectors contribute the most to the Information sector, contributing about 36 percent additional
employment variation to the sector. This is consistent with the pattern we have seen with the previous three sectors.

**FINANCIAL ACTIVITIES**

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**Figure 72: FROM Spillovers in Employment, Financial Activities, 2000 – 2017**

![Chart showing spillovers in employment, Financial Activities, 2000–2017](chart)


According to Figure 72, we see that the Financial Activities sector in Florida almost doubled in its dependency during the Great Recession, then dropped off slightly. Currently, the Financial Activities sector’s reliance on the other sectors within the Florida economy is still higher than it was at the beginning of our analysis period. The Financial Activities sector in the United States on the other hand has been consistent in its dependency throughout time. After the recession, the Financial Activities sector in both Florida and the United States started to follow a similar pattern. Currently, the Financial Activities sector is responsible for about 50 percent of its own employment variation. The Professional and Business Services and Government sectors
contribute the most to the Financial Activities sector’s variance, although only about 21 percent. Compared to other sectors we have examined thus far, Financial Activities appears to be less susceptible to outside fluctuations. This is interesting as we have preliminarily determined Financial Activities to be a driving sector. After examining the other sectors, if this comparison holds true, this sector will be determined to be one of the strongest growing, most stable sectors in Florida at this time.

PROFESSIONAL AND BUSINESS SERVICES

Figure 73: FROM Spillovers in Employment, Professional and Business Services, 2000 – 2017


According to Figure 73, the Professional and Business Services sector in Florida has been increasing throughout time. Despite this, it saw a dip right before the recession and a spike in dependency during it. The Professional and Business Services sector in the United States has
followed roughly the same trend as Florida. Currently, the Professional and Business Services sector creates about 28 percent of its own employment variation. The Financial Activities and Trade, Transportation, and Utilities sectors contribute the most, about 30 percent collectively. This sector’s measure of independency (or the amount of variation contributable to internal fluctuations) is lower than that of Financial Activities. Regardless, this does not disqualify this sector as being a driver of the economy as it contributes greatly to other sectors. It may, however, not exhibit the same stability as Financial Activities.

HEALTH CARE AND SOCIAL ASSISTANCE

Figure 74: FROM Spillovers in Employment, Health Care and Social Assistance, 2000 – 2017

According to Figure 74, the Health Care and Social Assistance sector in Florida has increasing in its reliance on other sectors since the spike from the Great Recession. We see that the Health Care and Social Assistance sector in the United States and Florida have followed roughly the same trend throughout time, with the Florida sector showing slightly more volatility. Currently, the Health Care and Social Services sector creates about 25 percent of its own employment variation. The highest contributors to the employment variance are the Trade Transportation and Utilities and Leisure and Hospitality sectors, which contribute about 27 percent additional employment variation collectively.

**LEISURE AND HOSPITALITY**

**Figure 75: FROM Spillovers in Employment, Leisure and Hospitality, 2000 – 2017**

![Graph showing spillovers in employment for US and FL leisure and hospitality sectors](image_url)

According to Figure 75, the Leisure and Hospitality sector in the United States followed an opposite trend than that of Florida, it has been declining throughout time except for the spike during the Great Recession. Currently, the Leisure and Hospitality sector is responsible for about 20 percent of its own employment variation. The largest contributors to the Leisure and Hospitality sector’s variance are the Trade, Transportation, and Utilities and Financial Activities sectors, which contribute an additional 26 percent collectively. This finding is interesting as tourism is considered to be an important part of the Florida economy. Using Leisure and Hospitality as a proxy for tourism, it is interesting that the sector was less susceptible than the U.S. sector to outside volatility prior to the Great Recession, and after became more susceptible. This causes us to wonder if the stability of the Leisure and Hospitality (or tourism) sector is decreasing.

**GOVERNMENT**

![Figure 76: FROM Spillovers in Employment, Government, 2000 – 2017](image)

As seen in Figure 76, the Government sector in Florida has doubled in the measure of dependency since the start of the analysis period. This sector saw a large spike in reliance on the other sectors during the Great Recession and started to slowly grow in its dependency thereafter. The United States saw a smaller spike in dependency during the recession, but the Government sector in both the United States and in Florida appear to have followed the same trend. Currently, the Government sector creates about 82 percent of its own employment variance, making it mostly independent when it comes to job growth. The Financial Activities contributes the most to the employment variation in government, but still only accounts for about 4 percent.

**AGRICULTURE**

**Figure 77: FROM Spillovers in Employment, Agriculture, 2000 – 2017**

![Graph showing spillovers in employment for Agriculture from 2000 to 2017 for the US and Florida.](https://www.bls.gov/cew/datatoc.htm)

According to Figure 77, the Agriculture sector in Florida has been consistently independent in terms of employment variation. The Agriculture sector in the United States saw a large spike in 2001 as well as two large spikes in dependency during the Great Recession. Other than these inconsistencies, the Agriculture sector in both economies has followed roughly the same pattern. Currently, the Agriculture sector creates about 76 percent of its own employment variation, so it is mostly independent. The Government and Health Care and Social Assistance sectors contribute the most to the Agriculture sector, but still only about 9 percent collectively.

OVERALL FINDINGS FROM THE ROLLOVER WINDOW

In Figure 78, we see that the Financial Activities, Professional and Business Services, and Trade, Transportation, and Utilities sectors all contribute comprehensively the most to the employment variation of the other sectors within the Florida economy. Most sectors’ dependency developments within Florida and the United States tend to work in the same directions. The exceptions to this are seen in the Leisure and Hospitality, Trade, Transportation, and Utilities, and Information sectors, where Florida is unique from the United States. These three sectors within the United States have become less susceptible to outside influence by the other sectors since the Great Depression, while in Florida they have all grown substantially in their subjectivity to volatility.

Following the execution of the rollover window using employment data, we performed the same using GDP data for both the United States and Florida. Because of the small number of observations available for GDP, we decided to base our conclusions on the influence of sectors on the findings from the employment data. This is due to the lack of dependability and potential for skewed results using data that has a substantially smaller amount of observable time. We retained most of our analysis and results performed using the GDP data, which can be found in Appendix G.
Prior to beginning our analysis, we defined a driver of the economy as a sector that is large in size in either GDP share or employment share and one that has exhibited strong, above average growth. We subsequently argued that sectors found to match these requirements must also prove to influence other sectors in the economy substantially and comparatively to other sectors. We organized this report so that we first identified potential drivers using the most highly recognized methods, share of GDP and employment and growth figures, then performed a comprehensive regression analysis on all sectors to further filter out any inconsistencies and solidify our findings.

Our GDP and employment analysis on sector size and growth gave us an in-depth look into the state’s economy and allowed us to identify sectors that we could consider potential current drivers of the economy. With this in mind, the following sectors were determined to be potential drivers of the economy: Financial Activities, Health Care and Social Assistance, Leisure and Hospitality, Professional and Business Services, and Trade, Transportation, and Utilities. These sectors have shown that they are pushing overall growth in the state’s economy through above average GDP or employment growth or both. If a sector’s growth is not significantly above average, we have decided to include it as a driver simply because it must still be a critical component of the economy due to its size.

The sectors we analyzed that we have determined are not driving sectors are the following: Construction, Manufacturing, Information, Agriculture, and Government. While Manufacturing, Information, and Agriculture were relatively easy to classify as non-drivers, Construction and Government proved more difficult. Construction has recently seen above average growth in employment and GDP, which would classify it as a driver. Despite this, the sector remains too minor in terms of employment and GDP share to be considered among the other drivers we have analyzed. With the Government sector, we see somewhat of an inverse problem. The sector is large in both employment and GDP share, but its growth has been significantly below average in both in recent years. While its shares of GDP and employment remain large, the trends show decline in both. These two sectors could arguably be defined as
current drivers of the Florida economy, but we have decided not to include them as such following our analysis.

In solidification of our findings, as seen in Figure 78, the **Financial Activities**, **Professional and Business Services**, and **Trade, Transportation, and Utilities** sectors all contribute comprehensively the most to the employment variation of the other sectors within the Florida economy. As these were also determined to be potential drivers of the economy based on the most recognized and frequently utilized methods, we conclude that these are the greatest drivers of the Florida economy at this time.
### APPENDIX A – COMPARISON OF S.A. VS. NOT S.A. DATA

#### Spillover Table – Not Seasonally Adjusted – Florida Employment (11/30/2017)

<table>
<thead>
<tr>
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<td>(1) Const’n</td>
<td>19.6</td>
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<td>12.59</td>
<td>12.46</td>
<td>10.48</td>
<td>13.44</td>
<td>3.09</td>
<td>1.95</td>
<td>80.4</td>
</tr>
<tr>
<td>(2) Man’g</td>
<td>15.48</td>
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<td>14.21</td>
<td>13.4</td>
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<td>2.91</td>
<td>1.32</td>
<td>79.99</td>
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<tr>
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<td>20.55</td>
<td>6.96</td>
<td>13.07</td>
<td>8.61</td>
<td>8.11</td>
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<tr>
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<td>13.15</td>
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<td>2.95</td>
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<td>(8) Leisure Hospitality</td>
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<td>8.81</td>
<td>13.51</td>
<td>6.82</td>
<td>10.13</td>
<td>8.92</td>
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<td>14.69</td>
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<td>18.31</td>
<td>6.03</td>
<td>12.39</td>
<td>4.33</td>
<td>5</td>
<td>10.83</td>
<td>23.41</td>
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<td>3.39</td>
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<td>22.13</td>
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<td>83.76</td>
<td>75.72</td>
<td>98.74</td>
<td>70.56</td>
<td>30.45</td>
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<td>NET</td>
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<td>-23.07</td>
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<td>-8.5</td>
<td>13.43</td>
<td>-6.03</td>
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*Performed prior to data filtering.*
<table>
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<tr>
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<th>3</th>
<th>4</th>
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<td>12.22</td>
<td>6.02</td>
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<td>6.97</td>
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<tr>
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<tr>
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<td>14.04</td>
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<tr>
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<td>28.14</td>
<td>12.81</td>
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<tr>
<td>Leisure Hospitality</td>
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<td>15</td>
<td>4.96</td>
<td>6.3</td>
<td>11.2</td>
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<td>81.19</td>
<td>65.21</td>
<td>72.35</td>
<td>5.11</td>
<td>11.8</td>
</tr>
</tbody>
</table>

*Performed prior to data filtering.*
#Must download readxl package first

#Read in Excel File

library(readxl)

colnames(agri) <- c("Date", "Ag_Employees")

#Convert variable from factor to numeric and set as ts (time-series)

agri$Ag_Employees <- as.numeric(gsub("","",agri$Ag_Employees))

agri = ts(agri[,2], start = c(1990,1), frequency = 12)

#Must download seasonal package first

#Run seas adj.

library(seasonal)

agri_sa <- seas(agri)

plot(agri_sa)

#Extract new data

agridat <- agri_sa$data

export <- as.data.frame(agridat)

#Exports forecasts to a csv file

write.table(export, file="deseasonalized_Agriculture.csv", sep="", row.names=FALSE)

#End of code

Repeat this code using the United States Employment data file to deseasonalize the Agriculture data from the United States Employment data. We were not able to find Deseasonalized employment data for the Agriculture sector in Florida nor in the United States. We used the x-13 package on the seasonal Agriculture data pulled from BLS.
# Must download readxl package first

library(readxl)

# Read in data from Excel file

Seasonally_Adj_FL_Employment_by_NAICS_1990_2017_1_ <- read_excel("Seasonally Adj.
FL Employment by NAICS 1990-2017 (1).xlsx", sheet = "VARg Data")

# Read in each line at a time to get sector titles

# After each sector is read in, preform a 3-month moving average filter to smooth out
unexplained inconsistencies within this data

Construction <- ts(Seasonally_Adj_FL_Employment_by_NAICS_1990_2017_1_[,c(2)],
start=c(1990,1),frequency=12)

Con <- filter(Construction,c(1/3,1/3,1/3), method="convolution",sides=2)

Manufacturing <- ts(Seasonally_Adj_FL_Employment_by_NAICS_1990_2017_1_[,c(3)],
start=c(1990,1),frequency=12)

Man <- filter(Manufacturing,c(1/3,1/3,1/3), method="convolution",sides=2)

Trade_TransportationUtilities <-
ts(Seasonally_Adj_FL_Employment_by_NAICS_1990_2017_1_[,c(4)],
start=c(1990,1),frequency=12)

Trade <- filter(Trade_TransportationUtilities,c(1/3,1/3,1/3), method="convolution",sides=2)

Information <- ts(Seasonally_Adj_FL_Employment_by_NAICS_1990_2017_1_[,c(5)],
start=c(1990,1),frequency=12)

Info <- filter(Information,c(1/3,1/3,1/3), method="convolution",sides=2)

Financial_Activities <- ts(Seasonally_Adj_FL_Employment_by_NAICS_1990_2017_1_[,c(6)],
start=c(1990,1),frequency=12)

Finance <- filter(Financial_Activities,c(1/3,1/3,1/3), method="convolution",sides=2)

Professional_Business_Services <-
ts(Seasonally_Adj_FL_Employment_by_NAICS_1990_2017_1_[,c(7)],
start=c(1990,1),frequency=12)

Prof <- filter(Professional_Business_Services,c(1/3,1/3,1/3), method="convolution",sides=2)
Healthcare_Social_Assistance <-
ts(Seasonally_Adj_FL_Employment_by_NAICS_1990_2017_1[,c(8)],
start=c(1990,1),frequency=12)

Health <- filter(Healthcare_Social_Assistance,c(1/3,1/3,1/3), method="convolution",sides=2)

Leisure_Hospitality <- ts(Seasonally_Adj_FL_Employment_by_NAICS_1990_2017_1[,c(9)],
start=c(1990,1),frequency=12)

Tourism <- filter(Leisure_Hospitality,c(1/3,1/3,1/3), method="convolution",sides=2)

Government <- ts(Seasonally_Adj_FL_Employment_by_NAICS_1990_2017_1[,c(10)],
start=c(1990,1),frequency=12)

Gov <- filter(Government,c(1/3,1/3,1/3), method="convolution",sides=2)

Agriculture <- ts(Seasonally_Adj_FL_Employment_by_NAICS_1990_2017_1[,c(11)],
start=c(1990,1),frequency=12)

Agr <- filter(Agriculture,c(1/3,1/3,1/3), method="convolution",sides=2)

#Prepare data for the VAR

#Must install quantmod package first

require(quantmod)

X <- as.xts(cbind(Con,Man,Trade,Info,Finance,Prof,Health,Tourism,Gov,Agr))

temp <- apply(X,2,log)  # Logs the data

temp <- apply(temp,2,diff)  # Differences the logs

Xindex <- index(X)

x <- as.xts(100*temp,frequency=12,order.by=Xindex[-1])  # multiply by 100 to get monthly
percentage changes  # Multiple by 100 to get year-over-year growth averages

dim(x)

xx <- x[2:334,]  # Adjust the data for the 3-month moving average applied

#Construct the VAR

#Must install Vars package first

require(vars)

vs <- VARselect(xx,lag.max=24,type="const")  # VAR lag selection

p <- vs$selection[3]  # Choose the SIC lag length

varout <- VAR(xx,p=p,type="const")  # Estimate the var
summary(varout)  
#Dump the estimation results

#Now we want to compute the FEVD matrices or spill over tables (SOT)

#Must install the frequencyConnectedness package first
require(frequencyConnectedness)

#Now we compute the gFEVD using the "order independent" method DY12
spilloverDY12(varout,n.ahead=100,0)  #Spillover table overall/ average of all

#Now we want to estimate the gSOTs over a rolling window of 10 years (or 120 observations)
params_list <- list(p=p, type="const")  #We need to pass these to the VAR method

#Now use the DY12 method

gSOTrollDY12 <- spilloverRollingDY12(xx, n.ahead = 100, no.corr=F, "VAR", params_list, window=120, cluster = NULL)
plotOverall(gSOTrollDY12)

#We need the following codes to extract the results from R

WindowPoints <- gSOTrollDY12$list_of_tables
WinPts <- plotOverall(gSOTrollDY12)

#View date/times on plot
pltdatetimes <- index(WinPts)
pltdatetimes

#View plotted values
pltpts <- coredata(WinPts)

#How to recover the gSOT as a matrix

gSOTDY12 <- genFEVD(varout,n.ahead=100,no.corr=F)

gSOTDY12  #Spillover table with rolling windows

#Recover the set of gSOT's
rollDY12 <- overall(gSOTrollDY12)

#These are R "lists" so we need to convert them to "zoo" objects
rDY12 <- rollDY12[[1]]; colnames(rDY12) <- "Rolling with DY12"
plot(rDY12)  #Plot of total spillover

#Extract the From values

plotFrom(gSOTrollDY12)
WindowPointsFrom <- gSOTrollDY12$list_of_tables
WinPtsFrom <- plotFrom(gSOTrollDY12)

#View date/times on plot

pltdatetimesFrom <- index(WinPtsFrom)
pltdatetimesFrom

#View plotted values

pltptsFrom <- coredata(WinPtsFrom)

#Recover the SOT as a matrix

gSOTDY12 <- genFEVD(varout,n.ahead=100,no.corr=F)

#End of code

We used the above code for every generalized VAR analysis done in this study. The 3-month moving average adjustment was only preformed on the seasonally adjusted Florida and United States employment data because they both had unexplainable inconsistencies occurring in different months. The unexplainable inconsistencies were determined to be outside noise or recording error and the smoothing average allowed for the most accurate results with minimal error. To replicate our results, change the excel sheet being read in, but make sure the column names align with the order they are read in.
APPENDIX D – UNDERSTANDING THE SPILLOVER TABLE

The spillover table shows how much of a sector’s variation is caused by that sector itself and how much is caused by fluctuations in other sectors, as well as how much variation they are receiving from other sectors. The diagonal, light blue boxes are the percent of volatility produced from each sector internally. It shows how much volatility is present within each industry alone and acts as a measure of independency. The To row is the sum of each sectors column minus its own variation. It tells us the amount of variation a sector gives off to or spills over into another sector. The From column is the percent of variation from spillovers, so 100 minus its own variation. It tells us the variation each sector receives from another. The Net row shows the values of the To row minus the values in the From column. It tells us on average whether a sector is a contributor or receiver of volatility within the Florida economy. The value in the bottom right corner is the average of all the light blue boxes. It shows the average spillover within the Florida economy.

There have been various points of concern alluding to the idea that the To and Net columns cannot be relied on for accurate findings due to scaling inconsistencies. Each row in a spillover table has its own scaling system, so when each column is summed to get the To values a mathematical error is committed. Thus, when the Net is calculated, it too must be mathematically incorrect. A solution to this problem has not yet been created but due to this inconsistency we have decided to report on only the individual variation (diagonal boxes) and the From variation, which together sum to 100 percent making for an easy calculation and representation of the interconnectedness within the economy.
Example of Spillover Table with Explanations

<table>
<thead>
<tr>
<th>FROM</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>FROM</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Sector 1</td>
<td>Percent of var(Sector 1) caused by variation in var(Sector 2)</td>
<td>Percent of var(Sector 1) caused by variation in var(Sector 2)</td>
<td>Percent of var(Sector 1) caused by variation in var(Sector 3)</td>
<td>Total of row (1) minus internally caused variation. Also 100 - (value in blue cell).</td>
</tr>
<tr>
<td>(2) Sector 2</td>
<td>Percent of var(Sector 2) caused by variation in var(Sector 1)</td>
<td>Percent of var(Sector 2) caused by variation in var(Sector 1)</td>
<td>Percent of var(Sector 2) caused by variation in var(Sector 3)</td>
<td>Total of row (2) minus internally caused variation. Also 100 - (value in blue cell).</td>
</tr>
<tr>
<td>(3) Sector 3</td>
<td>Percent of var(Sector 2) caused by variation in var(Sector 1)</td>
<td>Percent of var(Sector 2) caused by variation in var(Sector 1)</td>
<td>Percent of var(Sector 2) caused by variation in var(Sector 3)</td>
<td>Total of row (3) minus internally caused variation. Also 100 - (value in blue cell).</td>
</tr>
<tr>
<td>TO</td>
<td>Total contributions of Sector 1 to the variances of all other sectors.</td>
<td>Total contributions of Sector 2 to the variances of all other sectors.</td>
<td>Total contributions of Sector 3 to the variances of all other sectors.</td>
<td>A measure of the total interconnectedness of the economy. A figure given between 0 and 100.</td>
</tr>
<tr>
<td>NET</td>
<td>TO – FROM</td>
<td>TO – FROM</td>
<td>TO - FROM</td>
<td></td>
</tr>
</tbody>
</table>
The correlation matrices are 10 by 10 tables that show us how a shock to one sector might be correlated with a fluctuation in another. The correlations that are statistically significant, have a correlation value above 0.5 or less than -0.5, are highlighted in light green, while the insignificant correlations are highlighted in light red. The sum column shows the sum of the absolute correlation values of each sector to show, overall, which sectors are more correlated with others in the Florida economy. The sector that is the most correlated with others is highlighted in a darker green, while the sector with the lowest correlation with the others is highlighted in a darker red. A correlation matrix is useful in determining the strength of the correlation of the residuals between two sectors. In order to understand which sectors are influencing other sectors the most strongly.

**Correlation Matrix - Not Seasonally Adjusted Employment Florida**

<table>
<thead>
<tr>
<th>Sector</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
<th>(9)</th>
<th>(10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Construction</td>
<td>1.00</td>
<td>0.628</td>
<td>0.513</td>
<td>0.226</td>
<td>0.528</td>
<td>0.391</td>
<td>0.412</td>
<td>0.586</td>
<td>-0.025</td>
<td>0.142</td>
</tr>
<tr>
<td>(2) Manufacturing</td>
<td>0.628</td>
<td>1.000</td>
<td>0.609</td>
<td>0.388</td>
<td>0.521</td>
<td>0.493</td>
<td>0.585</td>
<td>0.644</td>
<td>0.013</td>
<td>0.214</td>
</tr>
<tr>
<td>(3) Trade Transportation Utilities</td>
<td>0.513</td>
<td>0.609</td>
<td>1.000</td>
<td>0.370</td>
<td>0.615</td>
<td>0.425</td>
<td>0.629</td>
<td>0.480</td>
<td>-0.005</td>
<td>0.232</td>
</tr>
<tr>
<td>(4) Information</td>
<td>0.226</td>
<td>0.388</td>
<td>0.370</td>
<td>1.000</td>
<td>0.409</td>
<td>0.287</td>
<td>0.464</td>
<td>0.242</td>
<td>0.069</td>
<td>0.016</td>
</tr>
<tr>
<td>(5) Financial Activities</td>
<td>0.528</td>
<td>0.521</td>
<td>0.615</td>
<td>0.409</td>
<td>1.000</td>
<td>0.474</td>
<td>0.534</td>
<td>0.431</td>
<td>-0.094</td>
<td>-0.005</td>
</tr>
<tr>
<td>(6) Professional Business Services</td>
<td>0.391</td>
<td>0.493</td>
<td>0.425</td>
<td>0.287</td>
<td>0.474</td>
<td>1.000</td>
<td>0.448</td>
<td>0.499</td>
<td>0.049</td>
<td>0.259</td>
</tr>
<tr>
<td>(7) Healthcare Social Assistance</td>
<td>0.412</td>
<td>0.585</td>
<td>0.629</td>
<td>0.464</td>
<td>0.534</td>
<td>0.448</td>
<td>1.000</td>
<td>0.450</td>
<td>0.160</td>
<td>0.223</td>
</tr>
<tr>
<td>(8) Leisure Hospitality</td>
<td>0.586</td>
<td>0.644</td>
<td>0.480</td>
<td>0.242</td>
<td>0.431</td>
<td>0.499</td>
<td>0.450</td>
<td>1.000</td>
<td>0.216</td>
<td>0.515</td>
</tr>
<tr>
<td>(9) Government</td>
<td>-0.025</td>
<td>0.013</td>
<td>-0.005</td>
<td>0.069</td>
<td>-0.094</td>
<td>0.049</td>
<td>0.160</td>
<td>0.216</td>
<td>1.000</td>
<td>0.358</td>
</tr>
<tr>
<td>(10) Agriculture</td>
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<td>0.233</td>
<td>0.016</td>
<td>-0.005</td>
<td>0.259</td>
<td>0.223</td>
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<td>0.358</td>
<td>1.000</td>
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<tr>
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<td>4.197</td>
<td>3.879</td>
<td>2.469</td>
<td>3.610</td>
<td>3.324</td>
<td>3.905</td>
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</table>

**Correlation Matrix - Seasonally Adjusted Employment Florida**

<table>
<thead>
<tr>
<th>Sector</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
<th>(9)</th>
<th>(10)</th>
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<tbody>
<tr>
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<td>0.445</td>
<td>0.435</td>
<td>0.060</td>
<td>0.303</td>
<td>0.262</td>
<td>0.206</td>
<td>0.545</td>
<td>0.060</td>
<td>0.067</td>
</tr>
<tr>
<td>(2) Manufacturing</td>
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<td>0.464</td>
<td>0.263</td>
<td>0.227</td>
<td>0.295</td>
<td>0.436</td>
<td>0.444</td>
<td>0.053</td>
<td>0.125</td>
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<td>0.464</td>
<td>1.000</td>
<td>0.101</td>
<td>0.313</td>
<td>0.248</td>
<td>0.444</td>
<td>0.386</td>
<td>0.073</td>
<td>0.059</td>
</tr>
<tr>
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<td>0.263</td>
<td>0.101</td>
<td>1.000</td>
<td>0.239</td>
<td>0.218</td>
<td>0.259</td>
<td>0.121</td>
<td>0.083</td>
<td>0.028</td>
</tr>
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<td>0.248</td>
<td>0.218</td>
<td>0.167</td>
<td>1.000</td>
<td>0.238</td>
<td>0.230</td>
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<td>0.199</td>
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<td>1.000</td>
<td>0.256</td>
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<tr>
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<td>0.322</td>
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<td>0.256</td>
<td>1.000</td>
<td>-0.017</td>
<td>0.135</td>
</tr>
<tr>
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<td>-0.032</td>
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The deseasonalized correlation matrices come before filtering the data.

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<th>Sector</th>
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<th>(2)</th>
<th>(3)</th>
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<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
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<th>(10)</th>
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<tr>
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<td>-0.02</td>
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<tr>
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<tr>
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<td>1.5%</td>
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<td>2.25%</td>
<td>2.5%</td>
<td>2.75%</td>
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<tr>
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<td>---------</td>
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<td>------</td>
<td>-------</td>
<td>------</td>
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<td>-------</td>
<td>------</td>
<td>-------</td>
</tr>
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<td>Agriculture &amp; Forestry</td>
<td>0.75%</td>
<td>0.9%</td>
<td>1.1%</td>
<td>1.3%</td>
<td>1.5%</td>
<td>1.7%</td>
<td>1.9%</td>
<td>2.1%</td>
<td>2.3%</td>
<td>2.5%</td>
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<td>1.1%</td>
<td>1.3%</td>
<td>1.5%</td>
<td>1.7%</td>
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<td>2.3%</td>
<td>2.5%</td>
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<td>1.3%</td>
<td>1.5%</td>
<td>1.7%</td>
<td>1.9%</td>
<td>2.1%</td>
<td>2.3%</td>
<td>2.5%</td>
</tr>
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<td>0.9%</td>
<td>1.1%</td>
<td>1.3%</td>
<td>1.5%</td>
<td>1.7%</td>
<td>1.9%</td>
<td>2.1%</td>
<td>2.3%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Professional business services</td>
<td>0.75%</td>
<td>0.9%</td>
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<td>1.3%</td>
<td>1.5%</td>
<td>1.7%</td>
<td>1.9%</td>
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<td>2.3%</td>
<td>2.5%</td>
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<td>1.5%</td>
<td>1.7%</td>
<td>1.9%</td>
<td>2.1%</td>
<td>2.3%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Information</td>
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<td>1.3%</td>
<td>1.5%</td>
<td>1.7%</td>
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<td>2.1%</td>
<td>2.3%</td>
<td>2.5%</td>
</tr>
<tr>
<td>wholesale trade</td>
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<td>1.5%</td>
<td>1.7%</td>
<td>1.9%</td>
<td>2.1%</td>
<td>2.3%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Transportation, communication</td>
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<td>1.1%</td>
<td>1.3%</td>
<td>1.5%</td>
<td>1.7%</td>
<td>1.9%</td>
<td>2.1%</td>
<td>2.3%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Construction</td>
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<td>0.9%</td>
<td>1.1%</td>
<td>1.3%</td>
<td>1.5%</td>
<td>1.7%</td>
<td>1.9%</td>
<td>2.1%</td>
<td>2.3%</td>
<td>2.5%</td>
</tr>
</tbody>
</table>
Again, due to the lack of GDP data available for both the United States and Florida, the moving window is less precise than that from the employment data. Unfortunately, the moving window analysis produced only 12 spillover tables, thus only 12 FROM values were used to make the above graph. The lack of data caused our analysis to only cover a 3-year period, in which the overall spillover table above does not change too drastically. Looking at the Overall GDP Spillover graph above, we see generally the same level of GDP interconnectedness within the United States and Florida economy. Currently, Florida’s GDP interconnectedness is slightly lower than at the start of our analysis period. There is some volatility, but the overall trend has been relatively stable over the past 3 years. The United States economy saw a longer period of slightly more connected GDP sectors through 2016 and most of 2017 before it dipped back down. Overall, both the United States and Florida economies have followed roughly the same trend. Currently, the United States economy is slightly more interconnected through GDP than Florida.
Looking at the above graph, we see consistency within the GDP interconnectedness within the Florida economy. This makes sense and is ideal due to the short 3-year period, we would not expect large changes to the connectedness in such a short time frame.
Looking at the above graph, we again see consistency within the GDP interconnectedness within the Florida economy. The Construction sector appears to have changed the most, dropping about 14 percent within the past 3 years. This means that currently the Construction sector is less dependent on the GDP within the other sectors. We see that both in the United States and in Florida, the sectors are all highly interconnected with one another.

INTERCONNECTEDNESS SECTOR ANALYSIS

The graphs shown in this section were made from the From values from each of the 12 spillover tables used to conduct our analysis. Again, the From data used to make these graphs have been divided by 10.

According to the above graph, we see that Construction sector in Florida has stayed consistent in its dependency on the GDP variance of the other sectors. The Construction sector in both the United States and in Florida have followed roughly the same pattern over the past 3 years. Currently, we see that the Construction sector creates about 15 percent of its own GDP variance. Its highest contributor is the Agriculture sector, which spills over about 14 percent.
According to the graph above, the Manufacturing sector in Florida has been stable over the past 3 years. The Manufacturing sectors dependence on the GDP of the other sectors is exactly the same currently as it was at the start of our analysis period. The Manufacturing sector in both the United States and in Florida have followed the same trend over time. Currently, we see that the Manufacturing sector creates about 13 percent of its own variation with the Agriculture and Leisure and Hospitality sectors contributing the most to its volatility. These two sectors contribute about 27 percent additionally to the Manufacturing sectors GDP variance.
According to the above graph, the Trade Transportation and Utilities sector has not changed in its dependence on the other sectors GDP variations. The Trade Transportation and Utilities sector in the United States and Florida follow the same trend over this 3-year period. Currently, we see that the Trade Transportation and Utilities sector creates only about 6 percent of its own GDP variance. This means that this sector is highly dependent on the others. The highest contributors to the Trade Transportation and Utilities sector are the Government, Information, and Leisure and Hospitality sectors, which contribute about 44 percent collectively.
According to the graph above, the Information sector in Florida has slightly decreased in its dependence on the other sectors over the past 3 years. The Information sector's dependence within the United States economy dipped in mid-2015 while in Florida it rose slightly in late-2015. Other than those two inconsistencies, the two economies have been in alignment with one another. Currently, we see that the Information sector creates about 13 percent of its own GDP variance. Its highest contributors are the Government and Leisure and Hospitality sectors, which contribute about 29 percent collectively.
According to the graph above, we see that the Financial Activities sector in Florida has stayed the same in its dependence on the GDP within other sectors. The Financial Activities sector within the United States and in Florida have had opposite peaks and troughs, but currently they are right in line with one another. Currently, we see that the Financial Activities sector creates about 14 percent of its own GDP variance. Its highest contributors are the Agriculture and Government sectors, which contribute about 26 percent to its GDP variance collectively.
According to the graph above, the Professional and Business Services sector in Florida has remained stable in its dependence on the other sectors GDP variation. Currently, it is slightly more dependent than at the start of our analysis period. The Professional and Business Services sector within the United States and in Florida has followed roughly the same pattern, though in Florida it has been more volatile. Currently, we see that the Professional and Business Services sector creates about 15 percent of its own variation. Its highest contributors are the Trade Transportation and Utilities, and Manufacturing sectors, which contribute about 29 percent of its GDP variation collectively.
According to the graph above, the Health Care and Social Assistance sector in Florida has been fairly steady while its been more volatile in the United States. Currently, the sector is less dependent on the GDP within the other sectors in both the United States and Florida economy than at the start of the analysis period. Currently, we see that the Health Care and Social Assistance sector creates about 11 percent of its own GDP variance. It highest contributors are the Agriculture and Leisure and Hospitality sectors, which contribute about 28 percent collectively.
According to the graph above, the Leisure and Hospitality sector in Florida has slightly declined in its dependence on the GDP within the other sectors. Currently, the Leisure and Hospitality sector in both the United States and Florida is at the same level of dependence. Currently, we see that the Leisure and Hospitality sector creates about 19 percent of its own GDP variance, this is higher than most of the other sectors. The largest contributor to its GDP variance is the Agriculture sector, by far, which contributes about 24 percent alone.
According to the graph above, the Government sector has been volatile but for the most part stayed relatively constant in its interconnectedness in both the United States and Florida economies. Currently, we see that the Government sector creates about 21 percent. The Government sector creates the most of its own GDP variance in the Florida economy, making it the most independent sector. The Government sector highest contributor is the Information sector, which contributes about 17 percent of its GDP variance alone.
According to the graph above, the Agriculture sector has been volatile in Florida, but has remained relatively constant in its dependence on the GDP of the other sectors. The Agriculture sector in the United States appears to be slightly more interconnected than that in Florida. Currently, we see that the Agriculture sector creates about 18 percent of its own GDP variance. Its highest contributors are the Government and Leisure and Hospitality sectors, which contribute about 27 percent collectively.

**OVERALL**

We see that within Florida, the driving sectors appear to be the Agriculture, Leisure and Hospitality, and Government sectors because they contribute highly to the GDP in the other sectors and create the most of their own variance compared to the other sectors. We see that the sectors within Florida and the United States do not differ much in their trends of dependence over the past 3 years.

Due to the lack of data causing questionable result, we cannot definitively say that these results are truly representing the interconnectedness between the sectors. This is the best we can measure thus far and suggest revisiting this type of analysis when more data is available. Another problem we noticed was that the data we collected for the Agriculture sector from BLS has a
variance trifold that of the other sectors. Considering the Agriculture sector only consists of about 1 percent of GDP within Florida, its share of GDP has not been growing, and its average growth since the end of the Great Recession has not significantly changed, we find it unlikely that the Agriculture sector is truly driving GDP. Because of this, the results we received about the other sectors could also be unreliable. However, it is possible that the Agriculture sector is having an effect on the other sectors, but we cannot accurately measure to what extent.
### Current Spillover Table From Florida Employment Data

<table>
<thead>
<tr>
<th>Sector</th>
<th>FL</th>
<th>GA</th>
<th>MS</th>
<th>PA</th>
<th>WI</th>
<th>ME</th>
<th>MD</th>
<th>DC</th>
<th>NY</th>
<th>CA</th>
<th>TX</th>
<th>FL</th>
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<tbody>
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<td>7.4%</td>
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<td>6.1%</td>
<td>6.7%</td>
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<td>8.7%</td>
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<td>9.3%</td>
<td>9.6%</td>
</tr>
<tr>
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<td>3.9%</td>
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<td>4.9%</td>
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### Notes
- FL: Florida
- GA: Georgia
- MS: Mississippi
- PA: Pennsylvania
- WI: Wisconsin
- ME: Maine
- MD: Maryland
- DC: District of Columbia
- NY: New York
- CA: California
- TX: Texas
- FL: Florida
## Current Spillover Table From Seasonally Adjusted Florida GDP data

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**Note:** The table shows the spillover effects from one sector to another, with values indicating the percentage change in GDP due to changes in other sectors. The **NET** column at the bottom represents the net effect across all sectors.
### Current Spillover Table From Seasonally Adjusted United States GDP data

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<th>Financial Activities</th>
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**Note:** The table provides a snapshot of spillover effects across different sectors for the years 2003 and 2009, with calculations for net effects and sector contributions.
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