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Economic Analysis of Livingston County

Jack L. Steichen

Southern Illinois University Carbondale, jacksteichen@siu.edu

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ECONOMIC ANALYSIS OF LIVINGSTON COUNTY

By

Jack Steichen

B.S., Southern Illinois University Carbondale, 2016

A Research Paper

Submitted in Partial Fulfillment of the Requirements for the

Master of Science

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in the Graduate School

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ECONOMIC ANALYSIS OF LIVINGSTON COUNTY

By

Jack Steichen

A Research Paper Submitted in Partial

Fulfillment of the Requirements

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Master of Science

in the field of Agribusiness Economics

Approved by:

Dr. Ira Altman

Graduate School

Southern Illinois University Carbondale

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This study develops an understanding of the impact the agriculture sector has on an economy at the local and state level. The economies analyzed in this study are Livingston County and Illinois. There are 11 sectors taken from each economy. The 11 sectors are farm earnings, agriculture services, mining, construction, manufacturing, transportation, wholesale trade, Retail Trade, (finance, insurance, and real estate), services, and (government and government enterprises). A couple different procedures are used to compare the impacts of each sector on the economy. Each method will show the direct impact that the agriculture sector has on its economy. A time series multiple regression model is performed to show the determinates of earnings by place of work in Livingston County from 1980-2000. Employment numbers from farm employment, manufacturing, services, wholesale trade, and mining are used as the explanatory variables to explain the changes in total earnings in Livingston County.

TABLE OF CONTENTS

<u>CHAPTER</u>	<u>PAGE</u>
ABSTRACT.....	i
LIST OF TABLES.....	iii
LIST OF FIGURES.....	iv
CHAPTERS	
CHAPTER 1 – Introduction.....	1
CHAPTER 2 – Review of Literature.....	4
CHAPTER 3 – Livingston County Economy.....	9
CHAPTER 4 – Illinois Economy.....	16
CHAPTER 5 –Data and Methods.....	22
CHAPTER 6 –Results.....	26
CHAPTER 7 – Discussion.....	29
BIBLIOGRAPHY.....	35
Appendix.....	39
VITA.....	48

LIST OF TABLES

<u>TABLE</u>	<u>PAGE</u>
Table 1: Hypothesis Tests.....	25
Table 2: Explanation of Variables	39
Table 3: Univariate Summary Statistics	40
Table 4: Time Series Regression Output	41

LIST OF FIGURES

<u>FIGURE</u>	<u>PAGE</u>
Figure 1: Circular Flow Diagram	42
Figure 2: 1990 Livingston County Sector Percentages.....	42
Figure 3: 2000 Livingston County Sector Percentages	43
Figure 4: 1990-2000 Livingston County Earnings Growth Rates	43
Figure 5: 1969-2000 Livingston County Sector Percentages	44
Figure 6: 1990-2000 Livingston County Location Ratio Comparison	44
Figure 7: 1990 Illinois Sector Percentages	45
Figure 8: 2000 Illinois Sector Percentages	45
Figure 9: 1990-2000 Illinois Earnings Growth Rates	46
Figure 10: 1969-2000 Illinois Sector Percentages	46
Figure 11: 1990-2000 Illinois Location Ratio Comparison.....	47

CHAPTER 1

INTRODUCTION

Agriculture is one of the most important industries in the world, in that its job is to supply enough food production for the 7.4 billion humans that walk this earth. The industry is one of the fastest growing industries and there is a good reason behind it, we need it. The agriculture industry is a necessity to our society in that the industry is held accountable to produce commodities at an efficient rate annually. Agriculture plays a role in almost every facet of the world. Strangers to the industry may believe that agriculture is just farming row crops. A couple of examples of agriculture beyond farming row crops include dairy, poultry, fruit production, forestry, etc.

Livingston County is one of the bigger counties in Illinois, located 92 miles southwest from Chicago in the northern part of central Illinois. Livingston County was founded in 1837 from parts of surrounding counties such as McLean, Iroquois, and LaSalle. The county was named after Edward Livingston, who was once the mayor of New York City. Livingston County is 1,046 square miles, 1,043 square miles is land and the other 1.6 square miles is occupied by water. It is the fourth largest county in Illinois in terms of land area. The population of Livingston County, which was last taken in 2010, was 38,950. Livingston County is covered with rich farmland as well as some big manufacturing companies. The county did have two prisons, the male, located in Pontiac Illinois, and the female prison located in Dwight Illinois. The female prison has been shut down due to financial issues in the Illinois. (“History of Livingston County” 2016)

The main objective for this research is to analyze how much contribution the economy gets from the agriculture sector (farm earnings, agriculture services). This study will be

analyzing these sectors from a local and state level. For each economic calculation we used the same 11 sectors, those sectors were: farm earnings, agriculture service (forestry, and fishing), mining, construction, manufacturing, transportation and public utilities, wholesale trade, retail trade, (finance, insurance, and real estate), services, and (government and government enterprises). The farm earnings sector includes farm labor and proprietors of a farm and is the amount of net income obtained by sole proprietors, hired laborers, and partnerships through production of agriculture commodities. The agriculture services, (forestry, and fishing) sector covers business that offer tree services such as tree farms, forest nurseries, and timber tracts and acts of gathering bark, needles, maple, sap, etc.. The classification of fishing, hunting, and trapping includes businesses primarily engaged in commercial fishing and the operation of fish hatcheries and fish and game preserves. Mining includes establishments that perform on and have complete responsibility of mines, oil and gas wells, and quarries. The construction sector includes establishments that are responsible for designing and constructing buildings and roads, as well as engineering projects. Construction may include small additions or maintenance and repairs to any facility or building structure within the local economy. Manufacturing includes establishments that utilize mechanical or chemical transformation of materials into a mass production of new products. The transportation and public utilities sector includes establishments that provide freight transportation, communication services, gas, water or sanitary services to the public within the local economy. The wholesale trade sector includes establishments that utilize the selling of wholesale merchandise to retailers throughout the area or region. The retail trade sector includes establishments involved direct with the public. There are two types of retail sectors, store retailers and nonstore retailers. Store retailers include stores that consumers physically walk into to purchase goods. Store retailers are looking for a high

volume of walk in business. Nonstore retailers include establishments that market their merchandise by broadcasting products or using infomercials to further increase sales. The Finance, insurance and real estate sector includes establishments operating in the finance, insurance and real estate fields. The services sector includes establishments engaged in providing a complex variety of services for business, government establishments and individuals within the local economy. Lastly, the government and government enterprises sector includes federal civilian, military, and state and local governments. Government enterprises are government agencies, which are allowed to cover a significant amount of their operating cost by selling goods and services to the public while maintaining separate accounts.

CHAPTER 2

REVIEW OF LITERATURE

Agriculture has been one of the most important industries to this world every sense since humans have walked this earth. Starting 7,000 years ago (5000BC), American Indians began using farming techniques to produce squash in present-day Illinois. In the 17th century, settlers were granted a small land grant. By the year of 1790, the total population was at 3,929,214, with farmers being 90% of the labor force. “The United States has collected data on the nation’s agriculture since the U.S. marshals inquired about families’ agricultural pursuits in 1820 (“Agriculture” 2016). By 1890, the total population had increased to 62,941,714, with the farming population being, 29,414,000 or (43%) of the total population. The average acres per farm was at about 136 acres. In the year of 1910, the total population of America was 91,972,266 and the farm population was at about 32,077,000, which stood for 31% of the total population in America. The average acres per farm jump up two acres to 138 acers. Jumping ahead 20 years, in 1930, the total population of America was 122,775,046, and the farm population was 30,455,350 or 21% of total population. The average acres per farm in 1930 was at about 157 acres. In 1950, the total population increased to 180,007,000, with farm population dropping to 15,635,000, or 8.3% of total population, and average acres increasing to 303 acres per farm. 20 years later, in 1980, the total population greatly increased to 227,020,000, with farm population dropping to under 10 million to 6,051,000 or (3.4%) of total population, and average acres increasing yet again to 426 acres per farm. From 1990-2000 the total population increased to 261,423,000, with farm population being 2,978,552, which dropped to as low as 2.6% of the total population. The average acre per farm increased to 461 acres. (“Historical Timeline - Farmers” 2014)

As you can see, from the brief timeline presented above, as the total population increased, the farm population decreased as average acre per farm increased. This shows that with changes in agriculture such as technology or techniques, farm size increased whereas the amount of farmers decreased.

As the agriculture industry advanced throughout the years, economies, big and small, see a rollercoaster type trend. It is inevitable that economies will drop in production and income but, will always turn around and become efficient again. There are internal and external markets that control an economy. In 2005 Edward P. Lazear and Paul Oyer did a study for the National Bureau of Economic Research on internal and external labor markets and they went into the theories of internal and external markets and how they affect community economics. “Internal markets are those where workers are hired into entry level jobs and higher levels are filled from within” (Lazear and Oyer 2003). Internal markets are markets that have wage rates and job settings set within the economy. Having more internal markets allows an economy to set the wage rate that is efficient for their economy to produce at the highest rate. “External markets imply that workers move somewhat fluidly between firms and wages are determined by some aggregate process where firms do not have significant discretion over wage setting” (Lazear and Oyer 2003). This happens when an economy does not have the resources to produce a good or service within the economy so relying on outside sources to help production is another option. This is also known as horizontal integration where firms will go elsewhere to produce a certain good or service, where vertical integration occurs when a company uses resources within to produce a good or service.

Looking at a more broad and conceptual approach of an economy, the circular flow diagram (figure 1), shows the market for goods and services and how the goods and services

flow through the particular economy being analyzed. The circular flow diagram allows for better understanding of economic linkages to growth and “outlines how a community economy operates” (Shaffer, Deller and Marcouiller 2004). “The circular flow diagram is linked to the outside world by imports/exports of goods and inflows/outflows of factor resources” (Shaffer, Deller and Marcouiller 2004). This diagram focuses more on an open economy rather than a closed or community economy, but can relate to smaller economies in a sense. When looking at the factors involved in community economics like Livingston County, households and firms are the main sources of growth and development. Households account for individuals and/or families that control the resources needed to produce income, and with that income, goods and services will be consumed to generate cash flows throughout the economy. Firms are local resources that use the primary factors of production to produce optimal amounts of goods and services. Governments play a big role in the function of the economy. “Governments regulate, create legal processes, and produce public goods that affect how households and firms interact” (Shaffer, Deller and Marcouiller 2004). Community economies rely on local citizens to purchase goods and services throughout the local economy to increase cash flow and further increase the wellbeing of the economy (Shaffer, Deller and Marcouiller 2004).

When researchers are looking to analyze an economy more in depth, whether it be regional/urban or rural, one of the main assumptions made is what the economic base(s) is for that particular economy. The economic base theory or export base theory is very popular in economic analysis. The theory shows the driving force or “backbone” for the particular county that is being analyzed. Finding the economic base will allow government officials and city leaders to make key economic decisions on where to invest money and what direction the economy needs to focus on and pursue allow for economic growth. Knowing where to invest

money is key for economic growth. Export base theory gives useful knowledge on the community and shows how the local economy changes overtime. The export base theory divides the community's economy into two sectors, the first being export, or basic sector and the second being nonexport or nonbasic sector ($\text{Total} = \text{Basic} + \text{Nonbasic}$). Shaffer, Deller, and Marcouiller state, "The export sector consists of that portion of the community's goods and services market that trades with other areas. The export sector brings dollars into the community because someone outside the community purchases goods and services produced in the community" (Shaffer, Deller and Marcouiller 2004). The second sector, the nonexport sector, is usually bigger than the export sector because most of the markets in a local economy are internal markets. "The second sector, termed the nonexport, nonbasic or residentiary sector, sells its products within the boundaries of the community (internal markets) and exists to support the export sector" (Shaffer, Deller and Marcouiller 2004). Shaffer, Deller, and Marcouiller claim that the nonexport sector is usually bigger but is still dependent on the export sector. The export sector is bringing in money from surrounding communities, which increases cash flow in the local economy. (Shaffer, Deller and Marcouiller 2004). Exports sectors in an economy can change or fluctuate over time, causing an impact or a multiplier effect on nonexport sectors.

Export base theory is a useful source that is frequently used as a base or foundation for community economic development policy. Export base theory requires many important assumptions that are unrecognized (Pfister 1976; Richardson 1973; Tiebout 1956a). The linear relationship between export and nonexport sectors is built on these eight key assumptions:

1. Income and employment changes in a community depend totally upon changes in the level of exports, with no other stimulus for local change.

2. The marginal propensity to consume locally, specifically the amount of local income spent for local products is stable over time and over a relatively wide range of income change.
3. The amount of local income generated by each dollar of local spending does not change, thus the local labor content does not vary over time.
4. There are no changes in the relative prices of capital or labor as their use increases or decreases (i.e., no shift from labor to capital or vice versa in response to changes in export demand).
5. The additional capital and labor required to expand production is available immediately and without any increase in wages or profits since the community has a perfectly elastic supply of capital and labor to meet increases in demand.
6. The economic structure of a community at one time will predict its future economic structure.
7. The homogenous export sector implies that earnings from jobs and backward linkages, among other factors in separate subsectors of the export sector, are roughly equivalent.
8. None of the local consumption of the goods and services sold for export comes

CHAPTER 3

LIVINGSTON COUNTY ECONOMY

Before any research took place, it was assumed that the agriculture (farm earnings) sector would have a significant impact on Livingston County's employment and income rates. This study begins with the past performance of each individual economic sector in Livingston County. Sectors in an economy each have their own proportion or influence on an economy put in to a percentage or sector proportion. A sector proportion is computed by dividing sector earnings by the total regional earnings. An example would be taking farm earnings for Livingston County (\$77,922), divided by earnings by place of work (\$487,514), which is total earnings for Livingston County ($487,514 / 77,922 = 16.0\%$). The 16.0% percent indicates that farm income controls 16.0% of Livingston County's economy. Figuring out the sector proportions for each sector is essential when trying to locate the base sector for an economy. The calculation showed Livingston County sector proportions for 1990 (figure 2). The manufacturing sector noticeably out performed all the other sectors besides (government and government enterprises) and farm earnings, which was calculated as the second and third best sources of income for the Livingston County. The data showed that in 1990, the manufacturing sector controlled, or took up 29% of Livingston County's economy, while the government and farm earnings sectors controlled 17.34% and 15.98% respectively. Behind those three export sectors, the following sectors consumed the rest of the economy: services (11.19%), retail trade (7.01%), construction (5.94%), wholesale trade (5.33%), finance, insurance, and real estate (3.73%), transportation and public utilities (3.09%), agricultural services, forestry, and fishing (0.80%), and mining (0.59%). Looking at the sector proportions for each of the 11 sectors in 1990, Livingston County's primary sectors were manufacturing, government, and farm earnings. Manufacturing,

government, and farm earnings account for 62.3% of total earnings in Livingston County, while the rest of the sectors control 37.6% of the Livingston County's total earnings. In the year 2000, Livingston County's sector proportions looked slightly different (figure 3). The Farm earnings saw a significant decline in earnings going from 16% in 1990 to just 7.7% in 2000. Looking back at the agriculture timeline from Ag in the classroom, the agriculture industry was seeing a trend of bigger farms getting bigger, while smaller farms were getting smaller or going out of business. In 1990-1991, the national economy experienced a recession, which could be a major factor in the decline of farm earnings ("Historical Timeline -1990" 2014). Manufacturing, on the other hand, grew from 29% to 34.6%, showing that the manufacturing industry is still the primary source of earnings for Livingston County's economy. Livingston County is the home of a couple big manufacturing plants; Caterpillar Inc., which is located in Pontiac Illinois and RR Donnelley, located in Dwight Illinois. The Government and government enterprises sector grew increased its earnings percentage from 17.3% in 1990, to 19.6% in 2000. Services increased to 14.4% in 2000 from 11.2% in 1990. The economy saw retail trade increase to 7.5%, and transportation and public utilities to 4.3%. The other five sectors stayed the same or witnessed a decrease in income. Finance, insurance, and real estate dropped to 2.8%, wholesale trade declined to 3.5%, construction declined to 4.3%, and agriculture services and mining account for 0.85% and 0.5%. Livingston County's earnings shifted from primarily farming, manufacturing, government in 1990 to manufacturing and government in 2000. With farm earnings dropping and smaller sectors increasing their earnings, the economy actually saw an increase in total earnings by place of work. The earnings by place of work in Livingston County went from \$487,514 in 1990 to \$699,254 in 2000.

Livingston County's economy went through some great changes in the 1990's, as did all of the United States. Some sectors saw growth and some saw shrinkage in earnings. The compound annual growth rate was calculated for each sector from 1990-2000 (figure 4). Livingston county saw a 3.7% increase in total earnings by place of work. With the fluctuation in certain sectors, the economy still increased its earnings drastically. Each sector saw a slight change over the 10-year period. Farm earnings is the only sector that saw a decline in growth (-3.6%) from 1990-2000, which could be explained by the recession and trend of the number of famers decreasing, while the number of acres owned per farmer increasing. Ag services, forestry, and fishing saw and 3.4 increase in growth rate, mining increased by 1.2%, construction increased by just 0.4%, wholesale trade decreased by 0.5%, retail trade increased by 4.3%, finance slightly increased by 0.6%. A few sectors saw a significant increase in annual growth rate. Manufacturing saw a 5.5% after already account for 30% of the economies income in 1990. Government and government enterprises saw a 5% increase, while the services sector shot up to 6.3%. The largest margin of increase in Livingston County's economy from 1990-2000 was the transportation and public utilities sector, which increased by 7.2%. Transportation includes railroads, trucking, and public transportation, including transit systems, highways, roads, and bridges. Public utilities include water, gas, electricity, sewage, and irrigation, including public and private wastewater treatment plants. Transportation will always be in demand. Technology is always advancing; roads and highways were improving as were the vehicles used for transportation. The demand for water, gas, electricity, sewage, and irrigation will always be in demand. The development of a community or communities would cause this sector to rise. With places like Caterpillar and Walmart located in Livingston County, transportation will be higher

with tractor truck and trailers (semis) constantly bringing in and shipping out products. (“NASA” 1996)

Data was collected on sector percentage over the period of 1969-2000. The sectors were combined into seven groups, and labeled as follows: Unearned Income, Agriculture, Goods, Utilities and Wholesale, Retail Finance Services, and Government. Putting the sectors in to groups allows for better analyzation of annual sector percentages The Unearned Income group includes two new subsectors, dividends, interest, and rent and personal current transfer receipts. The Agriculture group includes farm earnings and agricultural services, forestry, and fishing. The Goods group includes mining, construction, and manufacturing. The Utilities and Wholesale group includes the transportation and public utilities sector and the wholesale trade sector. The Retail Finance Services group includes the retail sector, finance, insurance, and real estate sector, and the services sector. The Government group includes the government and government enterprises sector. The last group analyzed is residence adjustment and that group includes the subsector adjustment for residence. Resident adjustment accounts for both residents who live outside of the economy and residents who live inside the economy. The wages and salaries an establishment pays to residents living outside of the economy are viewed as outflows. The salaries and wages that residents outside of the economy receive from establishments inside the economy are viewed as inflows. (“Personal Income- Livingston” 2017) The sector percentage for each group from 1969-2000 is calculated by adding the earnings for each sector or subsector per group divided by personal income, which is all income including earnings income. These groups were put in a line graph (figure 5) to show how they fluctuated overtime. The Unearned Income group has controlled around 25%-35% of the economy’s earnings since 1969. The Agriculture group fluctuated slightly from 1969 until 1980 when the earnings percentage

dropped from 17.02% to 5.84% due to the fact of a farm financial crisis that affected farmers with large amounts of debt, causing many smaller farmers to file for bankruptcy and leave the industry (“Historical Timeline -1980” 2014). The Goods sector proportion was at 17.81% in 1969, but saw a slow increase in earnings that grew 8.5% to 26.38% in 2000. Looking at the line graph (figure 5), Utilities and Wholesale have a straighter line meaning the earnings percentage was consistent over the 32-year period. Government, like utilities and wholesale, stayed steady with few years of slight fluctuation. With the government sector being the only source of earnings for the Government group, steadiness is more likely to happen without the impact of other sectors increasing or decreasing. The last group analyzed is the Residence Adjustment group. The Residence Adjustment group includes one subsector of Derivation of personal income. Residence saw little to no change staying around 5%-10% over the 34-year period.

The next technique used in this research is calculating the location ratio or (location quotation). The location ratio is a useful way to distinguish how concentrated an industry, occupation, or demographic group is in a region in comparison to the national economy. “The basic uses of industry LQs (and, by extension, for clusters and occupations as well) include these:

- To determine which industries make the regional economy unique
- To identify the ‘export orientation’ of an industry and identify the most export-oriented industries
- To identify emerging export industries beginning to bring money into the region
- To identify endangered export industries that could erode the region’s economic base.”

Location ratios classify sectors in three different groups, imports, neutral, and exports. Import sectors are sectors that do not have the resources to employ and produce the right amount of good or service demanded by the community. An export sector is the opposite of an import. Export sectors can produce more than enough goods or services for the community allowing them to export the extra products out of the economy to allow for greater earnings and cash flow in the economy. Neutral sectors are sectors that are self-sufficient, or able to produce enough of the demanded product for the local economy, but not enough to export to other economies. If the location ratio is less than .75 it is an import. If the location ratio falls between .75 and 1.25 then it is neutral or self-sufficient, and if it is greater than 1.25 it is considered an export. (“Understanding Location Quotient” 2017)

In this portion of the research, Livingston County’s income sector percentages are compared with the United States income sector percentages for the years 1990 and 2000. The location ratio is calculated by dividing the local sector percentage by the National sector percentage for each sector. An example would be, the Livingston County farm earnings sector percentage for the year 2000 (7.7%), divided by the US. farm earnings sector percentage for the year 2000 (0.8%) ($7.7\%/0.8\%=9.63$).

In 1990, the location ratios showed three exports, four neutral and four imports. The Livingston County farm earnings sector was thriving with a sector percentage of 15.98%, while the United States farm earnings sector attributed to just 1.29% of total earnings in the US. Farm earnings is the largest location ratio and biggest export at 12.36. This means that farm earnings is just over 12 times more concentrated in the region than average in the United States. The manufacturing and agriculture services, forestry, and fishing sectors are also an export sector that have a location ratio of 1.51 and 1.31. Construction (1.00), wholesale trade (0.84), government

and government enterprises (0.97), and retail trade (0.76) are all self-sufficient or neutral sectors. This shows that there is little concentration in the local economy over the national average. Mining (0.56), transportation and public utilities (0.47), finance, insurance, and real estate (0.55), and services (0.45) are all import sectors that depend on foreign markets to help supply the demand for products or services.

The location ratios for 2000 showed that farm earnings dropped, but is still the most concentrated in Livingston County at 9.68. The cause of the drop in the ratio could be from the farm earnings sector percentage going from 15.98% in 1990, to just 7.7% in 2000. The rest of the exports include agriculture services, forestry, and fishing slightly dropped to 1.30, while, manufacturing increased to 2.22, and government increased to 1.25. Construction and wholesale trade both decreased to import sectors. This is a case where government officials and economic developers need to organize a program or invest money into these sectors to all for increasing returns. Retail trade is the only neutral sector, while finance, insurance, and real estate, wholesale trade, transportation and public utilities, Services, and mining are all import sectors that saw little to know change in concentration. Looking at the differences in location ratios from 1990-2000, the economy showed improvement with gaining another export sector in government and government enterprises. In response to the export gain, sectors such as construction and wholesale trade became import sectors, which would cause more of local earnings to be spent in other economies, and further lower cash flows. (Figure 6) will show the trends of Livingston County's location ratios between 1990 and 2000.

CHAPTER 4

ILLINOIS ECONOMY

The second economy analyzed in this study is Illinois' economy. Illinois is a tough source of competition for other states as it sits in a central location (Midwest), and excellent transportation system. Illinois has more than 2,000 miles of interstate highways with 34,500 miles of state highways. This allows trucks to transfer goods on time and efficiently. "Illinois is a leading producer of soybeans, corn and swine" (Illinois Department of Agriculture 2014).

The sector proportions for Illinois economy were calculated for the years 1990 and 2000. Comparing the sector proportions for each sector for those two years will show what direction each sector went during those 10 years. A pie chart, in (figure 7); will graphically show the sectors, and their importance to the economy in terms of income. Like Livingston County, it was assumed that the agriculture industry is the driving force behind Illinois' economy. In 1990, Illinois economy made \$185,335,751.00, with services accounting for 24.82% of total earnings. Manufacturing, like Livingston County, is an efficient sector earning 19.26% of Illinois total earnings. Government and government enterprises controlled 13.90%, while the rest of the sectors were below 10%. The rest of the sector percentages were as follows: The finance, insurance, and real estate (9.43%), retail trade (8.41%), wholesale trade (7.91%), Transportation and public utilities (7.08%), construction (5.91%), farm earnings (0.95%), Mining (0.43%), and the agriculture services forestry and fishing sector accounted for just (0.43%) of total earnings in Illinois.

In 2000, Illinois almost doubled its total earnings from \$185,335,751.00 in 1990, to \$317,271,747.00. "During the period of 1993-2000 significant positive overall employment changes were seen for both Illinois and the U.S." (Bieneman, et al. 2014). However, (figure 8)

shows that all sector percentages dropped from 1990 except for the services sector and finance, insurance and real estate sector. The services sector increased its earnings accounting for almost 30% of Illinois economy. The finance, insurance, and real estate sector slightly increased from controlling 9.43% of Illinois earnings in 1990 to 10.78% of earnings in 2000. The manufacturing industry dropped by 3% in 2000, but still influenced the economy significantly at 16.97%. The government and government enterprises sector controlled 13.30% of the economies earnings. The retail trade, wholesale trade, transportation and public utilities, and construction sectors slightly dropped to 7.79%, 7.22%, 6.89%, and 5.82%, with farm earnings, agricultural services, forestry, and fishing, and mining all under 1%.

The data analysis above shows how much each industry contributes to the total earnings of the Illinois economy. The compound annual growth rate (figure 9), shows the percentage of growth or shrinkage that each sector encountered over the 10-year period. The overall earnings for Illinois increased by 5.6% in just 10 years. As stated before, Services increased by 7.7% from 1990 to 2000, while the finance, insurance, and real estate sector increased by 7.1%. That much growth to an industry in just 10 years can strongly influence an industry and what direction it is going. The agriculture services, forestry, and fishing sector earnings grew by 5.8%, as the construction industry quietly grew by 5.6%, where as their sector percentage did not increase near that drastically. Transportation and public utilities, government and government enterprises, retail and wholesale trade industries all increased by around 5% in the Illinois economy, with farm earnings increasing by just 0.3% and mining decreasing by 1.3%. Looking at the growth rates for each sector showed that the economy, overall grew stronger, with all of the sectors but one, increasing their earnings from 1990-2000.

Like Livingston County, sector earnings collected and analyzed from 1969-2000 (figure 10). This technique is different from the 1990-2000 sector percentage technique in that the personal income sector and the four subsectors that contribute to personal income were added to the calculation. The sectors were placed into seven different groups, Unearned Income, Agriculture, Goods, Utilities and Wholesale, Retail Finance Services, Government, and Residence Adjustment. Putting the sectors in to groups allows for better analyzation of annual sector percentages. The sector percentage for each group was calculated yearly from 1969-2000. The sector percentage for each group from 1969-2000 is calculated by adding the earnings for each sector or subsector per group divided by personal income, which is all income including earnings income. An example for calculating Illinois' sector percentage for the Agriculture group would be adding the income of farm earnings and agriculture services, forestry, and fishing, and dividing the sum by personal income. The Unearned Income group, which includes the subsectors, dividends and interest and transfer payments, saw a sector percentage above 20% throughout the entire analyzed period. The Unearned Income's sector percentage fluctuated between 20% and 27% in the 70's and rose past 30% in the 80's and 90's. The Agriculture group, which includes the farm earnings and agriculture services sectors, witnessed lower sector percentages with the amount of sectors going into it being smaller than the other groups. The Agriculture industry never had a sector percentage above 5%, but fluctuated between 1% and 4% over the years. Stated earlier, the United States went into a recession in 1981-1982, which could be the cause of a negative sector percentage the agricultural industry witnessed in 1983. After 1983, with the economy trying to regain ground lost in the recession, the agriculture industry increased its sector earnings slightly, but never exceeded the percentage it once had attained before the recession ("Historical Timeline – 1980" 2014). The Goods group, which includes the

mining, construction, and manufacturing sectors, had a significantly big impact on Illinois economy throughout the 32 years that were calculated. The group saw a steady decrease in earnings year after year going from 33.21% of the economies income to 17.87% in 2000. The Utilities and Wholesale group, which includes the transportation and wholesale trade sectors, stayed consistent with slight fluctuation at around 10%-12%. The Retail Finance Services group that includes the retail trade, finance and services sectors saw a fluctuation of sector percentages between 25%-30% from 1969-1986. After 1986, the Retail Finance Services group obtained over 30% of Illinois economy's income. The Residence Adjustment group includes only the subsector, adjustment for residents, had a sector percentage of 0.13% in 1969 and saw a negative percentage for most of the remaining years. Resident adjustment accounts for both residents who live outside of the economy and residents who live inside the economy. The wages and salaries an establishment pays to residents living outside of the economy are viewed as outflows. The salaries and wages that residents outside of the economy receive from establishments inside the economy are viewed as inflows. During the recession, as the other groups saw a decrease in sector percentage, Residence Adjustment saw a slight increase. The Government group, which includes the government and government enterprises sector stayed between 10%-12% throughout the 32 years. The consistency is no surprise with this sector, as the jobs or establishments included under this sector receive financial support from the federal government ("CA5 Personal Income-Illinois" 2017). Overall, from 1969-2000, Illinois economy saw great changes in their income percentage per sector. The Unearned Income group accounted for 20.94% in 1969 and increased by almost 10% in 2000 to 30.54%. The Agriculture group saw a significant decrease in income percentage with it earning 2.12% of the economies income in 1969 to just .77% in 2000. The Goods group had the largest decrease in income percentage over

the 32 years. The Goods group had a sector percentage of 33.21% in 1969 and a sector percentage of 17.87% in 2000. The Utilities Wholesale group also saw a slight decrease with the group producing 12.46% of the economies income in 1969 to 10.92% in 2000. The Retail Finance Services group greatly increased from 1969-2000. In 1969, the Retail Finance Services group had a sector percentage of 25.82% and a sector percentage of 37.84% in 2000. As stated before, the Residence Adjustment group only includes the adjustment for residence subsector, which is why the sector percentage is significantly lower than the rest of the groups.

The last technique used to analyze Illinois' economy is calculating the location ratios. The same 11 sectors that were used for Livingston County's location ratios were used to in calculation the location ratios for Illinois. Location ratios were calculated for the years 1990 and 2000. Calculating the location ratios for 1990 and 2000 will give a 10-year gap to show the changes each sector encountered. The comparing economy for this calculation is the United States Economy. In 1990, Illinois' economy had one export sector, three import sectors, and seven neutral sectors. The location ratios, when comparing Illinois' economy and the United States' economy will show lower concentration levels for each sector. The difference in economies is not as significant between Illinois and the United States as it was with Livingston County and the United States. The finance, insurance, and real estate sector was the most concentrated and only export sector in Illinois with a location ratio of 1.40. Wholesale trade's location ratio was just below finance, insurance, and real estate at 1.24. Transportation, manufacturing, and construction are neutral sectors with location ratios of 1.08, 1.07, and 1.00. Services (0.99), retail trade (0.91), and government and government enterprises (0.78) all have smaller ratios than the group above but are still classified as neutrals. Farm earnings (0.74),

agricultural services (0.70), and mining (0.54), are all less than 0.75, which classifies them as import sectors.

In 2000, Illinois recorded three import sectors, eight neutral sectors, and zero export sectors. The three import sectors are farm earnings (0.72), Agriculture services, fishing, and forestry (0.72), and mining (0.36). The rest of the sectors were all classified as neutral sectors. When looking at the location ratios between 1990 and 2000 (figure 11), Illinois economy declined in earnings for the majority of the sectors while also losing an export sector in finance, insurance, and real estate industry. In a case like this, economic analysts need to pursue a solution to further increase the inflow and outflow of money in the economy. Investing money into certain sectors, putting a policy(s) in place, or expanding the job market are all strategies to help improve an economy.

CHAPTER 5

DATA AND METHODS

The research procedures for the time series model used in this paper required data to be collected from Bureau of Economic Analysis (bea.gov). Determinates for Livingston County's total earnings or earning by place of work (EBPW), were collected to examine the significance of each sector on the Livingston County's total earnings. Farm employment (FE), manufacturing employment (MANU), services employment (SERV), wholesale trade employment (WT), and mining employment (MIN) were used as determinates to derive the factors that affect Livingston County's total earnings extending from 1980 to 2000.

The model performed in this research to show the relationships between each variable is a multiple regression model. The multiple regression model allows for analysis of the impacts of multiple independent variables (X) that determine the outcome of the dependent variable (Y). The ordinary least squares estimator (OLS) will be utilized to determine the coefficients for each of the independent variables. Utilizing the OLS estimator allows for estimation of parameters in the regression model. OLS estimator diminishes error sums of squares for the regression model, showing the effects of each of the explanatory variables on the dependent variable with minimal error in the output. Eliminating the errors allows for a line of best fit, which should show the predicted values are similar to the actual values in the data set.

There are several assumptions needed when running the OLS estimator. The first assumption is that the model being used is linear in its parameters, which means that the dependent variable must be linear with its explanatory or (independent) variables. The second assumption needed is the data being used must be a random sample of the total population, meaning, that the data used must be randomly picked from the data set. The third assumption is

that the error terms in the model will focus on a mean equal zero. The error terms should follow normal distribution with no relationship between independent variables. The fourth assumption is that the correlation between independent variables not be too high. Having strong correlation between independent variables causes a multicollinearity issue. Multicollinearity causes R^2 to increase and t-values to decrease, which affects the outcome of the regression. The fifth assumption is that the errors in the regression should be normally distributed. The sixth and final assumption is that the residuals should have a constant variance. Using these assumptions, the model used in this study can viewed as:

$$(1a) \text{ Earnings by place of work} = \beta_0 + \beta_1(\text{farm employment}) + \beta_2(\text{manufacturing}) + \beta_3(\text{services}) + \beta_4(\text{wholesale trade}) + \beta_4(\text{mining}) + \varepsilon_i$$

Equation (1a) is used as a function to determine what sectors employment rates have the largest impact on earnings by place of work in Livingston County. Whether the effect is negative or positive, this model will show the results of the question at hand. Each sector was given an expectation on the affects it has on the total earnings. The expected sign of the coefficient for farm employment will be positive with a statistical significant effect, which indicates that an increase in farm employment in Livingston County will cause a significant increase in Livingston County's total earnings. With Livingston County having great soil and many tillable acres being farmed, the assumption would be that farm earnings would increase as technology increased. The expected sign of the coefficient for manufacturing will positive as well. Not only is farm employment expected to increase total earnings, but also, manufacturing should play a big role with larger corporations, such as Caterpillar Inc., residing in Livingston County. The expected sign of the coefficient for services will be positive on total earnings. Services, which includes, banks, schools, post offices, health care etc. will cause a positive effect

on total earnings over the 20-year period. Schools, banks, and health care will always be in demand and those are just a few examples of what is included in the services sector. The expected sign of the coefficient for wholesale trade is positive but not significant. Wholesale trade includes the selling of merchandise to industrial, agricultural, construction, and commercial retailers. The expected sign of the coefficient for mining is positive but with little to no significance. Lastly, the mining sector has a small roll in Livingston County's economy. With an increase in mining jobs, a slight positive effect on total earnings is expected.

Several hypothesis test will be utilized in this study. T-tests will be conducted for each of the independent variables. This procedure will be done in order to analyze the coefficients and verify if each are statistically significant from zero. When looking at the t-statistic for each of the independent variables, if the t-statistic is lower than the given t-critical the null hypothesis (H_0) is failed to reject, indicating that the independent variable has no statistical effect on the dependent variable. When the t-statistic is greater than the given t- critical value the null hypothesis (H_0) is rejected, indicating that the explanatory variable has a significant effect on the dependent variable. Lastly, an f-test will be conducted to test the R-squared (R^2). The test is utilized when looking to see if R^2 is equal to zero. The R^2 provides the explanatory value of the model used. Failing to reject the null hypothesis (H_0), shows that the independent variables do an inefficient job in explaining the variation of the dependent variable. Hypothesis tests used in this study can be viewed as follows:

TABLE 1: Hypothesis test

1. H_0 : Farm Employment = 0
2. H_0 : Manufacturing = 0
3. H_0 : Services = 0
4. H_0 : Mining = 0
5. H_0 : $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$
6. H_1 : $\beta_1 = \beta_2 = \beta_3 = \beta_4 \neq 0$

CHAPTER 6

RESULTS

The results of the OLS estimation used in this study is provided below with proper coefficient estimates and t-statistics to their corresponding variables.

(1b) Earnings by place of work= $-257.819(\text{farm employment}) + 54.060(\text{manufacturing}) + 123.466(\text{services}) + 128.592(\text{wholesale trade}) + 249.242(\text{mining})$

The t-statistics for each of the following variables in the model are as follows:

Farm Employment = -4.82

Manufacturing = 2.85

Services = 3.03

Wholesale Trade = 1.73

Mining = .8446

The following is a result of the effect each sector had on total income from 1980-2000 in Livingston County's economy. The farm employment coefficient is the exact opposite from what was expected in the outcome. The coefficient for farm employment indicates that if the number of farms decreases by one, the total earnings for Livingston County will go increase by \$257,819 dollars. The coefficient for manufacturing is positive, as expected. The coefficient for manufacturing indicates that for every one job increase in the manufacturing sector, total income increases by \$54,060 dollars. Services also has a positive effect on Livingston County's total earnings, which is indicated by for every one job increase in the services sector, total earnings increases by \$123,466 dollars. Wholesale trade also shows a positive effect on total earnings. For every one job increase in wholesale trade, total earnings in Livingston county increases by 128,592. Mining, being a small job populated sector, shows that for every one job increase in

the mining sector, total earnings increases by \$249,242. The R^2 for model above is .97, and that indicates that only three percent of the variation in Livingston County's total earnings from 1980-2000 is not explained by farm employment, manufacturing employment, services employment, wholesale trade employment, and mining employment.

The elasticities for each variable were estimated to homogenize the units. The elasticity indicates that for every one percent increase in farm employment, earnings by place of work decreases by (-1.197%). The elasticity indicates for manufacturing indicates that for every one percent increase in manufacturing employment, earnings by place of work increases by .494%. The elasticity for services indicates that for every one percent increase in services employment, earnings by place of work increases by 1.018%. The elasticity for wholesale trade indicates that for every one percent increase in wholesale trade employment, earnings by place of work increases by .201%. The elasticity for mining indicates that for every one percent increase in mining employment, earnings by place of work increases by .053%.

The critical value for the t-tests that was conducted in this study is +/- 1.746. Farm employment had a t-statistic of -4.81663, which is greater than +/-1.746 so the null hypothesis is rejected. This indicates that the coefficient for farm employment has no statistical significance and is equal to zero. Manufacturing employment had a t-statistic of 2.84568, which is greater than 1.746 and the null hypothesis is rejected. The services sector employment had a t-statistic of 3.02607, so the null can be rejected. Rejecting the null indicates that the coefficient has a significant effect on Livingston County total earnings. Wholesale trade had a t-statistic of 1.73258, which can be viewed as a positive effect on total earnings, so the null hypothesis is rejected. Mining showed a t-statistic of .844642, indicating that failing to the null is the accurate outcome.

P-values were collected for each variable, which indicates if the null hypothesis is correct. Calculating P-values allows for further analysis in testing the statistical significance that each independent variable has on the dependent variable. P-values is a number between 0-1. P-values less than or equal to 0.05 indicates that the null hypothesis can be rejected. Farm earnings had a P-value of .000 indicating the null hypothesis is rejected. Manufacturing had a P-value of .012, which also indicates that manufacturing employment has a significant effect on the economy and the null hypothesis is rejected. Services had a P-value of .009, which means, the null hypothesis is rejected. Wholesale trade and mining scored P-values of .104 and .412, and both fail to reject the null hypothesis. The F-statistic for the null hypothesis of $H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$ is 126.932, which exceeds the F – critical value of 2.85, so the null hypothesis is rejected.

CHAPTER 7

DISCUSSION

Livingston County sector proportions were calculated for the years 1990 and 2000 (shown in figure 2 & 3). In 1990, the manufacturing, farm earnings, and government sectors controlled the majority of Livingston County's earnings. Those three sectors accounted for 62.3% of Livingston County's total earnings, while, in 2000, appeared significantly different. The sectors that controlled the majority of Livingston County's earnings in 2000 were manufacturing and government, and they brought in just over 50% of all earnings in Livingston County at 54.2%. Manufacturing increased its sector percentage from 29% in 1990 to 34.6% in 2000. An increase in population, as well as the opening of a Walmart could be the reason for growth in the manufacturing sector. The government sector saw a 2% increase in sector earnings from 1990-2000, where it controlled 17.3% in 1990 to 19.6% in 2000. The government sector collects and spends tax money to sustain the economy and further advance the economy financially. Farm earnings' sector percentage saw a rapid decline in percentage earnings dropping from 16.0% in 1990 to just 7.7% in 2000. Many scenarios could cause this, such as commodity prices fluctuating at the county level throughout the 10-year period. Corn prices in Illinois went from \$2.46/bushel in 1990 to \$1.90/bushel in 2000, while bean prices saw a decline from \$5.92/bushel in 1990 to \$4.81/bushel in 2000. Overall, all commodities in Illinois saw a decline in prices over the decade ("Illinois Average" 2016). The services sector saw a slight increase from 11.2% in 1990 to 14.4% in 2000. Growing population could be a cause of the increase, as well as schools and health care services advancing causing an increase in earnings for the local economy.

Growth rates in Livingston County showed change to all sectors (figure 4). Total earnings in Livingston County's economy increased by 3.7% from 1990-2000. Other notable changes in growth rates from 1990-2000 are farm earnings decreasing by 3.6%, which could be caused by the commodity prices dropping as stated before. However, Agricultural services, forestry, and fishing saw a 3.6% increase in growth, with services and government seeing a 6.3% and 5% increase in growth.

Looking at the trends sectors went through from 1969-2000 (shown in figure 5); sectors were grouped into seven groups with the group's sector percentage recorded. Sector percentages may differentiate drastically between sectors due to the number of sectors per group. This procedure was done to show what how much each group has changed over time. It was anticipated to see significant changes to each group with fluctuation and increasing wage rates as the years move forward. The unearned income group, which was explained earlier, had a sector percentage of 24.24% in 1969, and sector percentage of 31.12% in 2000. The agriculture group saw a significant decrease from 18.12% in 1969, to just 5.66% in 2000. The goods group increased by almost 10 percent from 17.81% in 1969 to 26.38% in 2000. The last sector that saw a significant change was the residence adjustment, which includes money made internally in the economy that is spent or taken out of the economy, and income made outside of the economy that is brought or spent inside the economy. Residence adjustment saw an increase in its sector percentage where it went from 9.83% to 13.19%.

Livingston County's location ratios in 1990 compared the sector percentages for each sector in Livingston County with the United States economy. In 1990, Livingston County obtained three export sectors, four neutral sectors, and four import sectors. In 1990, the export base for Livingston County was farm earnings with a ratio of 12.36, meaning that farm earnings

in Livingston County is 12 times more concentrated than farm earnings in the United States. Farm earnings had a significantly bigger location ratio than the rest of the sectors. The rest of the sectors saw location ratios between 0.45 and 1.51. In 2000, Livingston County's economy gained one more export sector with government going from a neutral sector (0.97) in 1990, to an export sector (1.25) in 2000. Livingston County provided four export sectors, one neutral sector, and six import sectors. Increasing in import sectors shows sectors losing sustainability in production causing them to import goods into the community rather than producing them for the community. This causes earnings made in Livingston County to be spent outside of the economy lowering cash flow. Figure 6 compares the location ratios from 1990-2000

Illinois sector percentages in 1990 (figure 7) were significantly different from Livingston County. The services sector was responsible for 24.82% of Illinois total earnings, while, manufacturing and government accounted for 20.59% and 13.90% of Illinois total earnings. Illinois' sector percentages in 2000 (figure 8), shows services increasing from 24.82% to 29.95%, which means services, increased their portion of earnings toward Illinois economy. All of the other saw little increase or little decrease in their earnings percentage within the decade.

Like Livingston County, sector percentages from 1969-2000 (figure 10) were recorded with sectors being placed into seven different groups. From 1969-2000, Unearned income saw a 10% increase, retail finance services witnessed a 12% increase, and Goods declined by 15%. These three sector encountered the largest margin of change within the seven groups. Group such as the agriculture group (declining from 2.12% to 0.77%) will see drastic changes with the prices of commodities fluctuating.

Illinois growth rates from 1990-2000 (figure 9), showed that Illinois' total earnings went up by 5.6%. Mining, (-1.3) is the only sector in Illinois' economy that saw a decline growth

over the decade. This shows that Illinois' economy saw growth rates increase overall which leads to more cash flow throughout the state. Services saw a 7.7% growth increase, which could be caused by an increase in the number of schools, health care facilities, legal firms etc. Finance, insurance, and real estate grew by 7.1% over the decade. This sector includes a large group of jobs. Insurance companies are always in demand. Real estate could play a role in the growth of the sector with people or corporations moving into Illinois causes the growth of the sector to increase. Manufacturing's growth increased by 5.6%, which is caused by large manufacturing corporations, moving into the state and allocating their resources throughout the world increasing cash flows as well as growth to the state of Illinois.

In figure 11, Illinois location ratios were compared at the state level. Illinois sector percentages for the years 1990 and 2000 were compared to the United States 1990 and 2000 sector percentages. Location ratios at the state level are going to be as concentrated as a local level economy due to the increase in population and jobs available. In 1990, Illinois economy consisted of just one export, 5 neutral and 3 import sectors. This proves that Illinois was a neutral economy, meaning the economy is not very concentrated within these particular sectors. The sole export sector in Illinois is the finance, insurance and real estate sector (1.40). Illinois is almost 2 times more concentrated for that sector than the US is. In 2000, Illinois' economy consisted of eight neutral sectors and three import sectors. This shows that the economy is not concentrated within the sectors compared to the US. Showing this procedure is important when looking at the uniqueness of specific region. Finance, insurance and real estate saw a significant drop in its location ratio. Investments and strategies must be made to endangered export sectors to keep them from falling to a neutral industry. Sectors such as wholesale trade (1.17) and transportation (1.07) are on the verge of becoming export sectors. Investing in certain programs

or policies could allow those sectors to become export sectors further growing how uniqueness of Illinois.

The results of this study show an indefinite relationship between Livingston County earnings by place of work and farm employment, manufacturing, and services. Wholesale trade showed a marginal effect on total earnings, but is not as drastic as the other variables. Mining showed to be the only independent variable that did not have a significant effect on Livingston County's earning by place of work. The result of mining not being significant could be the limited number of jobs offered within the local region. An important result in this study was that farm employment actually had a significant negative effect on earnings by place of work. As stated above, if farm employment increases by one job, total earnings decreases by \$257,000. This could happen when a farmer retires or sells his farm allowing bigger farmers to purchase and farm more land increasing their expenses, which decreases total earnings. Services showed significant impact on total earnings in that it is a very important sector for all economies. Citizens, businesses, and government establishments are always seeking a service whether it is medical, financial, legal, or educational, services can play a significant role in regional earnings. Manufacturing, as talked about before can include major corporations such as Walmart that move into the area and produce an abundance of goods that allows for greater earnings in a county level economy.

A possible limitation in this study was that only Livingston County was analyzed. Meaning that impacts on total earnings in other counties or states could vary. Smaller counties or counties in different geographic locations may not see as much of an effect on total earnings from these variables as Livingston County does. Counties differentiate in size, so examining at the state level and comparing states could be another possibility.

Regional economies are different all throughout the United States. Economies total earnings are controlled by different industries in different locations all throughout the world. The determinate of an economy's exports is the geographic location of the region. Meaning, agriculture is a primary resource in the Midwest, (where Illinois and Livingston County are located) so the agriculture sector can cause a distinct change in total earnings whether it is positive or negative. Future studies may want to include more variables that could affect local economy's total earnings. Future studies may also want to expand the years being analyzed to further, improve the results.

This study examines the trends of Livingston County's economy and Illinois' economy based on 11 sectors. Sector percentages from 1969-2000 are included for both Livingston County and Illinois. That data shows each sector and its percentage of earnings it brings in to the economy. This study also shows and explains the growth rates for each sector at the local and state level from 1990-2000. Location ratios were included in this study to show what industries make Livingston County and Illinois' economies unique compared to other economies. Overall, the assumptions based on the agricultural sector were off in Livingston County. The data did not show the agriculture sector having as much of an effect on Livingston as expected.

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APPENDIX

Table 2: Explanation of Variables

Variable	Explanation
EBPW	Livingston County's Earnings by place of work (Total Earnings)
FE	Livingston County's Farm Employment
MANU	Livingston County's Manufacturing sector employment
SERV	Livingston County's Services sector employment
WT	Livingston County's Wholesale Trade sector employment
MIN	Livingston County's Mining sector employment

*Variable labels to be used for the following tables

Table 3: 1980-2013 Univariate Summary Statistics

Univariate statistics
=====

Number of Observations: 21

	Mean	Std Dev	Minimum	Maximum
EBPW	451488.42857	138743.55009	251388.00000	699254.00000
FE	2095.66667	288.66249	1742.00000	2563.00000
MANU	4127.04762	421.85062	3529.00000	4972.00000
SERV	3723.61905	434.97155	2914.00000	4572.00000
WT	705.38095	91.62286	593.00000	966.00000
MIN	96.66667	22.94414	62.00000	141.00000

	Sum	Variance	Skewness	Kurtosis
EBPW	9481257.00000	1.92498D+10	0.18068	-1.21585
FE	44009.00000	83326.03333	0.23415	-1.44203
MANU	86668.00000	177957.94762	0.54394	-0.58855
SERV	78196.00000	189200.24762	0.44043	-0.27319
WT	14813.00000	8394.74762	1.65914	2.96423
MIN	2030.00000	526.43333	0.22990	-0.59840

Table 4: 1980-2000 Time Series Regression Output

```

Equation 1
=====

Method of estimation = Ordinary Least Squares

Dependent variable: EBPW
Current sample: 1 to 21
Number of observations: 21

Mean of dep. var. = 451488.          LM het. test = 2.57969 [.108]
Std. dev. of dep. var. = 138744.     Durbin-Watson = 2.20476 [<.932]
Sum of squared residuals = .888916E+10 Jarque-Bera test = .130252 [.937]
Variance of residuals = .592611E+09  Ramsey's RESET2 = .012943 [.911]
Std. error of regression = 24343.6    F (zero slopes) = 126.932 [.000]
R-squared = .976911                   Schwarz B.I.C. = 247.499
Adjusted R-squared = .969215          Log likelihood = -238.365

      Estimated      Standard
Variable Coefficient      Error      t-statistic      P-value
C        194143.          312304.      .621647          [.544]
FE       -257.819         53.5268     -4.81663         [.000]
MANU     54.0600          18.9972      2.84568          [.012]
SERV    123.466           40.8008      3.02607          [.009]
WT      128.592           74.2200      1.73258          [.104]
MIN     249.242           295.086      .844642          [.412]

```

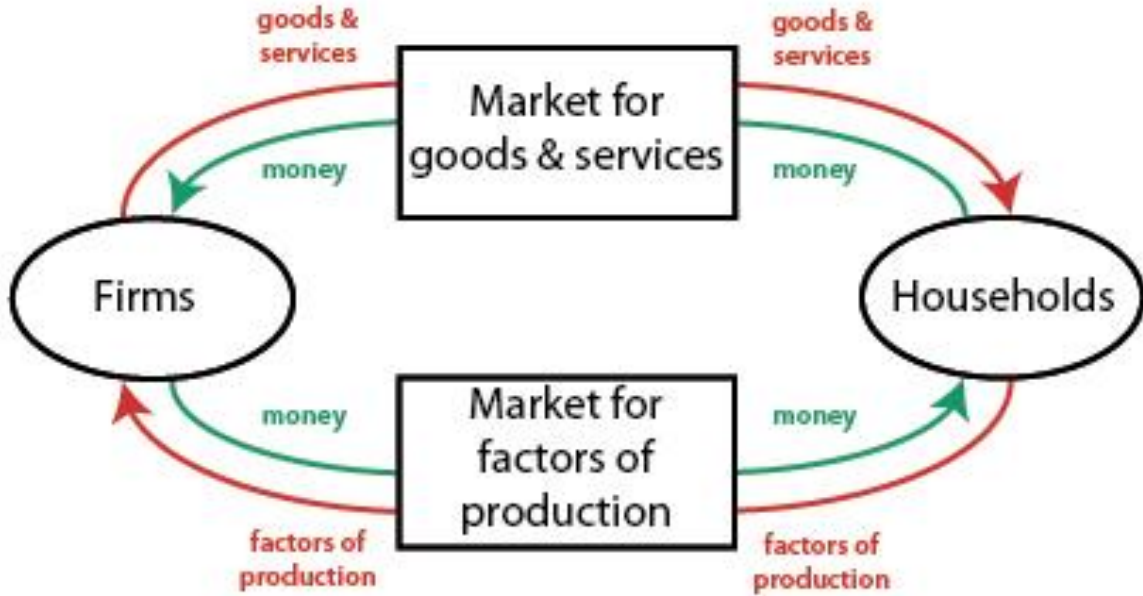



Figure 1: Circular Flows Model

Source: policonomics.com

1990 Livingston Sector Percentages

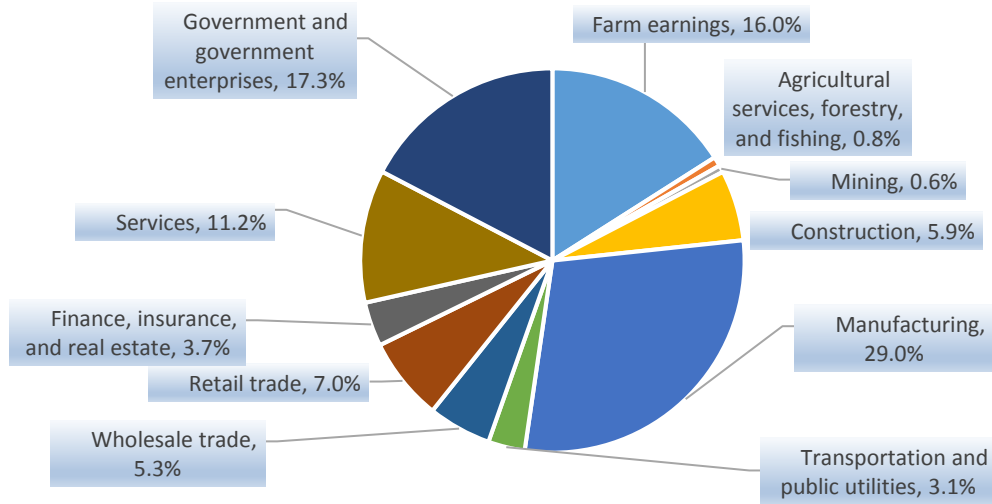


Figure 2: 1990 Livingston County Sector Percentages

Source: bea.gov

2000 Livingston County Sector Percentages

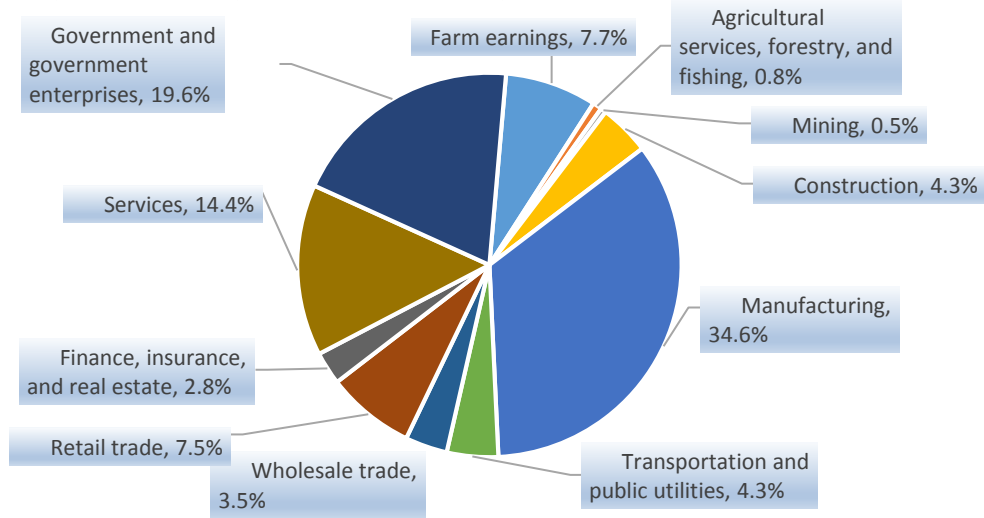


Figure 3: 2000 Livingston County Sector Percentages

Source: bea.gov

1990-2000 Livingston County Earning Growth Rates

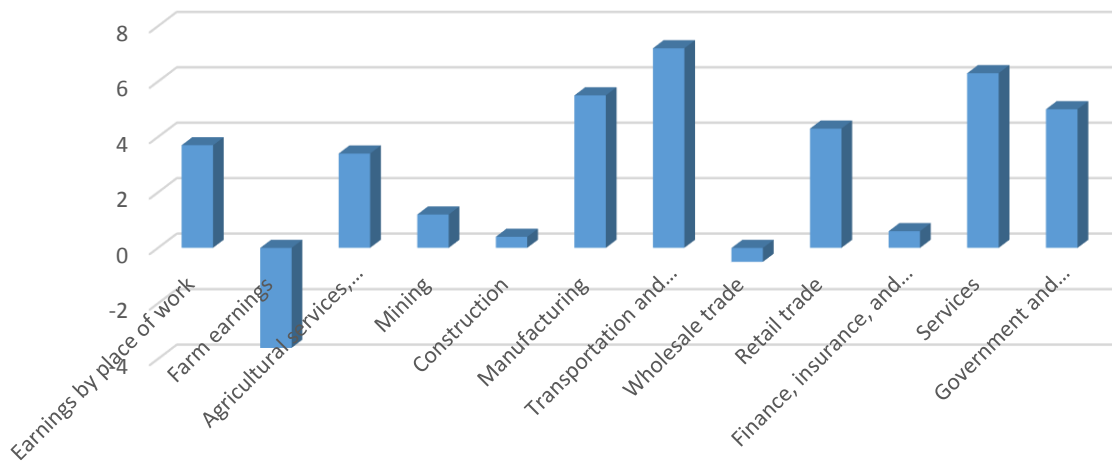


Figure 4: 1990-2000 Livingston County Earnings Growth Rates

Source: bea.gov

1969-2000 Livingston County Sector Percentages

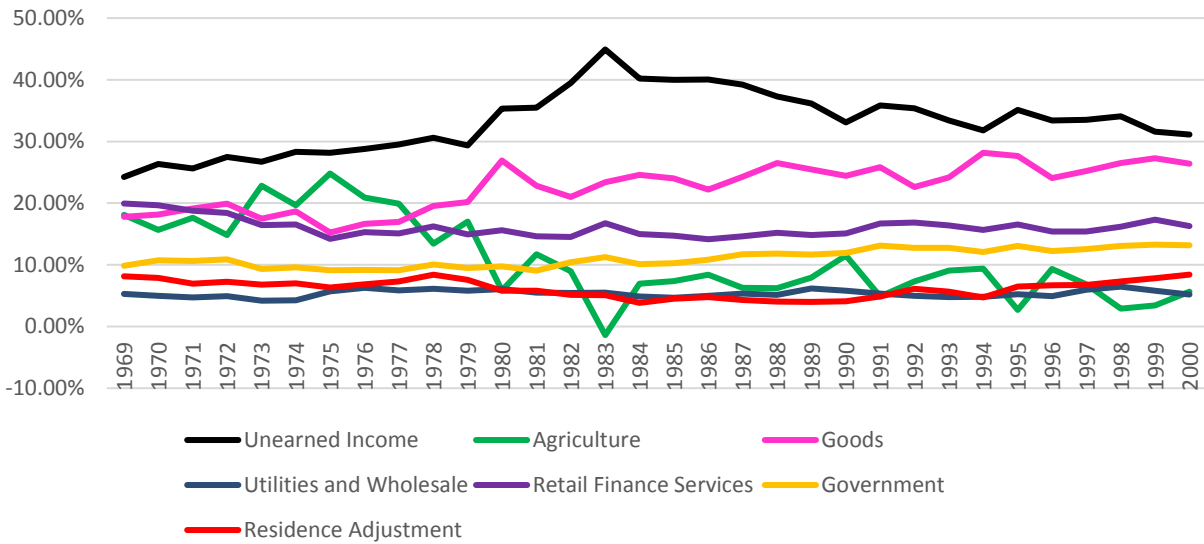


Figure 5: 1969-2000 Livingston County Sector Percentages

Source: bea.gov

Livingston County Location Ratio Comparison

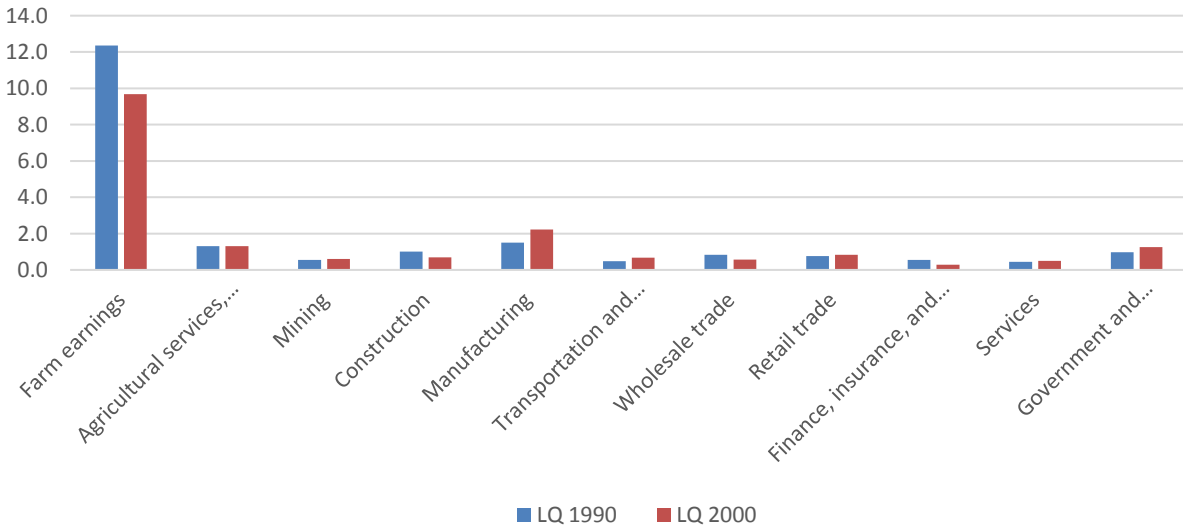


Figure 6: 1990-2000 Livingston County Location Comparison

Source: bea.gov

1990 Illinois Sector Percentages

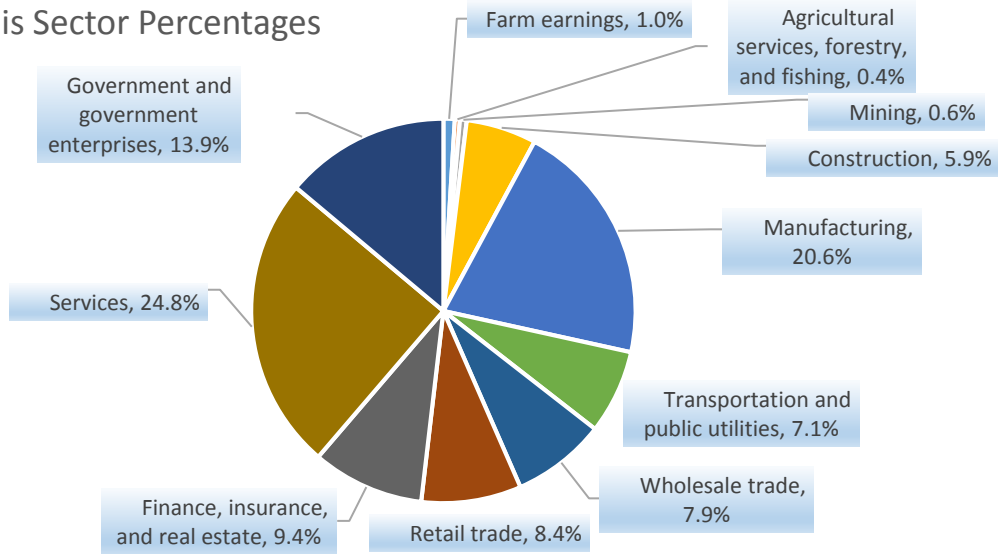


Figure 7: 1990 Illinois Sector Percentages

Source: bea.gov

2000 Illinois Location Ratio

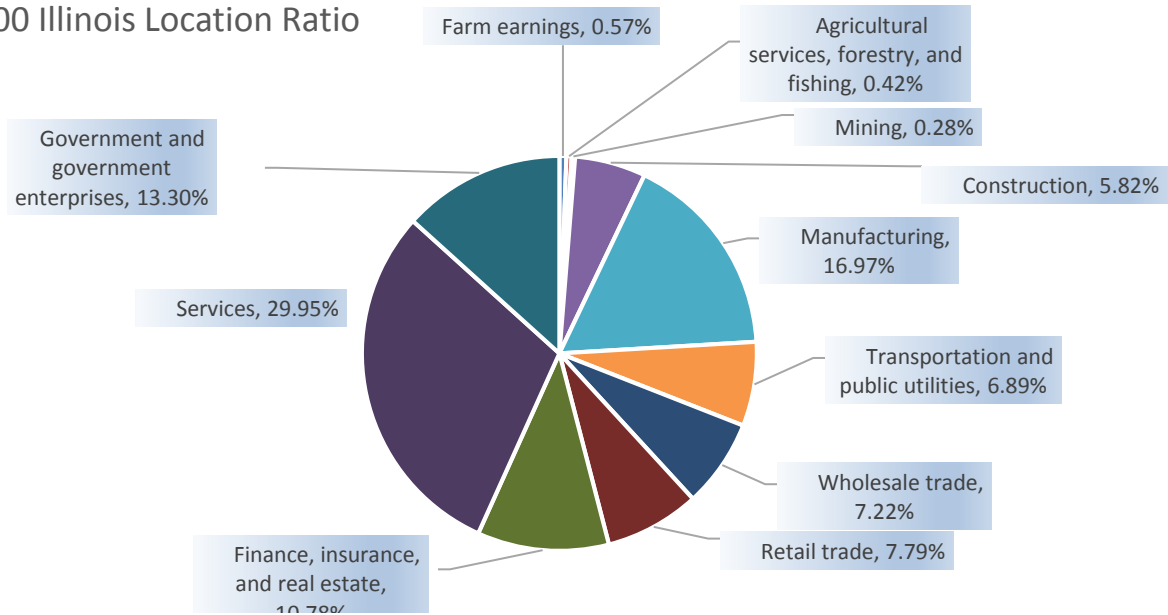


Figure 8: 2000 Illinois Sector Percentages

Source: bea.gov

1990-2000 Illinois Earnings Growth Rates

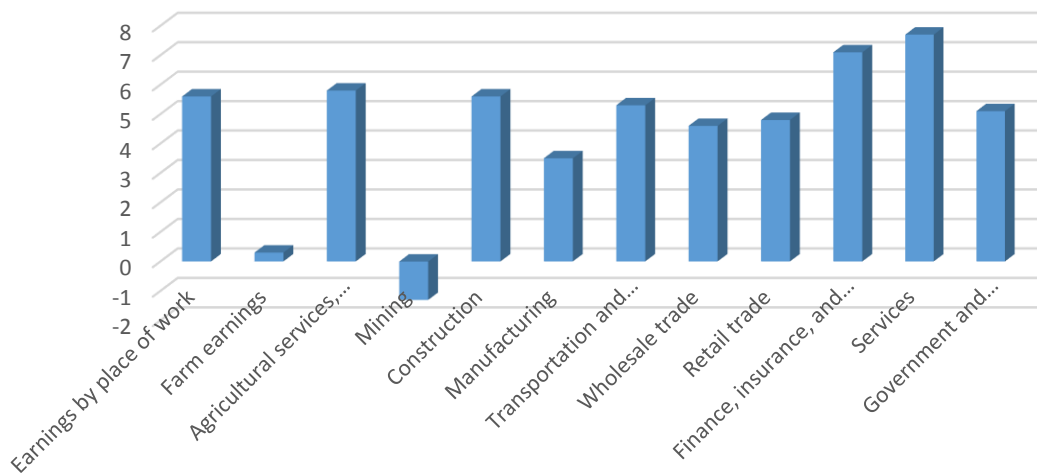


Figure 9: 1990-2000 Illinois Earnings Growth Rates

Source: bea.gov

1969-2000 Illinois Sector Percentages

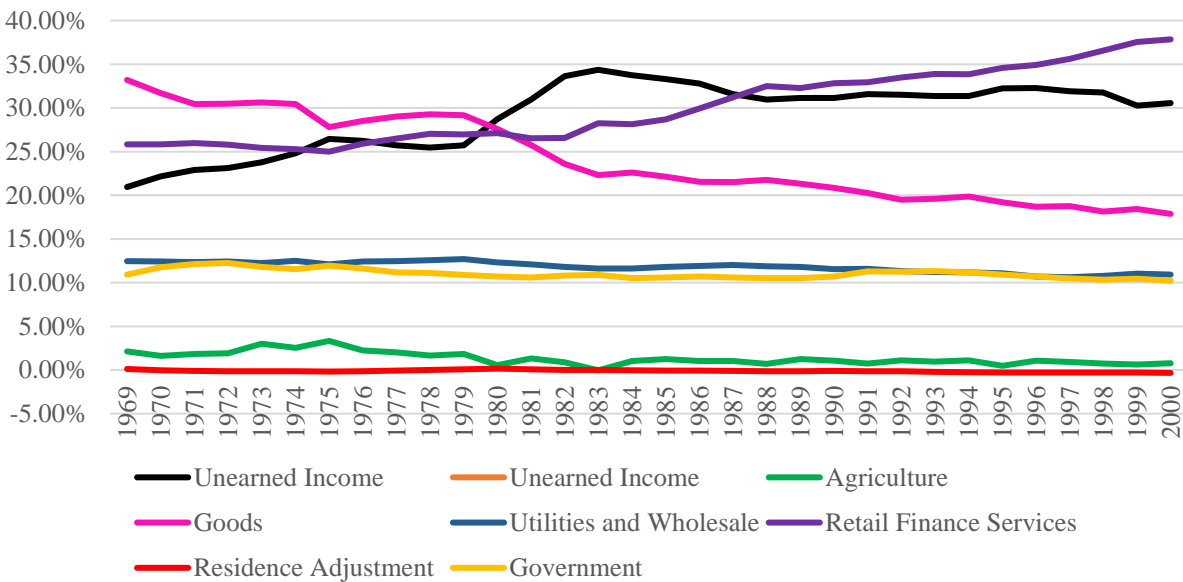


Figure 10: 1969-2000 Illinois Sector Percentages

Source: bea.gov

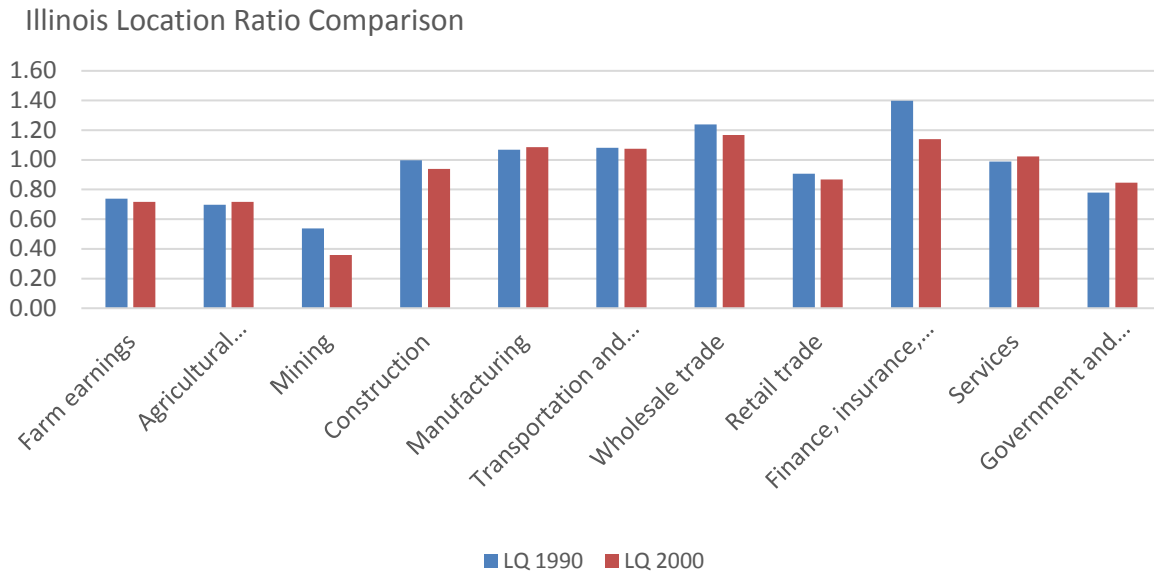


Figure 11 1990-2000 Illinois Location Ratio Comparison

Source: bea.gov

VITA

Graduate School
Southern Illinois University

Jack L. Steichen

jacksteichen@yahoo.com

Southern Illinois University Carbondale
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