

A Brief Treatment of NCCCS FTE Data  
David I. Hopp  
October 2012

A Brief Treatment of the NCCCS Curriculum FTE Data

Part I. Display of Curriculum Student FTE by College	2
Part II. Summary Indicators for Curriculum Student FTE - Including Maps of North Carolina	11
Part III. Further FTE Displays by College – Looking at Spring 2011 through Fall 2012	18
Part IV. Summary for Associate Degree FTE	26

## A Brief Treatment of NCCCS FTE Data

David I. Hopp

October 2012

The data dealt with here is available on the North Carolina Community College System web site <http://www.ncccommunitycolleges.edu/Reports/index.html>. This data for full-time equivalent students (FTE) is used for funding purposes and does not include head counts. While the lack of head counts limits a broader use of the data, the FTE counts do offer a good opportunity for learning more about the state's community colleges. The NCCCS data provides FTE counts for curriculum students, basic skills students and for people who take classes for interest or to gain specific skills. This paper considers only curriculum students so that we can more easily concentrate on methods of analysis and visualization. Part I presents the data for each individual college. Part II undertakes to identify and visualize a quality measure that can be used to classify and compare colleges. Part III looks at the four most recent regular session semesters.

The NCCCS web site provides additional detailed data in its “2012 Creating Success – Critical Success Factors” report <http://www.ncccommunitycolleges.edu/Publications/docs/Publications/csf2012.pdf>. Interested readers should find it informative to review the Creating Success report. Archived copies are available at <http://www.ncccommunitycolleges.edu/Publications/archivedCsfReports.htm>. We hope that NCCCS will provide more detailed data about head counts, withdrawals, success/failure and credits earned as part of its planned 2013 web site changes. These additional data, very difficult to obtain at the present time, would be of great value in understanding quantitative aspects of the North Carolina community colleges.

### Part I. Display of Curriculum Student FTE by College

#### Curriculum FTEs by Term

For the sake of compactness, Terms (semesters) are shown on the graphs as the numbers 1 through 10. These correspond to:

1: Fall 2008	2: Spring 2008	3: Fall 2009	4: Spring 2009	5: Fall 2010
6: Spring 2010	7: Fall 2011	8: Spring 2011	9: Fall 2012	10: Spring 2012

Data points are FTE counts for curriculum students. These include students declaring for associate degrees, certificate programs, diploma programs, and university transfer. The symbols are:

□	Total
○	Associate Degree
■	Certificate Program
●	Diploma Program
▲	University Transfer

We notice that the total curriculum FTE (the hollow squares at the top of each figure in Part I) do not

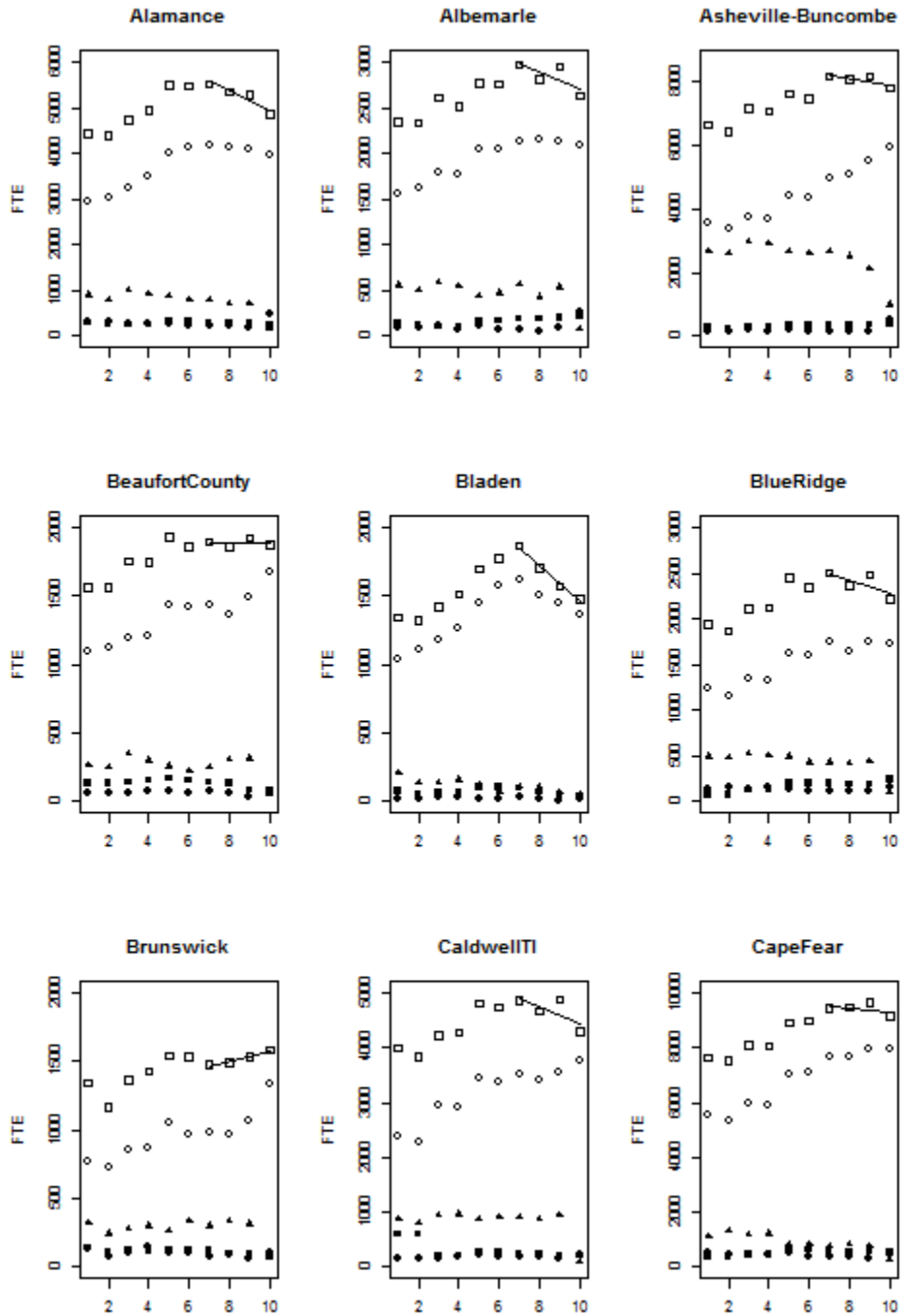
## A Brief Treatment of NCCCS FTE Data

David I. Hopp

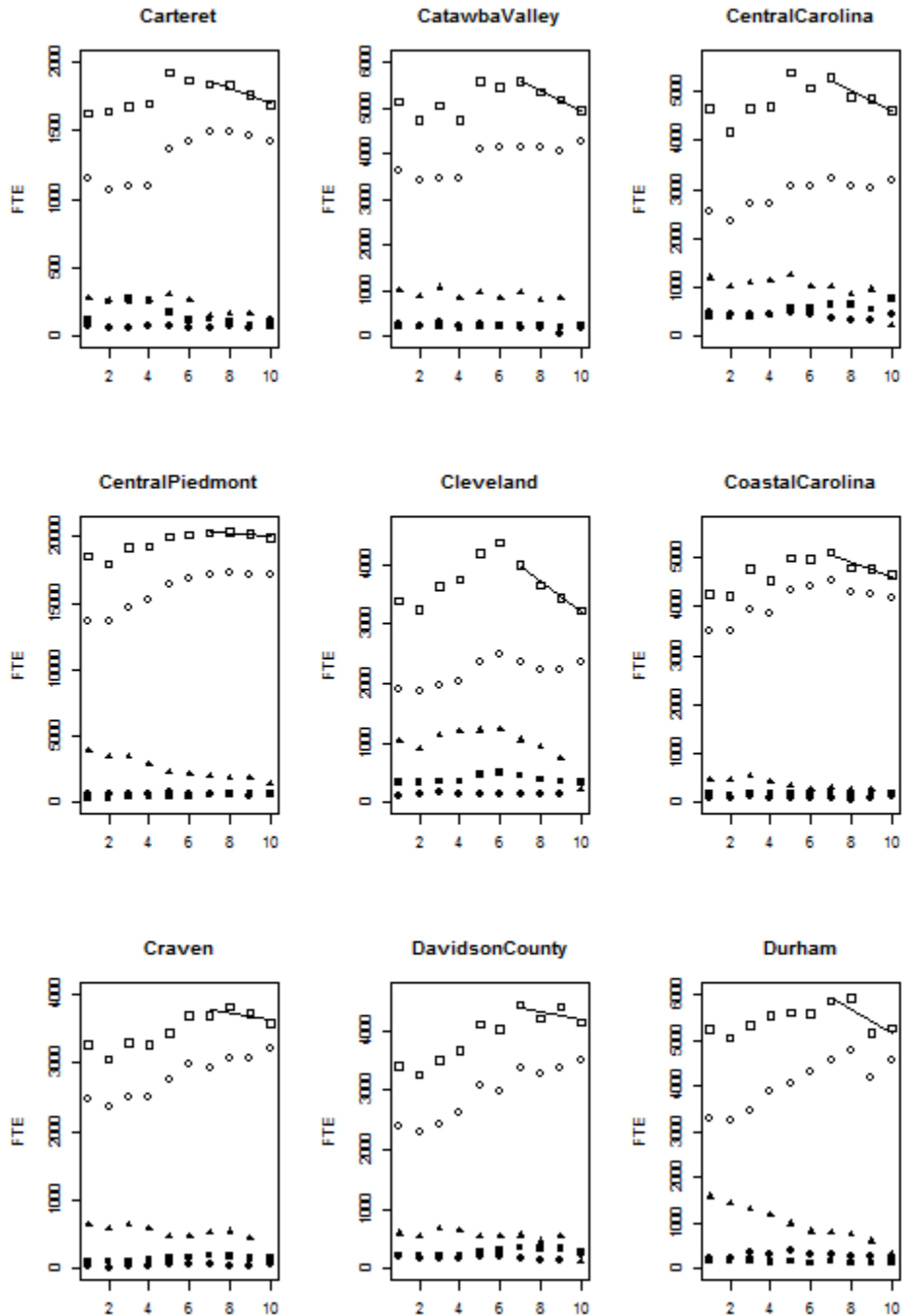
October 2012

appear that they would be well-modeled by a straight line, that is, linear regression does not appear to be useful. On the other hand, the more recent terms may be fitted by linear models. We isolated the most recent four terms which appear to show the influence of the recession that began in 2008. We then carried out linear regressions by means of a traditional least squares linear model function, using throughout the entire paper the R Statistical System. The slopes measure the rates of change of FTE counts over the most recent four terms. The FTE displays by college that follow include these regression lines. These lines will be used as the basis for further analysis in Part II. However, it is evident from visual review and some straightforward numerical tests, that the use of regression lines is of questionable utility for some of the colleges. In particular, we note that the lack of any consistent trends for Albemarle, Blue Ridge, Caldwell, Durham, Montgomery, Pamlico, Richmond and Robeson. Further analysis is required to better understand this data, but the cumulative nature of the Curriculum counts (the sum of Associates, Transfers, Diplomas and Certificate counts) makes it no surprise that there is substantial variation between colleges. We will make use of the regression lines in order to illustrate some useful data visualization techniques.

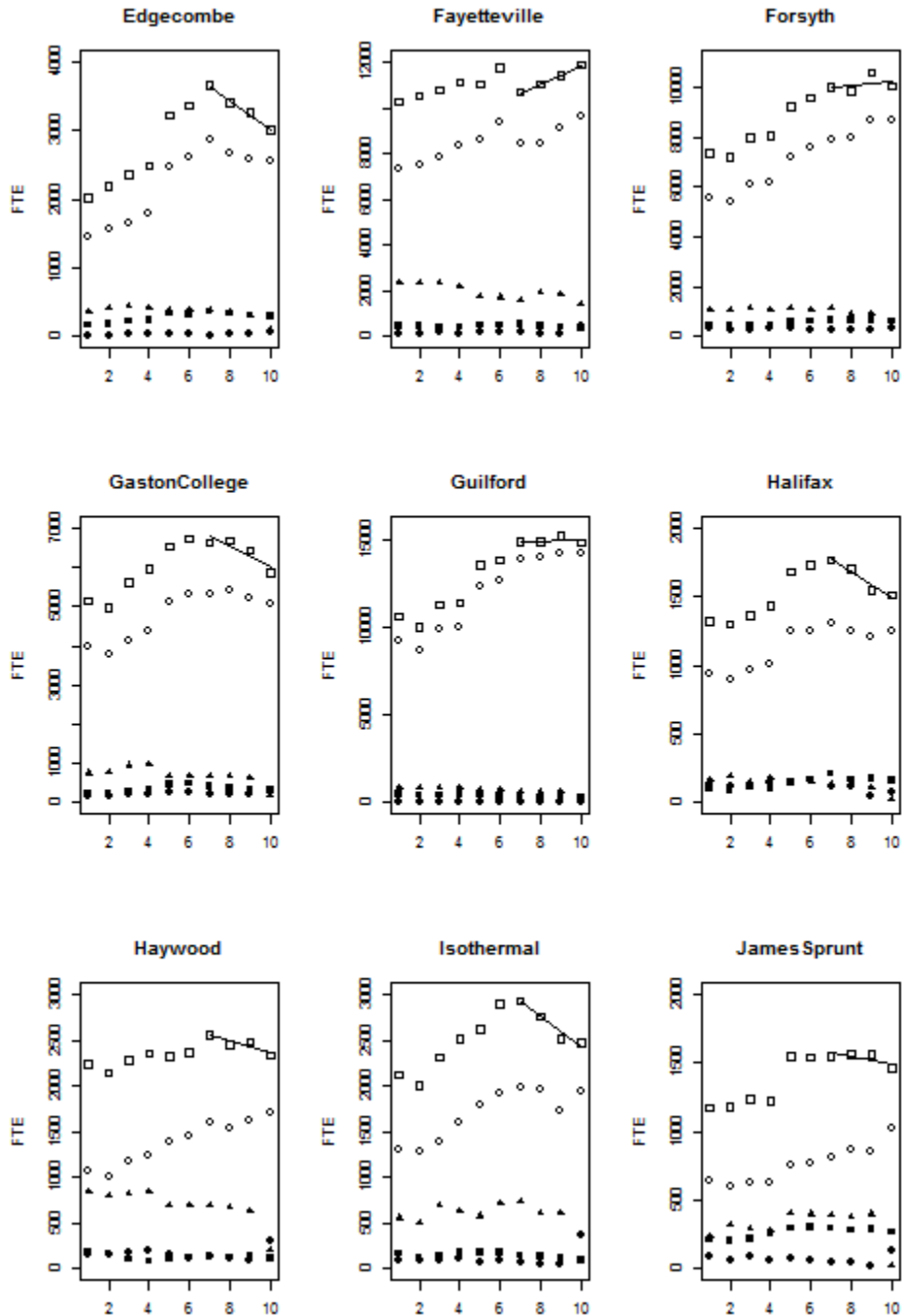
A Brief Treatment of NCCCS FTE Data  
David I. Hopp  
October 2012



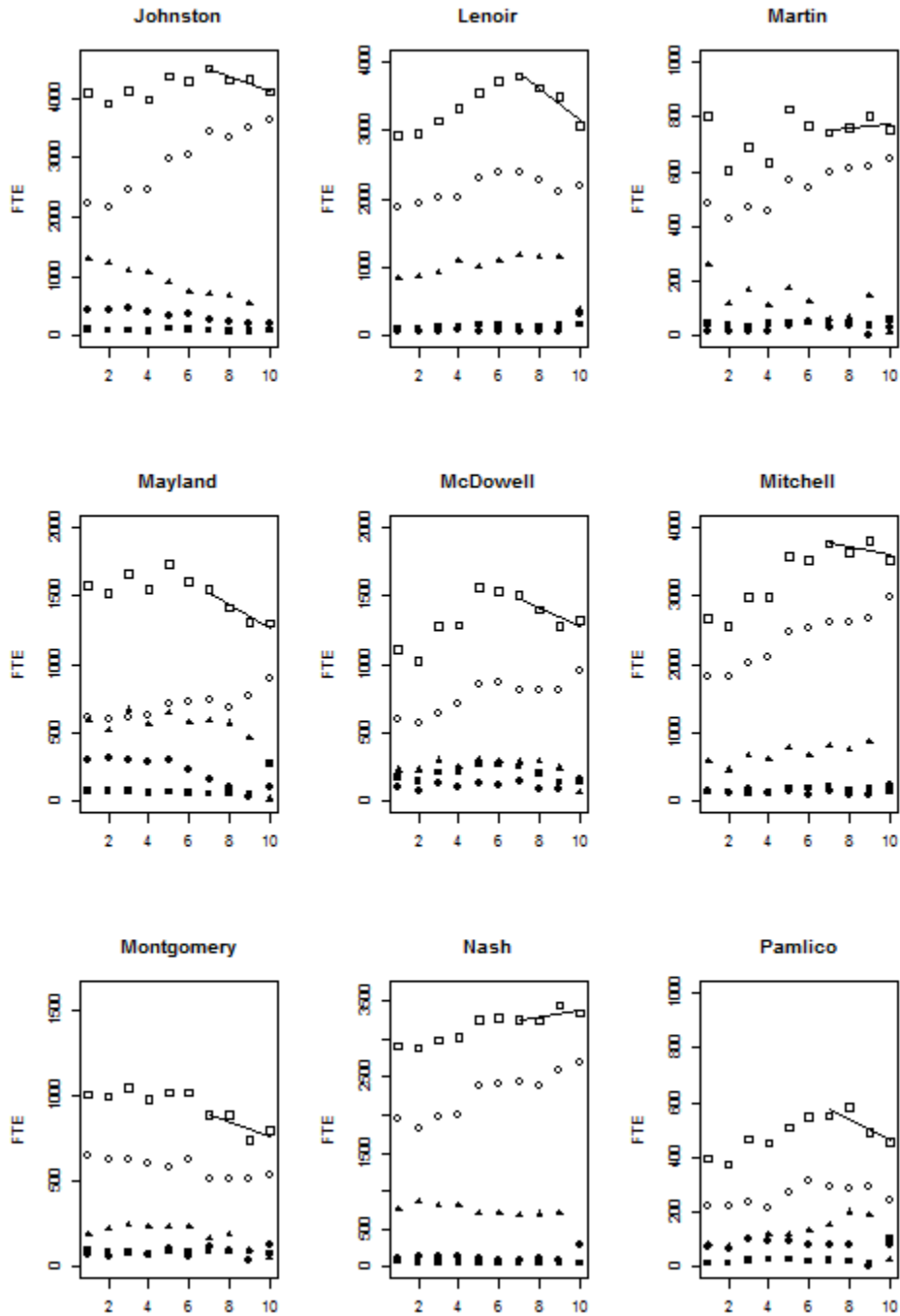
A Brief Treatment of NCCCS FTE Data  
David I. Hopp  
October 2012



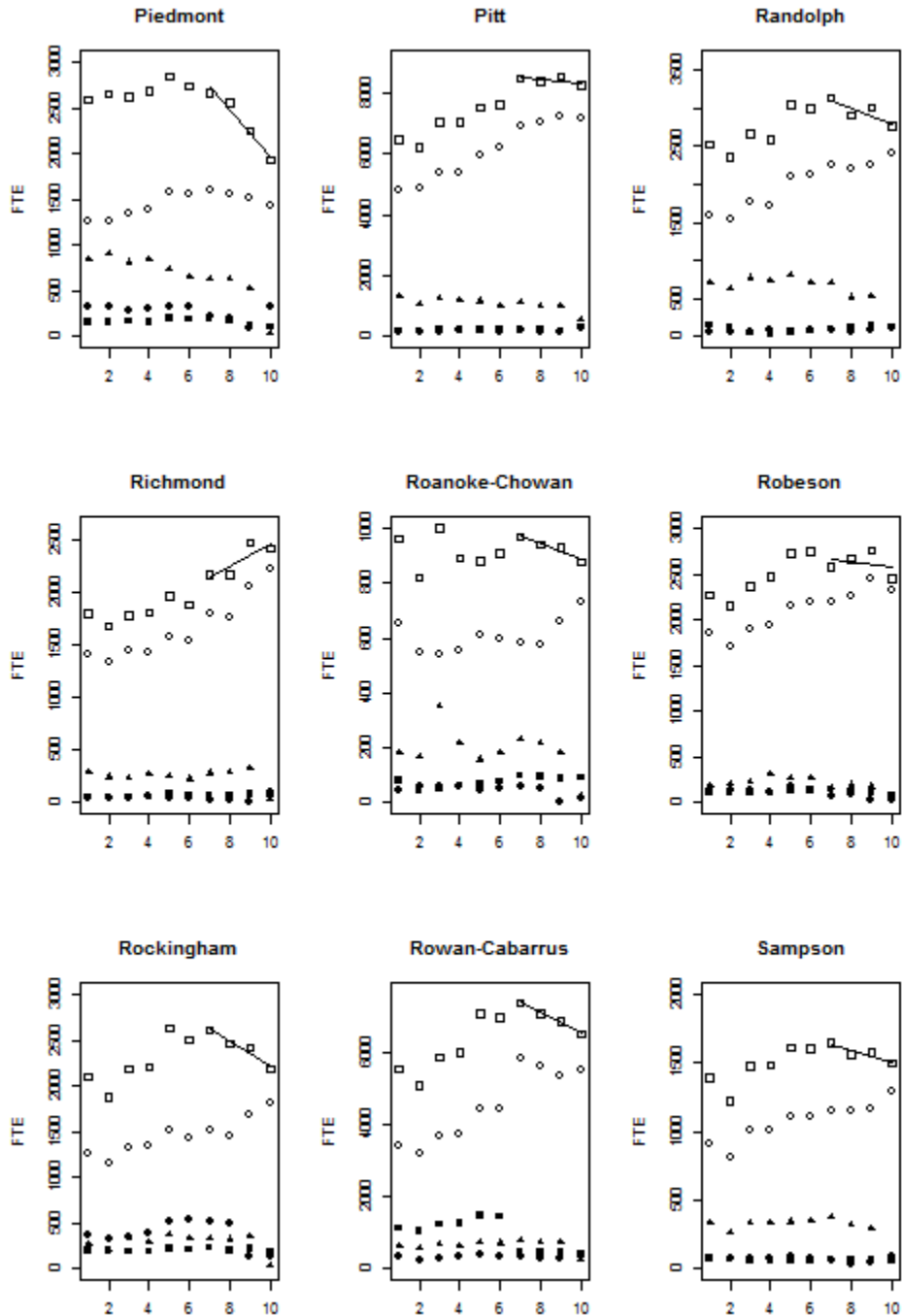
A Brief Treatment of NCCCS FTE Data  
David I. Hopp  
October 2012



A Brief Treatment of NCCCS FTE Data  
David I. Hopp  
October 2012

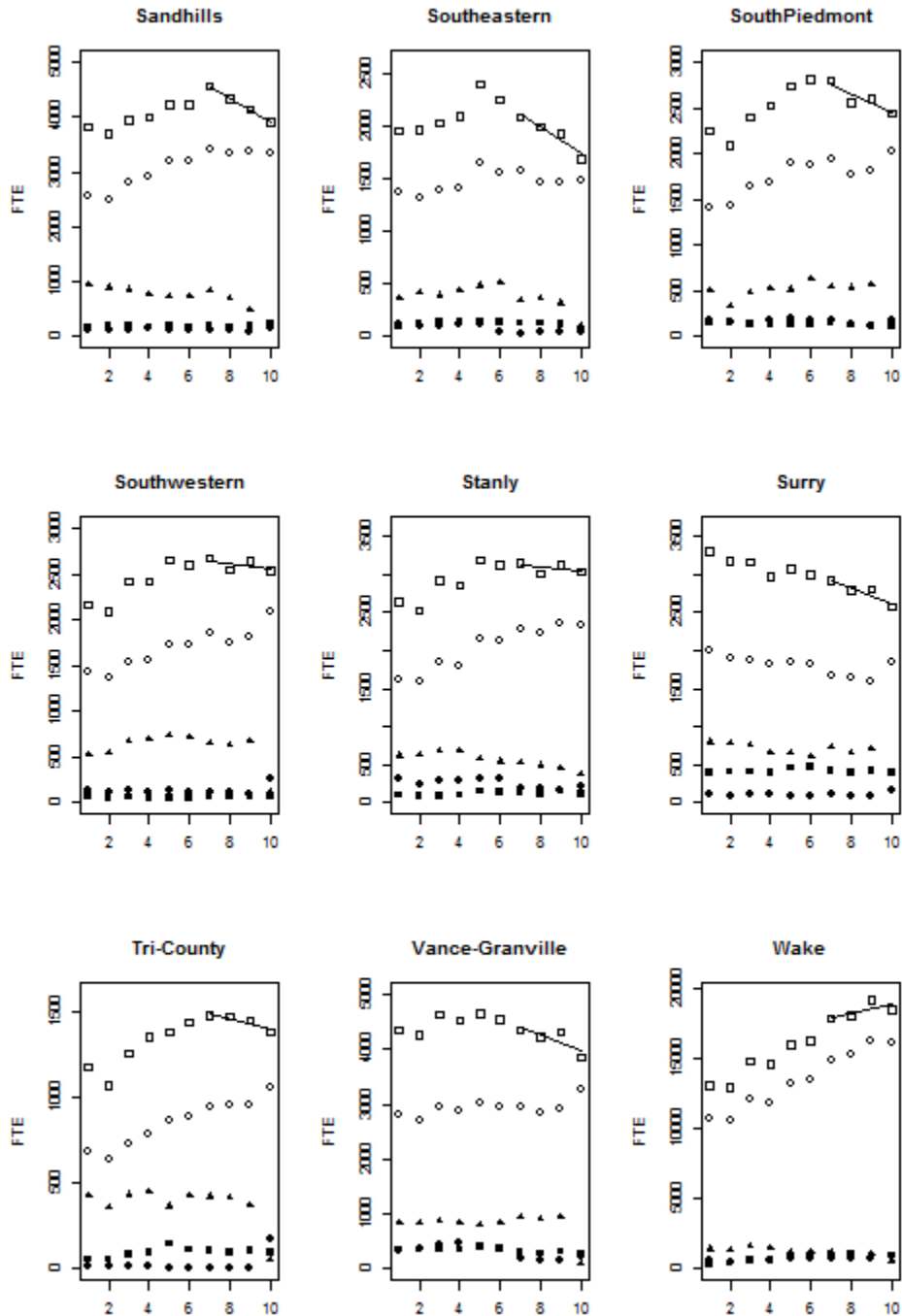


A Brief Treatment of NCCCS FTE Data  
David I. Hopp  
October 2012

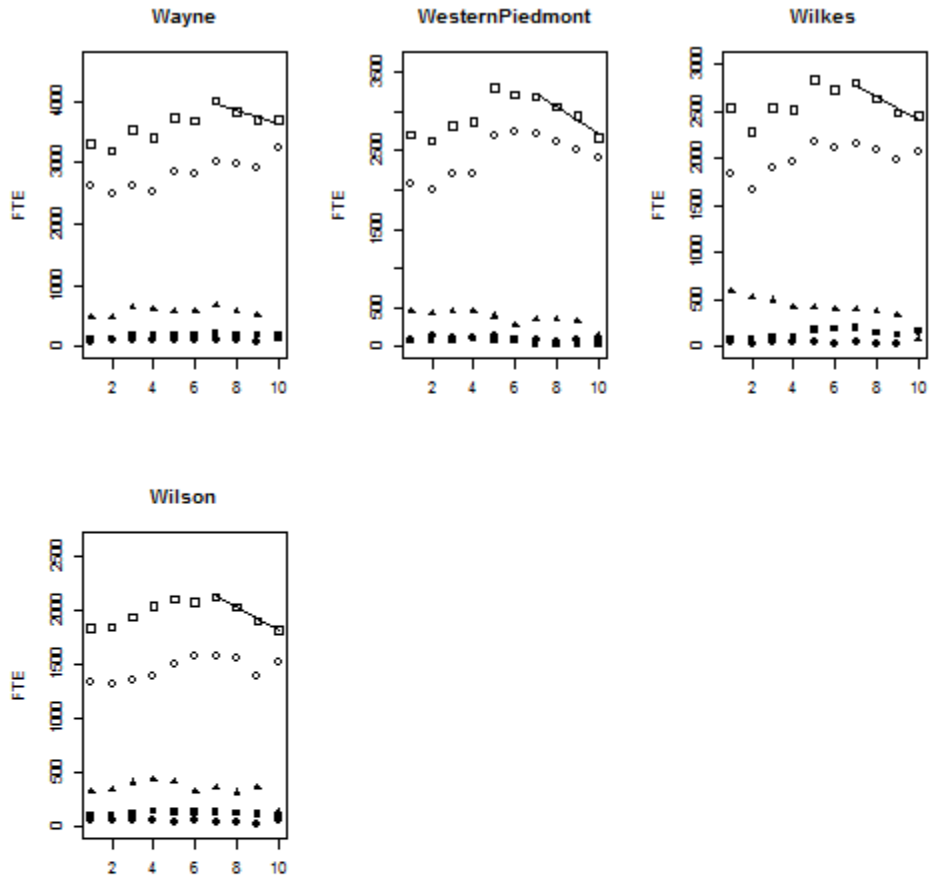




A Brief Treatment of NCCCS FTE Data  
David I. Hopp  
October 2012



A Brief Treatment of NCCCS FTE Data  
David I. Hopp  
October 2012



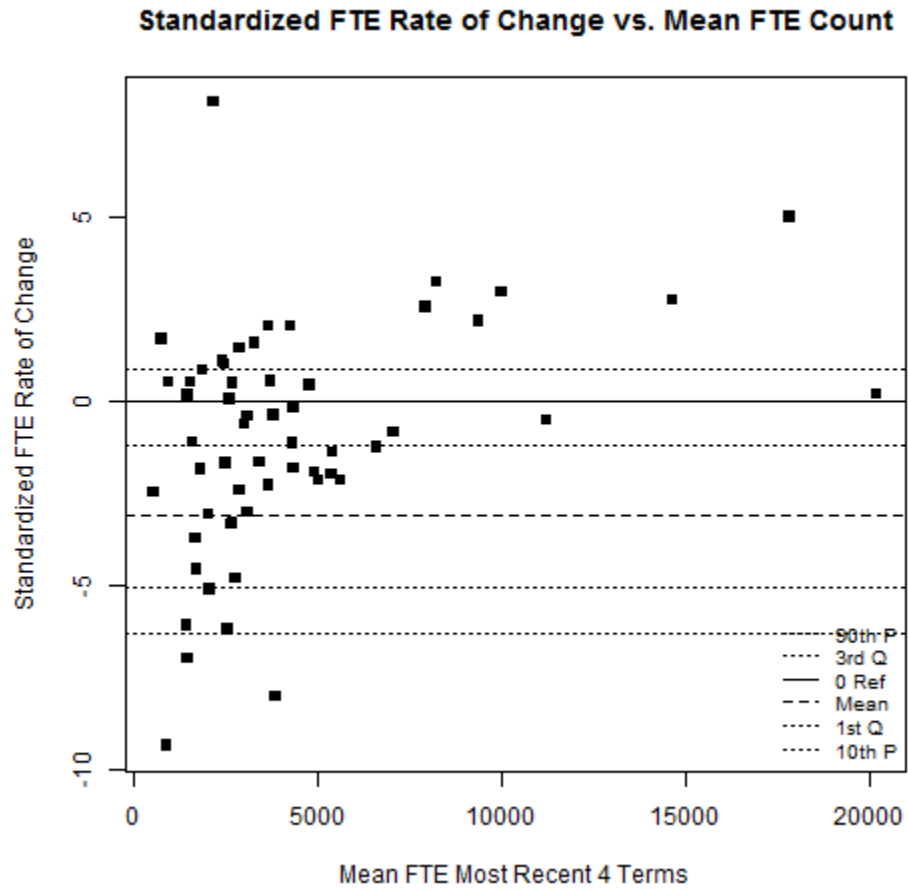
## Part II. Summary Indicators for Curriculum Student FTE

The large number of figures in Part I, one for each college, make it difficult to get an overall impression of FTE enrollment. In Part II we look at a few ways to present this data with the intent of making it easier to understand it.

The general goodness of fit of a regression line over the last four terms gives some hope for constructing a “quality measure” comparable across all the colleges, at least for recent years. However, the slopes of the fits are not directly comparable since the same numerical values clearly have much different significance when colleges with large enrollments are compared with those having small enrollments. We define instead a standardized slope which we will call the standardized FTE rate of change. This is the slope given by the linear model, divided by the mean of the FTE count over the most recent four semesters, multiplied by 100. This creates a measure of the slope as a percentage of the mean FTE count. These FTE rates of change constitute a performance measure that is comparable across all the colleges.

Figure II.A shows the standardized FTE rates of change for all the colleges. Tables II.A and II.B provide detailed data. We observe that there is a preponderance of decreases in FTE count for colleges under about 8000 FTEs. Above that number these larger colleges are adding, or at least not losing, FTE counts. However Central Piedmont, the college with the largest average FTE count, has a very small negative rate of change. Even with the contributions of the largest colleges, the mean of overall standardized FTE rate of change is negative.

Figure II.A. Standardized FTE Rates of Change



A Brief Treatment of NCCCS FTE Data  
David I. Hopp  
October 2012

Table II.A. Detailed Data for Figure II.A and Map II.C  
Sorted by Standardized Slope

College	Slope	Mean FTE	Stand. Slope	College	Slope	Mean FTE	Stand. Slope
Richmond	104.9	2298.75	4.563	BlueRidge	-74.0	2391.50	-3.094
Fayetteville	399.0	11270.00	3.540	CaldwellTI	-153.9	4676.75	-3.291
Brunswick	37.4	1520.50	2.460	Vance-Granville	-140.5	4186.25	-3.356
Wake	307.7	18405.75	1.672	Randolph	-101.0	2949.00	-3.425
Nash	48.0	3314.00	1.448	Surry	-101.9	2770.75	-3.678
Martin	7.2	765.50	0.941	Alamance	-205.2	5251.50	-3.907
----- 90 <sup>th</sup> P: 0.842 -----				GastonCollege	-254.4	6406.50	-3.971
Forsyth	80.8	10117.00	0.799	SouthPiedmont	-103.1	2595.75	-3.972
Guilford	26.3	14895.75	0.177	CatawbaValley	-210.6	5258.00	-4.005
BeaufortCounty	-0.4	1888.50	-0.021	Rowan-Cabarrus	-278.7	6952.75	-4.008
Pitt	-46.8	8402.00	-0.557	CentralCarolina	-207.8	4910.50	-4.232
CentralPiedmont	-123.9	20184.25	-0.614	Durham	-254.4	5550.50	-4.583
CapeFear	-62.3	9426.75	-0.661	Wilkes	-119.7	2591.75	-4.619
Stanly	-23.0	3075.50	-0.748	McDowell	-66.5	1377.25	-4.828
Robeson	-28.5	2612.75	-1.091	----- 1 <sup>st</sup> Q: -5.03 -----			
Asheville-Buncombe	-97.5	8029.75	-1.214	Sandhills	-215.8	4234.00	-5.097
----- 3 <sup>rd</sup> Q: -1.217 -----				Montgomery	-42.8	828.50	-5.166
Craven	-45.4	3705.50	-1.225	Wilson	-103.9	1959.25	-5.303
Southwestern	-32.6	2601.00	-1.253	Rockingham	-132.0	2418.00	-5.459
Mitchell	-53.8	3683.50	-1.461	WesternPiedmont	-166.5	2960.25	-5.625
DavidsonCounty	-71.6	4283.50	-1.672	Halifax	-92.3	1633.25	-5.651
JamesSprunt	-25.9	1533.75	-1.689	Mayland	-85.1	1394.75	-6.101
Tri-County	-31.2	1442.00	-2.164	Isothermal	-163.3	2665.75	-6.126
Haywood	-63.6	2459.50	-2.586	Edgecombe	-206.7	3335.75	-6.197
Johnston	-117.1	4300.25	-2.723	----- 10 <sup>th</sup> P: -6.28 -----			
Sampson	-43.3	1571.75	-2.755	Southeastern	-123.9	1916.75	-6.464
Wayne	-108.1	3803.25	-2.842	Lenoir	-231.2	3493.50	-6.618
CoastalCarolina	-137.8	4830.00	-2.853	Cleveland	-248.6	3574.50	-6.955
Carteret	-51.0	1780.50	-2.864	Pamlico	-37.8	520.00	-7.269
Roanoke-Chowan	-28.4	929.00	-3.057	Bladen	-130.0	1653.00	-7.864
Albemarle	-87.6	2839.50	-3.085	Piedmont	-254.0	2349.50	-10.811
----- Mean : -3.09 -----							

A Brief Treatment of NCCCS FTE Data  
David I. Hopp  
October 2012

Table II.B. Detailed Data for Figure II.A  
Sorted by Mean FTE Count Over Last 4 Semesters

College	Slope	Mean FTE	Stand. Slope	College	Slope	Mean FTE	Stand. Slope
Pamlico	-37.8	520.00	-7.269	WesternPiedmont	-166.5	2960.25	-5.625
Martin	7.2	765.50	0.941	Stanly	-23.0	3075.50	-0.748
Montgomery	-42.8	828.50	-5.166	Nash	48.0	3314.00	1.448
Roanoke-Chowan	-28.4	929.00	-3.057	Edgecombe	-206.7	3335.75	-6.197
McDowell	-66.5	1377.25	-4.828	Lenoir	-231.2	3493.50	-6.618
Mayland	-85.1	1394.75	-6.101	Cleveland	-248.6	3574.50	-6.955
Tri-County	-31.2	1442.00	-2.164	Mitchell	-53.8	3683.50	-1.461
Brunswick	37.4	1520.50	2.460	Craven	-45.4	3705.50	-1.225
JamesSprunt	-25.9	1533.75	-1.689	Wayne	-108.1	3803.25	-2.842
Sampson	-43.3	1571.75	-2.755	Vance-Granville	-140.5	4186.25	-3.356
Halifax	-92.3	1633.25	-5.651	Sandhills	-215.8	4234.00	-5.097
Bladen	-130.0	1653.00	-7.864	DavidsonCounty	-71.6	4283.50	-1.672
Carteret	-51.0	1780.50	-2.864	Johnston	-117.1	4300.25	-2.723
BeaufortCounty	-0.4	1888.50	-0.021	CaldwellTI	-153.9	4676.75	-3.291
Southeastern	-123.9	1916.75	-6.464	CoastalCarolina	-137.8	4830.00	-2.853
Wilson	-103.9	1959.25	-5.303	CentralCarolina	-207.8	4910.50	-4.232
Richmond	104.9	2298.75	4.563	Alamance	-205.2	5251.50	-3.907
Piedmont	-254.0	2349.50	-10.811	CatawbaValley	-210.6	5258.00	-4.005
BlueRidge	-74.0	2391.50	-3.094	Durham	-254.4	5550.50	-4.583
Rockingham	-132.0	2418.00	-5.459	GastonCollege	-254.4	6406.50	-3.971
Haywood	-63.6	2459.50	-2.586	Rowan-Cabarrus	-278.7	6952.75	-4.008
Wilkes	-119.7	2591.75	-4.619	Asheville-Buncombe	-97.5	8029.75	-1.214
SouthPiedmont	-103.1	2595.75	-3.972	Pitt	-46.8	8402.00	-0.557
Southwestern	-32.6	2601.00	-1.253	CapeFear	-62.3	9426.75	-0.661
Robeson	-28.5	2612.75	-1.091	Forsyth	80.8	10117.00	0.799
Isothermal	-163.3	2665.75	-6.126	Fayetteville	399.0	11270.00	3.540
Surry	-101.9	2770.75	-3.678	Guilford	26.3	14895.75	0.177
Albemarle	-87.6	2839.50	-3.085	Wake	307.7	18405.75	1.672
Randolph	-101.0	2949.00	-3.425	CentralPiedmont	-123.9	20184.25	-0.614

A Brief Treatment of NCCCS FTE Data  
David I. Hopp  
October 2012

We will now turn to using maps of North Carolina to visualize some aspects of the FTE data. First, two maps of North Carolina showing the locations of community colleges. Map II.A shows all the colleges. The area of each circle is proportional to the average of the FTE count over the most recent four terms.

Map II.B returns to the standardized FTE rates of change. It is based on the contents of Table II.A, and shows the locations of colleges below the 25<sup>th</sup> percentile and above the 75<sup>th</sup> percentile. Squares indicate colleges with positive growth rates, and circles those with negative rates.

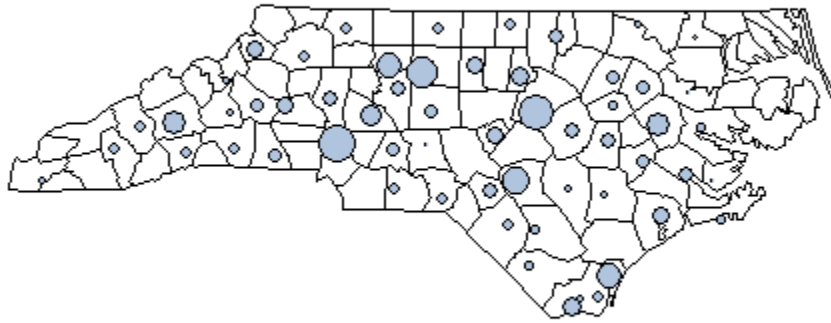
Map II.C shows only the largest colleges, specifically those with an FTE count over 8000. This map incorporates the standardized FTE rates of change shown in Map II.B. Map II.D reverses this and shows all the colleges except the largest.

By way of summary, we see that on the whole, the largest colleges have fared better than most of the smaller in the past two years. The maps are interesting, but anyone familiar with North Carolina already knows that the region called the Piedmont Urban Crescent is where the population, and the jobs, are. Maps might prove more useful if they were combined with census and economic data. We also note that the correlation between total curriculum student counts and associate degree student counts should be explored at more length.

A Brief Treatment of NCCCS FTE Data  
David I. Hopp  
October 2012

Map II.A North Carolina Community Colleges

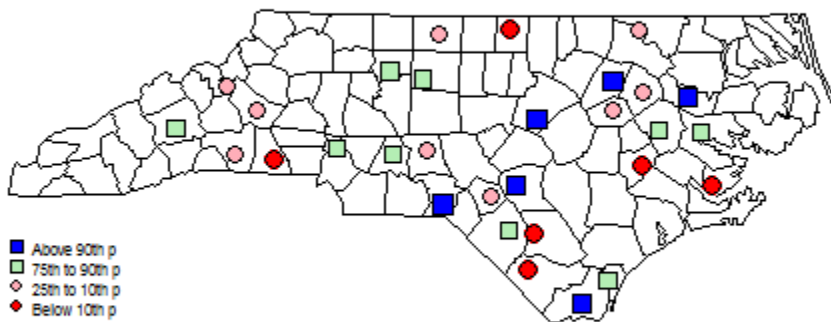
**North Carolina Community Colleges by FTE Count**



Area of circle proportional to  
Ave. FTE over past 4 terms

Map II.B Colleges and Standardized FTE Rates of Change

**North Carolina Community Colleges  
Rate of Gain or Loss**

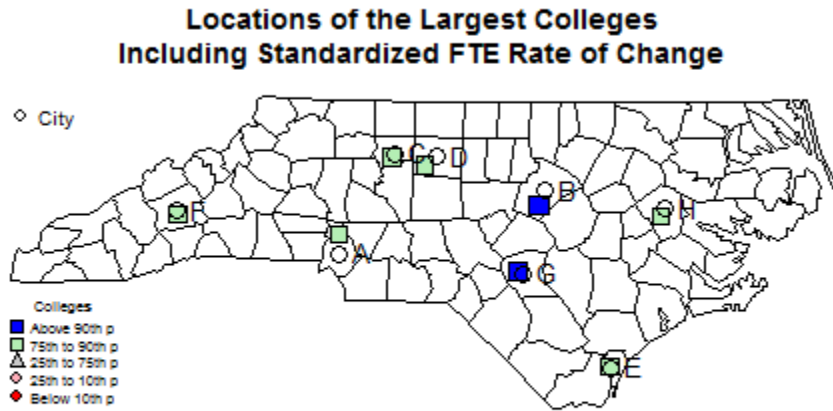


Upper and Lower Percentiles of Standardized FTE Rate of Change  
Squares show gain Circles show loss



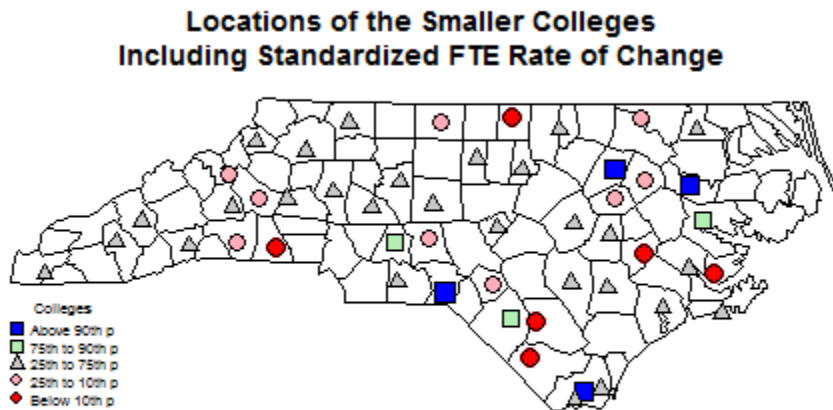
A Brief Treatment of NCCCS FTE Data  
David I. Hopp  
October 2012

Map II.C Largest Colleges by Standardized FTE Rate of Change



A: Charlotte B: Raleigh C: Winston-Salem D: Greensboro  
E: Wilmington F: Asheville G: Fayetteville H: Greenville

Map II.D All Colleges but Excluding the Largest



Largest colleges have been removed from this map

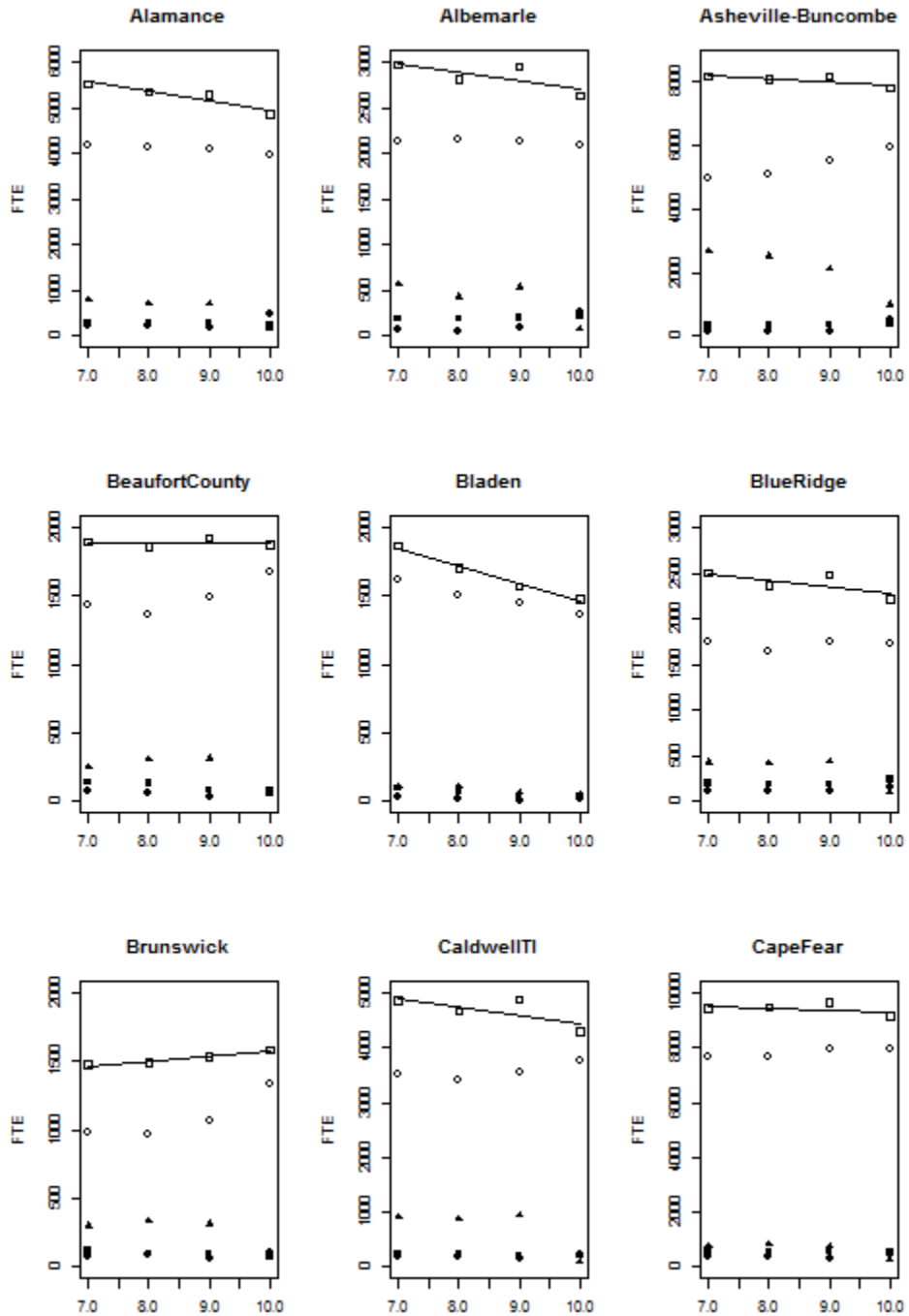
A Brief Treatment of NCCCS FTE Data  
David I. Hopp  
October 2012

### Part III. Further FTE Displays by College

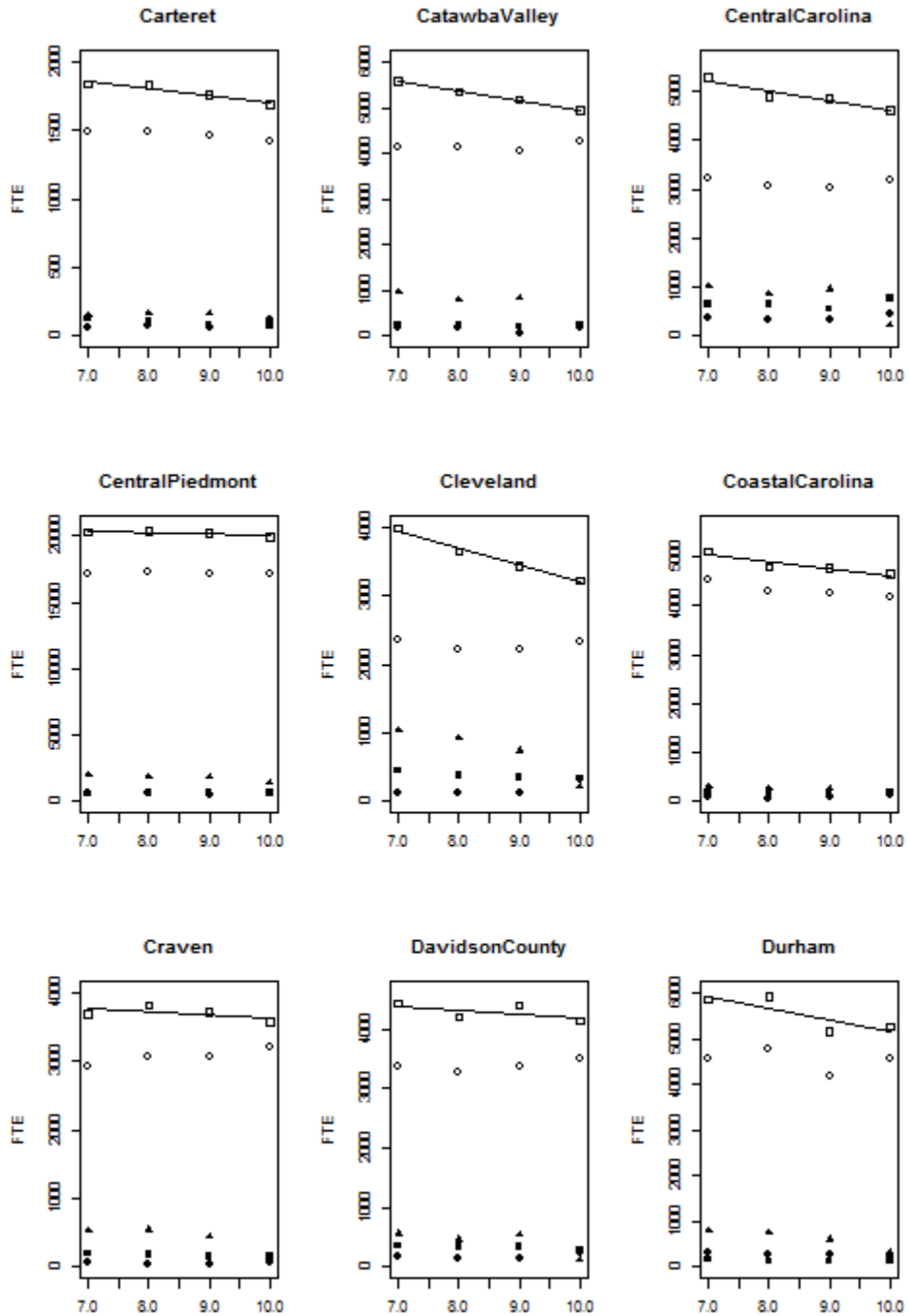
#### Looking at the Most Recent Terms

In this Part III we will look closely at the most recent Terms, in particular at Fall 2011, Spring 2011, Fall 2012 and Spring 2012. A review of the displays by college shows a robustness in Associate Degree FTEs even where the total FTE is declining. While this is not true in all cases (such as Pamlico), it does hold in most. Thus, declines in FTEs for Certificates, Diplomas and University Transfers are not reflected in Associate FTEs, which remain the most significant contributor to total Curriculum FTE.

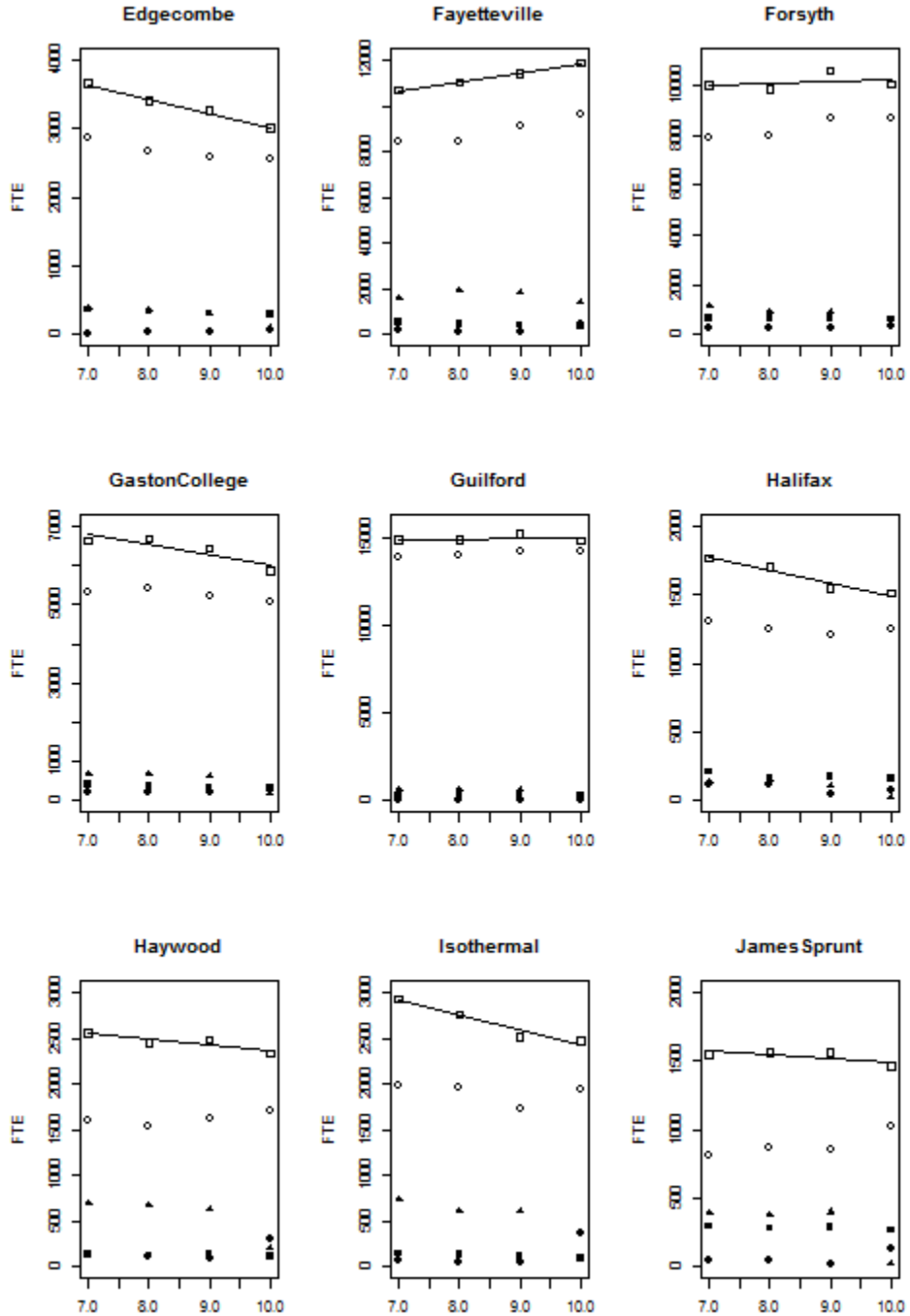
A Brief Treatment of NCCCS FTE Data  
 David I. Hopp  
 October 2012



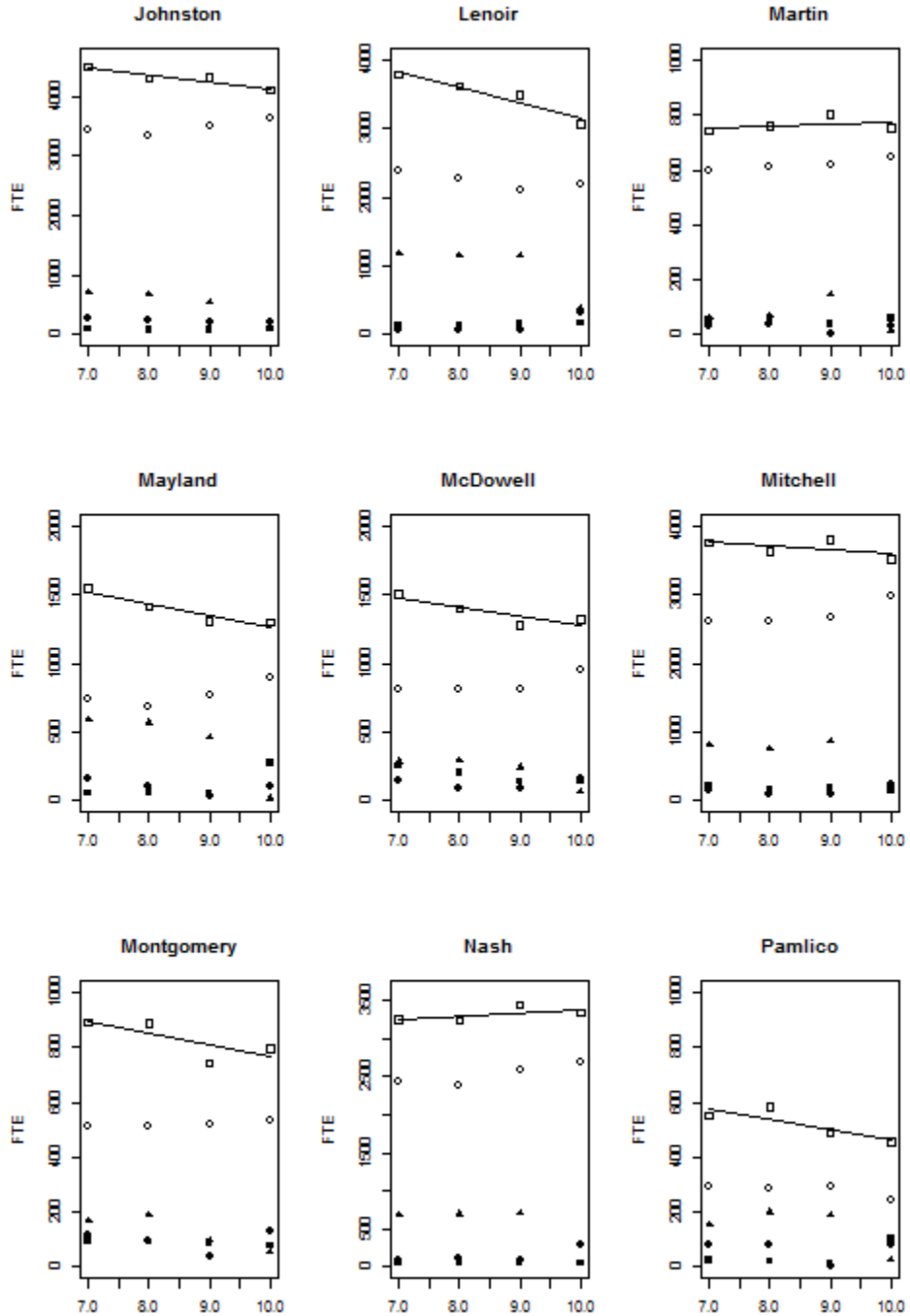
A Brief Treatment of NCCCS FTE Data  
 David I. Hopp  
 October 2012



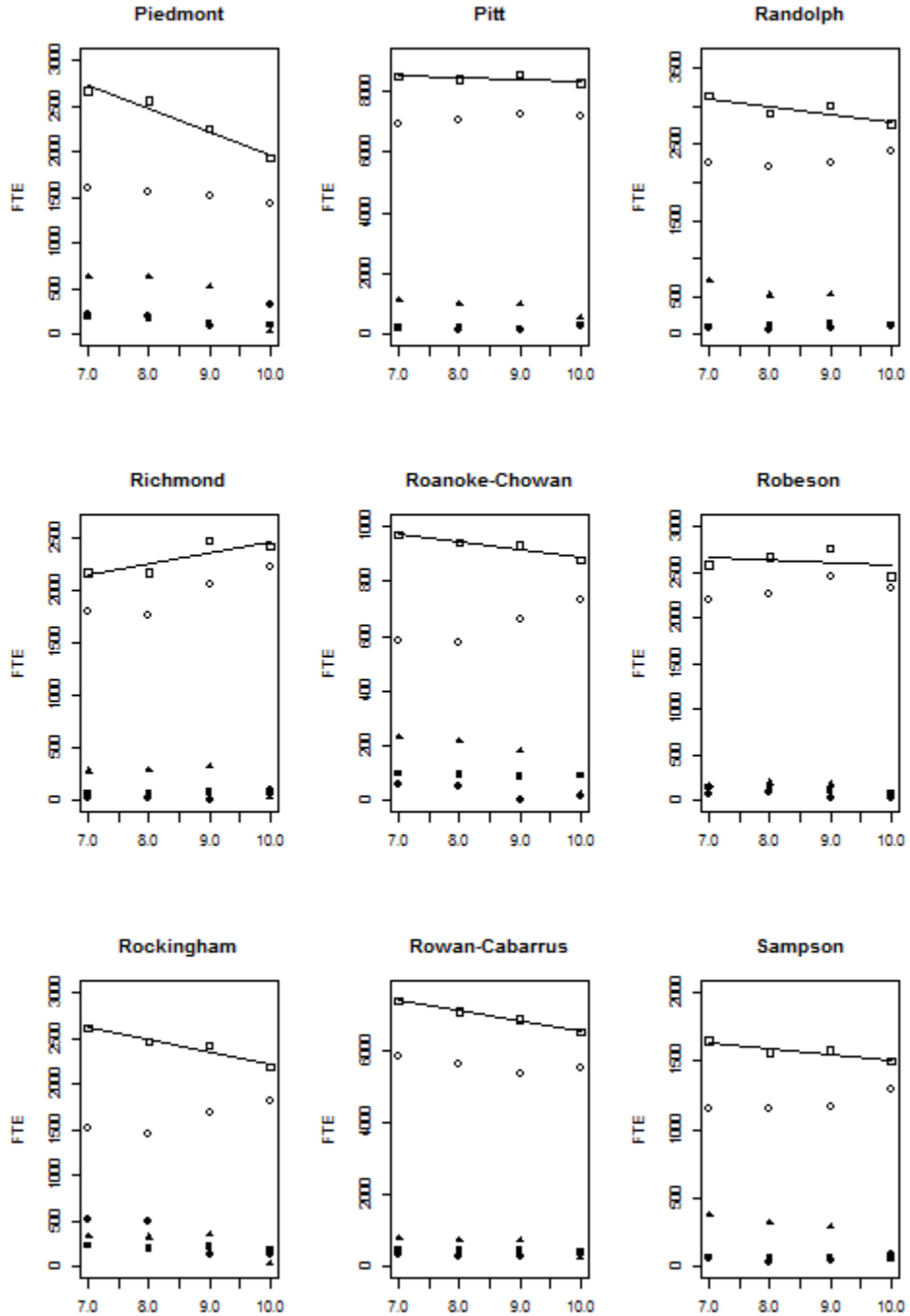
A Brief Treatment of NCCCS FTE Data  
 David I. Hopp  
 October 2012



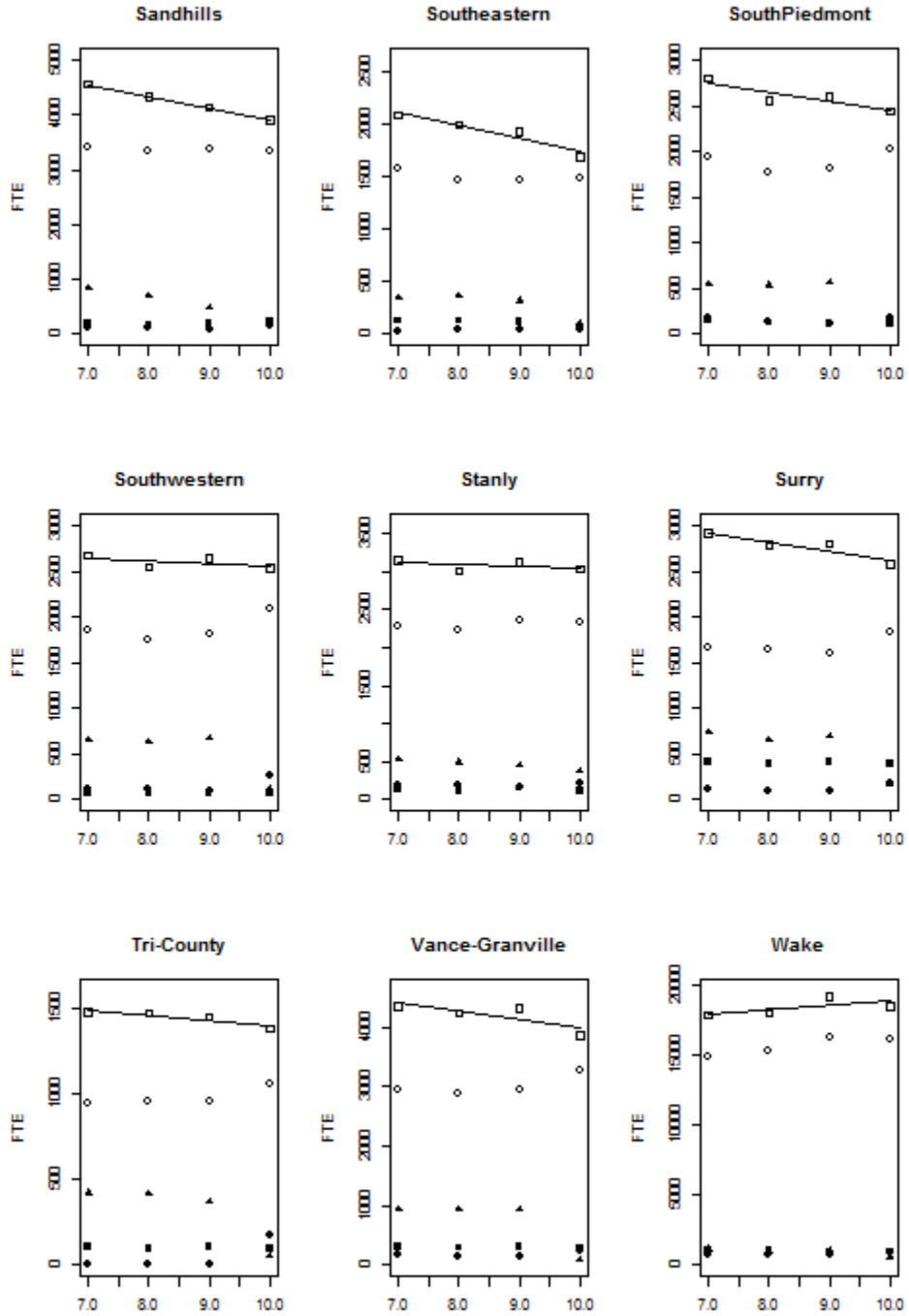
A Brief Treatment of NCCCS FTE Data  
David I. Hopp  
October 2012



A Brief Treatment of NCCCS FTE Data  
 David I. Hopp  
 October 2012

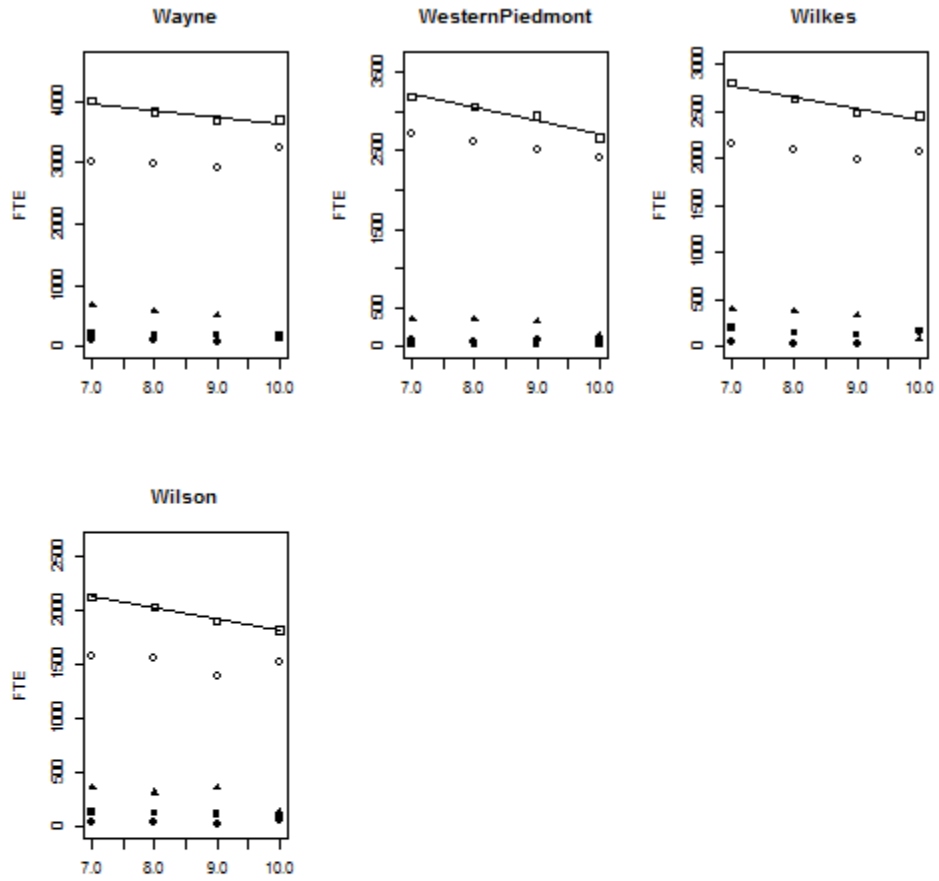


A Brief Treatment of NCCCS FTE Data  
David I. Hopp  
October 2012





A Brief Treatment of NCCCS FTE Data  
David I. Hopp  
October 2012



## Part IV. Summary for Associate Degree FTE

Figure IV.A shows Associate Degree FTE as a percentage of total Curriculum student FTE across all the Terms in the NCCCS data.\* There had been a slow increase of the percentage up until the most recent Term (Fall 2012) when there was a noticeable jump. Part of this Fall 2012 increase may be a consequence of the lower overall Curriculum student FTE for that Term.

The robustness of the Associate Degree FTE, remarked upon in Part III, is made even more evident in Figure IV.A.

\*The box and whiskers plot shows the median (not the mean) as a horizontal line in the box. The ends of the box are the upper and lower quartiles (the interquartile range). The ends of the whiskers extend to the highest and lowest values except that outliers (further out from the box than 1.5 times the interquartile range) are indicated by circles. Part of the utility of this kind of a plot is that it does not depend on knowing the mean or standard deviation of the data from which it is drawn, and thus is not dependent on any assumptions about the normality of that data.

A Brief Treatment of NCCCS FTE Data  
David I. Hopp  
October 2012

Figure IV.A Box Plot Summarizing Associate Degree FTE as a Percentage of Curriculum FTE

