I. Carroll County

Carroll County is a rural county in southwestern Virginia geographically located on the North Carolina border. According to the LCI, Carroll County is considered a low fiscal capacity school division ($LCI_{1996\text{-}98}$ - 0.2727). The county is typical of many rural jurisdictions in the Commonwealth exhibiting slower than the state's average change pursuant to the three indicators. Its total population has remained steady, fluctuating only a few percentage points for several decades, while its small (less than 4,000) average daily membership has declined steadily for the past two decades.

Local to State Ratio Net Biennial Change Rate.

$(TPV/ADM)_{Carroll\ /}$ $(TPV/ADM)_{State}$ (Table 4.11)

For the first five Periods the State Net Biennial Change Rate dampened, either completely (Periods II, III, and IV) or incompletely (Periods I and V), the magnitude of the corresponding Local Net Biennial Change Rate. The degree of dampening in Period I was miniscule (0.0741%). Periods II-IV exhibited increases ranging from 13% to 22% in their Local Net Biennial Change Rate. However, these percentages were much smaller than the corresponding State amounts, thus producing a negative difference in the respective Local to State Ratio. In Period VI the Local Net Biennial Change Rate was enhanced completely by a negative State Net Biennial Change Rate that was lower than that of Carroll County. Over all six Periods the steadily declining ADM always contributed to the synthetic enhancement of the Local Net Biennial Change Rate.[98]

$(TPV/POP)_{Carroll\ /}$ $(TPV/POP)_{State}$ (Table 4.12)

Similar to the $TPV/ADM_{Carroll}$ the volatility pattern first exhibited a dampening effect, then one that was enhancing. For the first five Periods the State Net Biennial Change Rate dampened, either completely (Periods I-IV) or incompletely (Period V), the Local Net Biennial Change Rate. The degree of dampening in Period I was the smallest (-2.222%). Periods II-IV exhibited the typical volatility pattern of complete dampening characteristic of localities whose Net Biennial Change Rate lagged behind the State rate. However, in the fifth period when the State Net Biennial Change Rate dropped to 6.300% (partly due to the sharp increase in ADM_{State}), the dampening became incomplete. Thus, the Local to State Ratio increased by a small amount (+0.0100). In Period VI the Local Net Biennial Change Rate was enhanced completely through the effects of a *negative* State Net Biennial Change Rate that was lower than that of the locality.

[98] Refer to the appropriate section in Volume II: Technical Appendix for detailed analyses of the synthetic enhancement pattern of volatility to the Local Net Biennial Change Rate.

TABLE 4.11. $(TPV/ADM)_{Carroll}$ Local to State Ratio Net Biennial Change Rate, Difference, and Volatility, Biennia 1984-86 through 1996-98

	Period	Local Net Biennial Change Rate (Percentage)	-	State Net Biennial Change Rate (Percentage)	=	Local to State Ratio Net Biennial Change Rate (Percentage)	Difference in the Local to State Ratio	Volatility Type[1]
I	84-86 to 86-88	16.117	-	15.376	=	0.0741	0.0046	Type A3
II	86-88 to 88-90	13.009	-	15.421	=	-2.412	-0.0152	Type B1
III	88-90 to 90-92	18.731	-	26.239	=	-7.509	-0.0461	Type B1
IV	90-92 to 92-94	22.230	-	29.817	=	-7.588	-0.0431	Type B1
V	92-94 to 94-96	9.382	-	6.095	=	3.287	0.0173	Type A1
VI	94-96 to 96-98	18.302	-	-2.168	=	20.470	0.1111	Type D1

[1]Refer to Appendix C in this volume and the appropriate section in Volume II: Technical Appendix.

TABLE 4.12. $(TPV/POP)_{Carroll}$ Local to State Ratio Net Biennial Change Rate, Difference, and Volatility, Biennia 1984-86 through 1996-98

	Period	Local Net Biennial Change Rate (Percentage)	-	State Net Biennial Change Rate (Percentage)	=	Local to State Ratio Net Biennial Change Rate (Percentage)	Difference in the Local to State Ratio	Volatility Type[1]
I	84-86 to 86-88	7.543	-	9.765	=	-2.222	-0.0139	Type B2
II	86-88 to 88-90	9.398	-	12.659	=	-3.260	-0.0200	Type B1
III	88-90 to 90-92	14.415	-	23.049	=	-8.634	-0.0512	Type B1
IV	90-92 to 92-94	19.032	-	26.551	=	-7.520	-0.0408	Type B1
V	92-94 to 94-96	8.492	-	6.300	=	2.192	0.0110	Type A1
VI	94-96 to 96-98	11.142	-	-2.704	=	13.846	0.0710	Type D2

[1]Refer to Appendix C in this volume and the appropriate section in Volume II: Technical Appendix.

(AGI/ADM)$_{Carroll}$ / (AGI/ADM)$_{State}$ (Table 4.13)

For the first three Periods the State Net Biennial Change Rate dampened completely the local change rate. Similar to the TPV/ADM, the degree of dampening in Period I was miniscule (-1.019%) producing only a small change in the Local to State Ratio (-0.0064). Period II exhibited the more pronounced effect of complete dampening attributable to the greater difference between the State and Local Net Biennial Change Rates. Conversely, Period III in which the State and the Local Net Biennial Change Rates were approximately equal indicated a transition toward the incomplete dampening resulting in the volatility pattern evident in the fourth period. Note that while the Local Net Biennial Change Rate declined only two percentage points, the State Net Biennial Change Rate declined almost ten percent. Thus, Table 4.13 shows that the degree of dampening was more influenced by the State Net Biennial Change Rate than of the local. The Local to State Ratio was completely dampened in Period V due partly to a decrease in the Carroll County Adjusted Gross Income total[99] and partly due to the effect of the State increase. The loss in AGI was not uniform across most localities in the Commonwealth and was atypical for rural school divisions, although it did occur occasionally in some rural, perhaps economically undifferentiated, low fiscal capacity jurisdictions. In Period VI the +18.6% Local Net Biennial Change Rate was greater than twice the +9.2% State rate. Thus, the Local to State Ratio was incompletely dampened.

(AGI/POP)$_{Carroll}$ / (AGI/POP)$_{State}$ (Table 4.14)

The AGI/POP Local to State Ratio exhibited a trend in this study similar to that of the AGI/ADM discussed above. The major differences occurred in the magnitude of the Local Net Biennial Change Rate. Whereas the $ADM_{Carroll}$ had decreased between all Periods of the study, the $POP_{Carroll}$ did not increase for only the first and last Periods. These decreases served to provide enhancement *within* the Net Local Biennial Change Rate, However, they were not sufficiently large enough to overcome the counter-effect of the Net State Biennial Change Rate.

[99] The AGI (in Thousands of Dollars) declined from $198,267 (Biennium 1992-94) to $197,361 (Biennium 1994-96). Refer to Volume II: Technical Appendix, Carroll County AGI for specific percentages.

TABLE 4.13. $(AGI/ADM)_{Carroll}$ Local to State Ratio Net Biennial Change Rate, Difference, and Volatility, Biennia 1984-86 through 1996-98

	Period	Local Net Biennial Change Rate (Percentage)	-	State Net Biennial Change Rate (Percentage)	=	Local to State Ratio Net Biennial Change Rate (Percentage)	Difference in the Local to State Ratio	Volatility Type[1]
I	84-86 to 86-88	18.413	-	19.432	=	-1.019	-0.0064	Type B3
II	86-88 to 88-90	10.936	-	17.785	=	-6.848	-0.0426	Type B1
III	88-90 to 90-92	19.982	-	20.364	=	-0.382	-0.0022	Type B1
IV	90-92 to 92-94	17.720	-	10.441	=	7.279	0.0420	Type A1
V	92-94 to 94-96	1.237	-	4.283	=	-3.046	-0.0189	Type E1
VI	94-96 to 96-98	18.600	-	9.267	=	9.333	0.0561	Type A1

[1]Refer to Appendix C in this volume and the appropriate section in Volume II: Technical Appendix.

TABLE 4.14. $(AGI/POP)_{Carroll}$ Local to State Ratio Net Biennial Change Rate, Difference, and Volatility, Biennia 1984-86 through 1996-98

	Period	Local Net Biennial Change Rate (Percentage)	-	State Net Biennial Change Rate (Percentage)	=	Local to State Ratio Net Biennial Change Rate (Percentage)	Difference in the Local to State Ratio	Volatility Type[1]
I	84-86 to 86-88	9.670	-	13.600	=	-3.930	-0.0248	Type B2
II	86-88 to 88-90	7.392	-	15.050	=	-7.658	-0.0464	Type B1
III	88-90 to 90-92	15.621	-	17.215	=	-1.594	-0.0089	Type B1
IV	90-92 to 92-94	14.640	-	7.282	=	7.358	0.0405	Type A1
V	92-94 to 94-96	0.414	-	4.487	=	-4.074	-0.0241	Type E1
VI	94-96 to 96-98	11.422	-	8.101	=	3.321	0.0188	Type A2

[1]Refer to Appendix C in this volume and the appropriate section in Volume II: Technical Appendix.

(TRS/ADM)$_{Carroll}$ / (TRS/ADM)$_{State}$ (Table 4.15)

For four (I, II, IV, and VI) Periods, the State Net Biennial Change dampened incompletely the Local to State Ratio. In each Period the Local Net Biennial Change Rate was greater than the State Net Biennial Change Rate. These higher change rates were partially a function of the relatively small size of the Carroll County Taxable Retail Sales Receipts base which comprises less than one percent of the TRS_{State}. As mentioned in Chapter 3, a small dollar amount of change in a small base produces a larger percentage change than when compared with the same dollar amount of change added to a larger base. Thus, the fact that Carroll County experienced only incomplete dampening rather than complete dampening is partially attributable to the high percentage derived from smaller bases.

The third Period exhibited complete dampening and a decrease in its Local to State Ratio. Period V exhibited complete enhancement in the Local to State Ratio. This increase of +9.210% was attributable to a negative State Net Biennial Change Rate (-1.611%) that enhanced the positive Local Net Biennial Change Rate by the same amount. Paradoxically, although the Local Net Biennial Change Rate had *decreased* from +18.505% to +7.559%, the appearance of its change on a superficial level suggested that the Local Taxable Retail Sales Receipts per pupil had increased.

(TRS/POP)$_{Carroll}$ / (TRS/POP)$_{State}$ (Table 4.16)

Its volatility pattern was similar to that the TRS/ADM as discussed above. Similarly, the negative State Net Biennial Change Rate for Biennium V (-1.329%) effectively *enhanced* the declining (but not negative) Local Net Biennial Change Rate to produce a Local to State Ratio Net Biennial Change Rate of +8.052%.

TABLE 4.15. $(TRS/ADM)_{Carroll}$ Local to State Ratio Net Biennial Change Rate, Difference, and Volatility, Biennia 1984-86 through 1996-98

	Period	Local Net Biennial Change Rate (Percentage)	-	State Net Biennial Change Rate (Percentage)	=	Local to State Ratio Net Biennial Change Rate (Percentage)	Difference in the Local to State Ratio	Volatility Type[1]
I	84-86 to 86-88	22.810	-	20.892	=	1.918	0.0063	Type A3
II	86-88 to 88-90	32.202	-	28.381	=	3.821	0.0128	Type A1
III	88-90 to 90-92	6.472	-	15.161	=	-8.689	-0.0302	Type B1
IV	90-92 to 92-94	18.505	-	10.223	=	8.282	0.0263	Type A1
V	92-94 to 94-96	7.559	-	-1.611	=	9.210	0.0317	Type D3
VI	94-96 to 96-98	14.618	-	10.933	=	3.685	0.0138	Type A1

[1]Refer to Appendix C in this volume and the appropriate section in Volume II: Technical Appendix.

TABLE 4.16. $(TRS/POP)_{Carroll}$ Local to State Ratio Net Biennial Change Rate, Difference, and Volatility, Biennia 1984-86 through 1996-98

	Period	Local Net Biennial Change Rate (Percentage)	-	State Net Biennial Change Rate (Percentage)	=	Local to State Ratio Net Biennial Change Rate (Percentage)	Difference in the Local to State Ratio	Volatility Type[1]
I	84-86 to 86-88	13.472	-	14.821	=	-1.349	-0.0360	Type B2
II	86-88 to 88-90	27.978	-	25.060	=	2.918	0.0095	Type A1
III	88-90 to 90-92	2.602	-	12.402	=	-9.800	-0.0329	Type B1
IV	90-92 to 92-94	15.405	-	7.043	=	8.362	0.0253	Type A1
V	92-94 to 94-96	6.724	-	-1.329	=	8.052	0.0265	Type D3
VI	94-96 to 96-98	7.682	-	9.697	=	-2.015	-0.0072	Type B2

[1]Refer to Appendix C in this volume and the appropriate section in Volume II: Technical Appendix.

Local Composite Index Net Biennial Change Rate. (Table 4.17)

The Carroll County Local Composite Index[100] exhibited patterns of volatile behavior that appeared to support the existence of the three LCI change trends discussed in Chapter 1. For Periods I, IV, and V the approximately equal Weighted Sum of Local and State Factors indicates that the change in the LCI was attributable almost equally to both entities, a characteristic of Balanced Change. Divergent Change appeared to occur in Periods II and III in which the Carroll County LCI declined 4.222% and 5.042%, respectively. The third trend, Convergent Change, appeared to occur in Period VI, when the LCI increased +12.430%. The large point difference in the LCI change attributable to either local (0.0428) or state (0.0093) effects was evident.

It is possible that the magnitude of the dampening or enhancement volatility of the six individual Local to State Ratios comprising an LCI calculation could influence significant changes in its value. The decline in the LCI for Periods I, II, III, IV and V is coincident with the phenomenon that every Local to State Ratio exhibited dampened change.[101] On the other hand, for Period VI some Local to State Ratios exhibited enhanced change, which appeared to contribute to the increase in the LCI for Carroll County.

In Period II the Net Biennial Change Rate for each of the four TPV and AGI Local to State Ratios was completely dampened to a lower value than its initial value. Conversely, TRS/ADM and TRS/POP Local to State Ratios exhibited incompletely dampened volatility. These small increases (approximately 0.0128 and 0.0265 points as indicated by the Difference in the Local to State Ratio in Tables 4.15 and 4.16, respectively), when taken with the amount of complete dampening present in the other four Local to State Ratios, appeared not to have reversed the decline in the LCI significantly.

[100] The Local Composite Index is the weighted sum of the Local to State Ratios. Recall that each Local to State Ratio is composed of the sum of the Local Net Biennial Change and the State Net Biennial Change.

[101] TPV/ADM, TPV/POP, AGI/ADM, and AGI/POP exhibited complete dampening and a negative Net Biennial Change Rate. TRS/ADM and TRS/POP exhibited Incomplete Dampening, thus exhibited a positive Net Biennial Change Rate.

TABLE 4.17. Local Composite Index Values, Net Biennial Change Rate, and Local and State Percentages, Carroll County, 1984-86 through 1996-98 Biennia

	Period	$LCI_{initial}$	LCI_{final}	LCI Net Biennial Change Rate		Percentage of Change Attributable to Local Factors	Percentage of Change Attributable to State Factors
				LCI_{final} - $LCI_{initial}$	**% of $LCI_{initial}$**		
I	1984-86 to 1986-88	0.2988	0.2961	-0.0027	-0.904[1]	48.494	51.506
II	1986-88 to 1988-90	0.2961	0.2836	-0.0125	-4.222[2]	42.514	57.486
III	1988-90 to 1990-92	0.2836	0.2693	-0.0143	-5.042[2]	43.588	56.412
IV	1990-92 to 1992-94	0.2693	0.2683	-0.0010	-0.371[1]	49.952	50.048
V	1992-94 to 1994-96	0.2683	0.2695	+0.0012	+0.447[1]	52.204	47.796
VI	1994-96 to 1996-98	0.2695	0.3030	+0.0335	+12.430[3]	82.149	17.851

[1] Balanced Change - LCI Biennial Change Rate is approximately equally attributable to local and state factors.

[2] Divergent Change - Low fiscal capacity localities experienced decreases in their LCI values and high fiscal capacity localities experienced increases in their LCI values.

[3] Convergent Change - Low fiscal capacity localities experienced increases in their LCI values and high fiscal capacity experienced decreases in their LCI values.

[4] The 0.0093 is a Net value, because Period VI exhibited both enhancement and dampening behavior on behalf of the State change. The enhancement volatility contributed 0.0031, and the dampening volatility (in the opposite direction) contributed 0.0124 for a Net effect of 0.0093. Correspondingly, 0.0031 divided by the initial LCI value, 0.2695, yields a percentage change of 1.15%. Dividing the LCI increase (0.0335) by the amount due to the State enhancement (0.0031) yields 9.25%.

In the fourth Period the TPV/ADM and TPV/POP Local to State Ratios exhibited enhanced change, while four Local to State Ratios exhibited incompletely dampened change, and another exhibited completely dampened change. While these enhancements were decidedly larger than the TRS increases (approximately +0.1111 and +0.0710 points[102]), the greater (0.5 weight for TPV ratios versus 0.1 for TRS ratios) allowed the TPV indicator to exert a more substantive impact than did the TRS indicator (for the previous biennium) in the LCI calculation. These enhancements in combination with the incomplete dampening presented by four other Local to State Ratios contributed to an increase in the LCI for approximately .

When the Local Net Biennial Change Rates are compared with their State Net Biennial Change Rates for Period VI, it is apparent that the Local rates are larger than the State rates in every ratio, except one (TRS/POP). As discussed earlier, these larger Local rates are indicative of incomplete dampening and allow the Local to State Ratio to increase, albeit to a limited extent. Interestingly, the TPV/ADM and TPV/POP Local to State Ratio enhancement (attributable to the State) is only a small proportion (0.0031 points) of the total LCI increase of 0.0335 points. This is equivalent to approximately ten percent of the increase in the LCI or just over one percent of the previous LCI value. While this amount may seem a small value, the 0.0031 amount is greater than the entire LCI increase for Periods I, IV, and V.

Initially, it may appear that the ratio structure through the dampening effects of the denominator on the numerator favorably inhibits the change in the LCI, especially Local Standardized Indicator growth. In all, but two of the thirty-six examples, the Local to State Ratio Net Biennial Change Rate was smaller than the Local Net Biennial Change Rate alone. One might conclude that the volatility in the LCI functions to the advantage of Carroll County and similar school divisions by forcing a lower LCI value which in turn drives a smaller local share of Basic Aid funding obligation. This situation occurred in the earliest four biennia. However, this analysis ignores the more fundamental issue relating to the basis on which the change in the fiscal capacity indicators is measured. For the Carroll County LCI calculation, there are three concerns:

- the synthetic change rate effects due to the decreasing ADM and/or POP,
- the limited influence of small Indicator and Standardized Indicator values on the large, aggregate (mean) State values in the calculation of Biennial Change Rates, and

[102] Note: these points do not refer to the LCI. Rather, they refer to the difference in the Local to State Ratio. However, these differences can be appropriately proportioned, weighted, and multiplied to arrive at the corresponding points in the LCI.

- the subordination of Carroll County's independent fiscal capacity measurement to the relative method of the LCI.

The decreasing value of the standardization units, ADM and POP, tends to synthetically increase the Local Standardized Indicator.[103] The ADM decrease occurred in every Period and ranged from 1.801% to 7.389%, which was cumulative to the positive rates of change in each of the Indicators.[104] Thus, if the denominator is not held constant, but allowed to increase at a slower rate (as occurred for TRS in Period V) or decrease (as occurred for TPV in Period VI), the rationalized structure of the local standardized indicator acts to increase or completely enhance the respective Local to State Ratio. Depending upon its magnitude, the increase in the Local to State Ratio may lead to an increase in the LCI.

[103] Given a hypothetical constant indicator value in the Standardized Indicator numerator, a decrease in the denominator (ADM or POP) would allow the Standardized Indicator to become larger. See Appendix F in this volume for further examples and explanations.

[104] For detailed analyses of the magnitude of synthetic change to the Local Net Biennial Change Rate and to the Local to State Ratio Net Biennial Change Rate, please refer to the appropriate section in Volume II: Technical Appendix.