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Evaluating North Carolina's Economic Progress Using Multiple Growth Rates

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Abstract: This study evaluates the performance of North Carolina's economy over a 29-year period (1988-2017) on the basis of six measures of economic growth: growth in real (inflation-adjusted) GDP (Gross Domestic Product), employment, real GDP per capita, real personal income per capita, employment per capita, and worker productivity. The study period is divided into seven sub-periods of alternating expansions and recessions. Comparisons are made to performance on the same six measures for the U.S. and the Southeast states.

There are ten key findings:

- 1. For five of the six economic growth measures, the 1992-2000 expansion was the strongest.**
- 2. In contrast, for five of the six growth measures, the current expansion (2010-2017) has been the weakest.**
- 3. On all six growth measures, the 2008-2009 recession (the "Great Recession") was the worst downturn during the 1988-2017 period.**
- 4. During the current economic expansion, worker productivity has declined, a change not occurring during any expansion or recession in the study period.**

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- 5. A possible reason for the recent decline in worker productivity is relatively larger employment gains in the state in economic sectors with low worker productivity.**
- 6. Compared to the nation and the Southeast, North Carolina has performed best on real Gross Domestic Product growth and employment growth.**
- 7. Relative to the nation, North Carolina has more of a “boom or bust” pattern in employment growth, by adding relatively more jobs during economic expansions and losing relatively more jobs during recessions.**
- 8. Compared to the nation and Southeast, North Carolina has tended to add jobs faster than the state has added jobs per capita. This indicates population is growing faster than employment.**
- 9. During the current economic expansion (2010-2017), North Carolina has underperformed the nation and the Southeast on five of the six growth measures, with the exception being employment growth**
- 10. However, all six growth measures improved in North Carolina relative to the nation and the Southeast during the 2014-2017 period, when major structural changes were made to the state’s tax code.**

Introduction

How fast a state's economy expands is a key determinant of its prosperity. Faster growing economies often generate more jobs, greater entrepreneurial ventures, and enhanced chances for individuals to move up the income ladder. In short, faster economic growth means more economic opportunities, which creates both excitement and optimism. In contrast, in slower growing economies – and especially contracting economies – the opportunities for jobs, business creation, and income mobility are all reduced. In this kind of economic situation, it's easy for pessimism and despair to prevail, and in the political arena for sharp conflicts to occur over use of shrinking public resources.

But a big question is – what is the best measure of economic growth in a state? Is it growth based on production, income, jobs, or some other measure? Or, does it matter? Do the various measures of economic growth all tell the same story?

These questions are addressed in this report for one state – North Carolina – with comparative measures to the nation and to the Southeast.² The paper examines several alternative measures of economic growth in the state over the past three decades. The measures are analyzed and compared for what they say about the development of the North Carolina economy in the late 20th and early 21st centuries.

Measures of Economic Growth

This paper studies six alternative measures of economic growth: the growth rates in real gross domestic product, employment, real gross domestic product per capita, real personal income per capita, employment per capita, and worker productivity. Following are definitions for each of the measures:

Real gross domestic product: Gross domestic product, or GDP, is the monetary value of all products and services generated in a state using inputs in that state – importantly labor, machinery, and technology. The “real” term means the monetary values in different years have been adjusted for inflation. Real GDP is therefore a measure of state output. It is the state counterpart to national GDP at the country level. The data are from the U.S. Bureau of Economic Analysis (BEA).

Employment: Also from the BEA, employment includes both full-time and part-time positions.

Real gross domestic product per capita: This is real GDP divided by the population of the state. It accounts for the likelihood that states with larger populations will have larger GDPs. Hence, GDP per capita, or per person, allows a comparison of the amount of economic output in the state over time after adjusting for changes in state population, and allows a similar comparison between states at a point in time.

Real personal income per capita: Personal income is income to individuals in the state from all sources minus contributions for government social insurance (mainly Social Security and

² The U.S. Bureau of Economic Analysis' definition of the Southeast is used in this report. The BEA Southeast includes Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, West Virginia, and Virginia.

Medicare). The total is divided by population, with the annual amounts adjusted for inflation to make them comparable in terms of purchasing power. The measure can be considered an approximation of average annual income per person.

Employment per capita: This is total employment divided by total population. Similar to GDP, states with larger populations will usually have more employment. So just like real GDP per capita, employment per capita allows employment to be compared across a single state over time as the state population changes and across different states at a point in time with different populations.

Worker productivity: Productivity measures how much output a worker is responsible for producing in a given period of time. In this report it is measured by real GDP divided by the number of workers; thus, it is a measure of annual productivity. Productivity is important for several reasons. States with higher productivity rates are considered more efficient and therefore more attractive for business investors. More productive workers are more valuable to companies, so there should be a positive relationship between worker productivity and worker pay. Last, improvement in worker productivity over time can often be linked to improvement in worker education and training.

Trends in the Economic Growth Measures for North Carolina over Time

In this section the performance of the alternative economic growth measures for North Carolina are compared for the 29-year period from 1988 to 2017. In the next section the North Carolina measures are compared to their counterparts for the nation and the Southeast. The beginning year of the comparisons is 1988 as this is the earliest year for the availability of the real GDP and real GDP per capita measures. To accommodate likely changes in economic growth rates during economic expansions and economic recessions, the business cycles during the 1988 to 2017 period are divided into expansions and recessions as measured by the National Bureau of Economic Research.³

The results are shown in Table 1. Comparing the expansionary periods (1988-1990, 1992-2000, 2002-2007, and 2010-2017) for each of the alternative growth rates, North Carolina's economic growth rates peaked in the 1992-2000 period have declined since then for all but one of the measures – employment per capita - which was highest in the 1988-1990 period. Growth rates in the current expansion (2010 – 2017) have been particularly modest, with the average real GDP growth rate being 30% of its average during 1992-2000, the average employment growth rate being less than 60% of the comparable rate during 1992-2000, and the average real GDP per capita growth rate being only 15% of the comparable rate during 1992-2000.

³ National Bureau of Economic Research, *US Business Cycle Expansions and Contractions*. Available on-line at <http://www.nber.org/cycles.html>.

Table 1. Alternative North Carolina Economic Growth Rates for Expansions and Recessions from 1988 to 2017 (annual averages).

Column #	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Period	Cycle Type	Real GDP	Employment	Real GDP pc	Real Inc pc	Emp pc	Prod
1988-1990	Exp	3.25%	2.63%	1.89%	2.52%	1.28%	0.62%
1991	Rec	0.15%	-0.94%	-1.62%	-0.63%	-2.70%	1.09%
1992-2000	Exp	4.96%	2.65%	2.93%	2.84%	0.68%	2.31%
2001	Rec	2.06%	-0.75%	0.46%	-0.51%	-2.30%	2.81%
2002-2007	Exp	2.97%	1.93%	1.18%	2.11%	0.15%	1.04%
2008-2009	Rec	-0.74%	-1.92%	-2.50%	-1.63%	-3.66%	1.18%
2010-2017	Exp	1.50%	1.55%	0.44%	0.92%	0.50%	-0.05%

Exp = expansion; Rec = recession; pc = per capita; Inc = personal income; Emp = employment; Prod = worker productivity

The trend in worker productivity during recent expansions is worrisome. Worker productivity more than tripled from the 1988-1990 expansion to the 1992-2000 expansion, but it was cut by more than half from the 1992-2000 expansion to the 2002-2007 expansion, and in the current expansion (2010-2017) average annual worker productivity actually declined. Since growth in both wages and the standard of living are linked to productivity growth, the recent decline in worker productivity raises questions about the ability of workers to “move ahead” in the economy.

Economic growth measured by real GDP can be decomposed into two parts – that due to employment growth and that due to worker productivity growth. Indeed, notice that the real GDP rate (column 2) is the sum of the Employment growth rate (column 3) and the Worker Productivity growth rate (column 7). It is instructive to see the relative contributions of employment growth and worker productivity growth to real GDP growth in each of the expansions. These relative contributions are given in Table 2.

Table 2. Relative Contribution of Employment Growth and Worker Productivity Growth to Real GDP Growth during Economic Expansions in North Carolina.

Expansion	Employment Growth	Worker Productivity Growth
1988-1990	81%	19%
1992-2000	53%	47%
2002-2007	65%	35%
2010-2017	103%	-3%

After the drop in the contribution of employment growth from 1988-1990 to 1992-2000, employment growth's contribution rose over the next two expansions. Again, the obvious concern is the negative contribution of worker productivity growth in the current expansion.

There were three recessions during the time period – 1991, 2001, and 2008-2009. The 2001 recession was milder than the 1991 recession, but clearly the 2008-2009 recession was the most severe on all measures. Real GDP fell in the 2008-2009 recession, while rising modestly during the 1991 and 2001 recessions (in part because the 1991 and 2001 recessions comprised only parts of those years). Employment dropped more than twice as much in the 2008-2009 recession compared to both the 1991 and 2001 recessions. Real GDP per capita, real personal income per capita, and employment per capita each retreated substantially more during the 2008-2009 recession than during the previous two downturns.

It is not unusual for worker productivity to increase during recessions compared to its level during the previous expansion.⁴ This happens if output (GDP) falls less than employment during the recession. This pattern of an increase in worker productivity in a recession occurred for each of the three recessions in North Carolina during the time period studied. Worker productivity rose from an average annual rate of 0.62% during the 1988-1990 expansion to 1.09% in the 1991 recession; worker productivity increased from an average annual rate of 2.31% during the 1992-2000 expansion to 2.81% in the 2001 recession; and worker productivity jumped from an average annual rate of 1.04% in the 2002-2007 expansion to 1.18% in the 2007-2009 recession.

North Carolina Economic Growth Compared to the U.S. and the Southeast

In this section North Carolina economic growth measures are compared to the comparable economic growth measures for the U.S. and the Southeast. There are three tables for the two comparisons. Table 3 repeats the North Carolina growth rates, Table 4 gives the comparable U.S. growth rates, and Table 5 has the numerical differences between the North Carolina and U.S. growth rates. For each comparison in Table 5, positive differences (meaning the North Carolina rate is higher than the corresponding U.S. rate) are given in black, whereas negative differences (indicating a North Carolina rate is lower than the corresponding U.S. rate) are presented in bold **red**. Similarly, Table 6 repeats the North Carolina growth rates, Table 7 has the comparable Southeast growth rates, and Table 8 presents the numerical differences between the North Carolina and Southeast growth rates.

Comparing the percentage point differences in growth rates for North Carolina and the U.S. in Table 5, North Carolina looks good on Real GDP, with the state exceeding the nation in each time period except the most recent. For employment, North Carolina beats the nation in each of the four expansion periods – including the current one – but underperforms the nation during recessionary periods. This pattern confirms the greater “boom and bust” performance of North Carolina employment growth compared to the nation.

⁴ Research supports the idea that worker productivity rises during recessions because work effort increases (Edward Lazear, Kathryn Shaw, and Christopher Stanton, “Making Do with Less: Working Harder during Recessions,” Working Paper 19328, Boston: National Bureau of Economic Research, August 2013.)

Table 3. North Carolina Economic Growth Rates, 1988-2017.

Column #	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Period	Cycle Type	Real GDP	Employment	Real GDP pc	Real Inc pc	Emp pc	Prod
1988-1990	Exp	3.25%	2.63%	1.89%	2.52%	1.28%	0.62%
1991	Rec	0.15%	-0.94%	-1.62%	-0.63%	-2.70%	1.09%
1992-2000	Exp	4.96%	2.65%	2.93%	2.84%	0.68%	2.31%
2001	Rec	2.06%	-0.75%	0.46%	-0.51%	-2.30%	2.81%
2002-2007	Exp	2.97%	1.93%	1.18%	2.11%	0.15%	1.04%
2008-2009	Rec	-0.74%	-1.92%	-2.50%	-1.63%	-3.66%	1.18%
2010-2017	Exp	1.50%	1.55%	0.44%	0.92%	0.50%	-0.05%

Exp = expansion; Rec = recession; pc = per capita; Inc = personal income; Emp = employment; Prod = worker productivity

Table 4. U.S. Economic Growth Rates, 1988-2017.

Column #	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Period	Cycle Type	Real GDP	Employment	Real GDP pc	Real Inc pc	Emp pc	Prod
1988-1990	Exp	3.00%	2.21%	1.99%	2.14%	1.20%	0.79%
1991	Rec	-0.16%	-0.52%	-1.48%	-1.23%	-1.84%	0.36%
1992-2000	Exp	3.98%	2.06%	2.71%	2.82%	0.83%	1.92%
2001	Rec	0.94%	0.09%	-0.06%	1.11%	-0.90%	0.85%
2002-2007	Exp	2.54%	1.40%	1.59%	1.64%	0.47%	1.14%
2008-2009	Rec	-1.62%	-1.57%	-2.52%	-1.99%	-2.47%	-0.05%
2010-2017	Exp	1.96%	1.52%	1.20%	1.62%	0.77%	0.44%

Exp = expansion; Rec = recession; pc = per capita; Inc = personal income; Emp = employment; Prod = worker productivity

Table 5. Differences between NC and U.S. Growth Rates, 1988-2017 (% points).

Column #	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Period	Cycle Type	Real GDP	Employment	Real GDP pc	Real Inc pc	Emp pc	Prod
1988-1990	Exp	0.25	0.42	-0.10	0.38	0.08	-0.17
1991	Rec	0.31	-0.42	-0.14	0.60	-0.86	0.73
1992-2000	Exp	0.98	0.59	0.22	0.02	-0.15	0.39
2001	Rec	1.12	-0.84	0.52	-1.62	-1.40	1.96
2002-2007	Exp	0.43	0.53	-0.41	0.47	-0.32	-0.10
2008-2009	Rec	0.88	-0.35	0.02	0.36	-1.19	1.23
2010-2017	Exp	-0.46	0.03	-0.76	-0.70	-0.27	-0.49

Exp = expansion; Rec = recession; pc = per capita; Inc = personal income; Emp = employment; Prod = worker productivity

The growth rates for North Carolina relative to the nation are not as good on a per capita basis (columns 4, 5, and 6 in Table 5). North Carolina underperformed the nation on real GDP per capita in four of the seven time periods, with the exceptions being the Great Recession (2008-2009) and the 1992-2000 expansion and corresponding 2001 recession. The comparisons are better for real personal income per capita, where North Carolina exceeded the nation in five of the seven time periods. But for employment growth per capita, North Carolina underperformed the nation in all seven time periods. For the final comparison (worker productivity, column 7), North Carolina did better than the nation in four of the seven periods.

North Carolina's performance on the alternative economic growth rates relative to the Southeastern states is shown in Table 8. Similar to the national comparison, North Carolina beats the Southeastern states on both real GDP and employment growth – besting the Southeast on real GDP in five of the seven time periods and also in five of the seven time periods for employment. For employment, both of the time periods for which North Carolina underperformed were recessionary periods (1991 and 2001), but the state's employment growth actually exceeded the Southeast employment growth during the Great Recession (2008-2009).

Like the nation, North Carolina did not do as well compared to the Southeast on the per capita measures. The state underperformed the Southeast on real GDP per capita in four of the seven time periods, came in under the Southeast on real personal income per capita in three of the seven time periods, and underperformed the Southeast on employment per capita in all seven time periods. But the state outperformed the Southeastern states on worker productivity in five of the seven time periods.

Economic Growth Rate Trends during the Current Economic Expansion

One conclusion is very evident by examining both Table 5 and Table 8 – among the seven time periods, North Carolina has performed the poorest during the current economic expansion (2010-2017). Compared to the nation (Table 5), North Carolina underperformed on five of the six economic growth measures. The record is the same compared to the Southeast – North Carolina underperformed on five of the six economic growth measures. Interestingly, in both cases the exception in which North Carolina outperformed the nation and the Southeast was the same – employment growth.

However, during the 2010-2017 period, the North Carolina General Assembly made major changes to the state's tax system. The corporate income tax rate was 6.9% in 2013. In 2014 it was lowered to 6%, in 2015 to 5%, in 2016 to 4%, and in 2017 to 3%. It remained at 3% in 2018, and the rate is scheduled to drop to 2.5% in 2019. These changes moved the state's corporate income tax rates from one of the highest in 2013 to one of the lowest by 2017.

There were similar changes made to the individual income tax rates. In 2013 there was a three-tiered progressive system of 6%, 7%, and 7.75%. These were lowered to a flat rate of 5.8% in 2014, to 5.75% in 2015 and 2016, 5.5% in 2017 and 2018, with another cut scheduled for 2019 to 5.25%.

During this period there were also increases in the standard deductions for individual income tax payees, as well as several additions to the base of the state sales tax.

Table 6. North Carolina Economic Growth Rates, 1988-2017.

Column #	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Period	Cycle Type	Real GDP	Employment	Real GDP pc	Real Inc pc	Emp pc	Prod
1988-1990	Exp	3.25%	2.63%	1.89%	2.52%	1.28%	0.62%
1991	Rec	0.15%	-0.94%	-1.62%	-0.63%	-2.70%	1.09%
1992-2000	Exp	4.96%	2.65%	2.93%	2.84%	0.68%	2.31%
2001	Rec	2.06%	-0.75%	0.46%	-0.51%	-2.30%	2.81%
2002-2007	Exp	2.97%	1.93%	1.18%	2.11%	0.15%	1.04%
2008-2009	Rec	-0.74%	-1.92%	-2.50%	-1.63%	-3.66%	1.18%
2010-2017	Exp	1.50%	1.55%	0.44%	0.92%	0.50%	-0.05%

Exp = expansion; Rec = recession; pc = per capita; Inc = personal income; Emp = employment; Prod = worker productivity

Table 7. Southeast Economic Growth Rates, 1988-2017.

Column #	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Period	Cycle Type	Real GDP	Employment	Real GDP pc	Real Inc pc	Emp pc	Prod
1988-1990	Exp	3.02%	2.55%	1.87%	2.46%	1.82%	0.47%
1991	Rec	1.05%	-0.36%	-0.59%	-0.35%	-1.98%	1.41%
1992-2000	Exp	4.16%	2.52%	2.58%	2.73%	0.96%	1.64%
2001	Rec	1.77%	-0.16%	0.58%	1.49%	-1.32%	1.93%
2002-2007	Exp	2.72%	1.82%	1.37%	1.90%	0.48%	0.90%
2008-2009	Rec	-2.09%	-2.03%	-3.16%	-2.35%	-3.10%	-0.06%
2010-2017	Exp	1.52%	1.53%	0.59%	1.28%	0.61%	-0.01%

Exp = expansion; Rec = recession; pc = per capita; Inc = personal income; Emp = employment; Prod = worker productivity

Table 8. Differences between NC and Southeast Growth Rates, 1988-2017 (% points).

Column #	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Period	Cycle Type	Real GDP	Employment	Real GDP pc	Real Inc pc	Emp pc	Prod
1988-1990	Exp	0.23	0.08	0.02	0.06	-0.54	0.15
1991	Rec	-0.90	-0.58	-1.03	-0.28	-0.72	-0.32
1992-2000	Exp	0.80	0.13	0.35	0.11	-0.28	0.67
2001	Rec	0.29	-0.59	-0.12	-2.00	-0.98	0.88
2002-2007	Exp	0.25	0.11	-0.19	0.21	-0.33	0.14
2008-2009	Rec	1.35	0.11	0.66	0.72	-0.56	1.24
2010-2017	Exp	-0.02	0.02	-0.15	-0.36	-0.11	-0.04

Exp = expansion; Rec = recession; pc = per capita; Inc = personal income; Emp = employment; Prod = worker productivity

Table 9. Economic Growth Rates for North Carolina, the U.S., and the Southeast, 2010-2013 and 2014-2017.

	North Carolina		United States		Southeast	
	2010-13	2014-17	2010-13	2014-17	2010-13	2014-17
Real GDP	0.90%	2.10%	1.75%	2.17%	1.00%	2.03%
Employment	1.02%	2.08%	1.16%	1.89%	1.05%	2.01%
Real GDP pc	-0.12%	1.01%	0.98%	1.41%	0.12%	1.07%
Real Inc pc	-0.45%	2.28%	1.26%	1.98%	0.50%	2.04%
Emp pc	-0.02%	1.02%	0.39%	1.14%	0.18%	1.05%
Prod	-0.11%	0.02%	0.60%	0.27%	-0.04%	0.02%

Table 10. Differences between NC and US Growth Rates and between NC and Southeast Growth Rates, 2010-2013 and 2014-2017 (% points).

	North Carolina – U.S.		North Carolina - Southeast	
	2010-13	2014-17	2010-13	2014-17
Real GDP	-0.85	-0.07	-0.10	0.07
Employment	-0.14	0.19	-0.03	0.07
Real GDP pc	-1.10	-0.40	-0.24	-0.06
Real Inc pc	-1.71	0.30	-0.95	0.24
Emp pc	-0.41	-0.12	-0.20	-0.03
Prod	-0.71	-0.25	-0.07	0.00

Table 9 shows the results for the three regions' six economic growth measures by dividing the 2010-2017 period into two periods – 2010-2013 prior to the tax rate changes, and 2014-2017 after the tax rate changes. Table 10 gives the differences in the rates between North Carolina and the U.S. and between North Carolina and the Southeast. Again, positive differences are shown in black, and negative differences are shown in bold red.

Looking at Table 9, there is definite improvement in the growth rates for all regions from the 2010-2013 period to the 2014-2017 period. North Carolina's growth rates increased for all six measures between 2010-2013 and 2014-2017. Five of six growth rates improved for the nation, the exception being worker productivity. All six growth rates gained for the Southeastern states.

Since North Carolina, U.S. and Southeast growth rates generally improved from 2010-2013 to 2014-2017, more telling is the comparisons in the differences between North Carolina and the U.S. growth rates and between North Carolina and Southeast growth rates for the two time periods. This is done in Table 10. Here the results are consistent: in every comparison of North Carolina growth rates to the growth rates of the U.S. and the Southeast, North Carolina's

growth rates improved relative to the growth rates of the other region. Either the difference between the North Carolina growth rate and the U.S. or Southeast growth rate changed from negative to positive, or the size of North Carolina's deficit improved (that is, became "less" negative).

Do these results prove the tax rate changes that began to take effect in North Carolina beginning in 2014 caused the state economy to expand faster? Such a question can rarely be answered definitely using economic analysis.⁵ While there appears to be a correlation between reduced tax rates and economic growth in North Carolina in the 2010-2017 period, such a relationship does not prove causation.

Investigation into North Carolina's Recent Performance on Worker Productivity

A worrisome finding has been North Carolina's recent performance on worker productivity during the current economic recovery. Compared to both the nation and the Southeast, North Carolina has underperformed on worker productivity during 2010-2017. Separating the period into 2010-2013 and 2014-2017, the state still underperforms the nation during both time periods, although the gap improved during 2014-2017. Compared to the Southeast, North Carolina underperformed on worker productivity during 2010-2013 and had the same performance on worker productivity as the Southeast during 2014-2017.

There could be two factors behind these findings. Education and skill acquisition are key factors in developing more productive workers. It could be that North Carolina has fallen behind other states in education and skill training of its workforce. Or, North Carolina's economic growth during 2010-2017 could be more tied to economic sectors with lower worker productivity

Each of these factors were investigated. National Assessment of Educational Progress (NAEP) scores for 8th grade reading held steady for North Carolina between 2002 and 2017, the same pattern as for the nation. NAEP scores for 8th grade math between 2000 and 2017 gained ten points in North Carolina and increased by six points in the nation, so North Carolina improved relative to the nation on this measure.

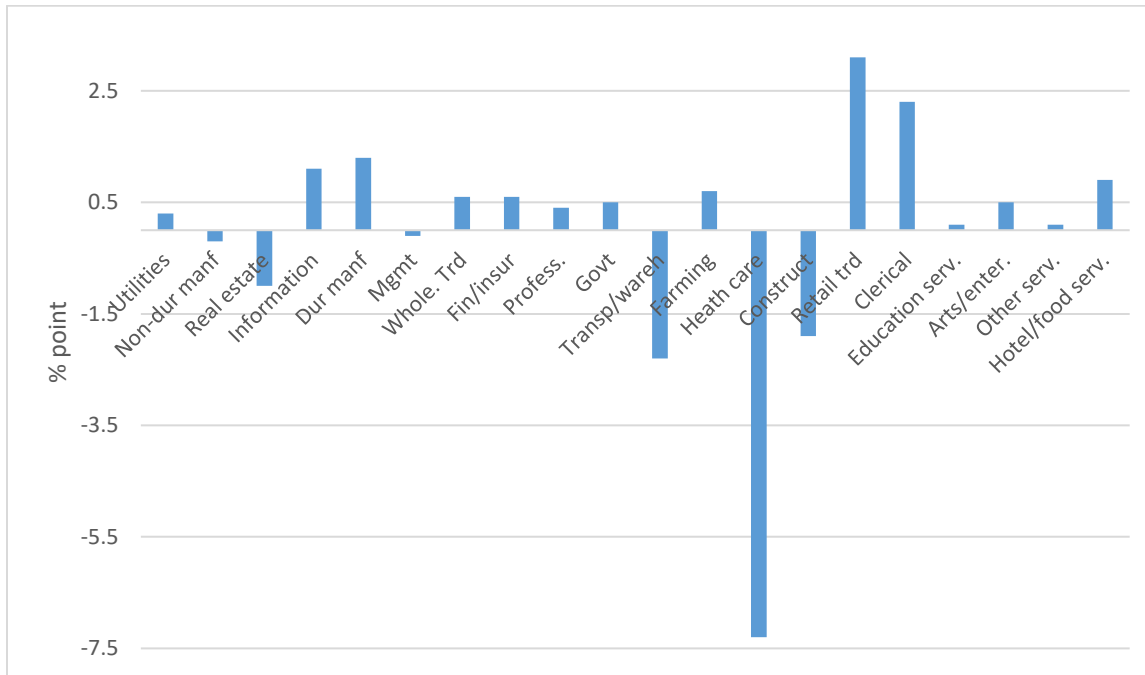
Looking at the percentage of the adult population (age 25 and over) with a bachelor's degree or higher finds North Carolina adding 5.3 percentage points (from 25.1% to 30.4%) between 2005 and 2016, while the nation gained 4.2 percentage points (from 27.1% to 31.3%).

Hence, for these education measures related to worker productivity, North Carolina has *not* fallen behind the nation in the last ten to fifteen years.

Figure 1 shows the differences in contributions to total employment growth between North Carolina and the nation for different economic sectors during the period 2010 to 2016.

⁵ For two examples of competing conclusions about the impact of tax rate reductions on a state's economic growth, see Xiaobing Shuai and Christine Chmura, "The Effect of State Corporate Income Tax Rate Cuts on Job Creation," *School of Professional and Continuing Studies Faculty Publications*, University of Richmond, July 2013; and Tom Rex, "Tax Reductions in Arizona: Effects on Economic Growth and Government Revenue," *Office of the University Economist*, W.P. Carey School of Business, Arizona State University, October 2016.

Figure 1. Differences in North Carolina and U.S. Employment Economic Sector Share of Total 2010-2016 Employment Growth, with Sectors Arrayed from Highest Productivity on Left to Lowest Productivity on Right (data are % point differences, North Carolina –U.S.)



The economic sectors are organized by the size of their worker productivity, from the sector with the highest productivity sector on the left (utilities) to the sector with the lowest worker productivity on the right (hotels and food service). A positive value shows the North Carolina sector’s relative contribution to total employment growth was greater than for the nation, and a negative value indicates the state’s relative contribution was less than for the nation.

The figure shows that among the six sectors with the highest worker productivity (utilities, non-durable manufacturing, real estate, information, durable manufacturing, and management) North Carolina had smaller relative employment growth in three of the six sectors from 2010 to 2016. But among the six sectors with the lowest worker productivity (hotel/food service, other services, arts/entertainment, education services, clerical, and retail trade), North Carolina had larger relative employment growth in each of the six sectors from 200-2016.

These differences between the economic sectors where North Carolina has added employment and the nation has added employment during the current expansion are the most logical explanation for the state’s relative decline in worker productivity. This may be related to the greater degree of “hollowing out” of the state’s labor force, which has resulted in a larger

relative reduction in middle-paying jobs than in the nation.⁶ Many of these displaced workers may have moved to lower-paying jobs with lower productivity.

Conclusion

The study has shown the value of evaluating economic growth in a state using several measures. In North Carolina's case, the state has generally performed better on total growth measures compared to per capita measures, particularly when comparisons are made to other regions, such as the nation and Southeast.

There are four strong results from the analysis. First, North Carolina's aggregate employment growth displays more of a "boom or bust" nature during expansions and recessions, especially compared to the nation. Second, the relative strength of the state's employment growth is considerably diminished when measured on a per capita basis. Third, North Carolina's lag in worker productivity improvement during the current expansion is – regardless of the reason – cause for concern. Fourth, looking at the 2014-2018 period of the current expansion – the time during which North Carolina enacted major tax rate reductions – shows improvement in all six of the state's economic growth measures relative to both the nation and the Southeast compared to the earlier post-recessionary period of 2010-2013.

⁶ For details, see Michael L. Walden, "Labor Market Hollowing-Out in North Carolina: Measurement and Analysis," *The Review of Regional Studies*, forthcoming.