Newtown

School Enrollment Dynamics & Projections 2010 - 2019

Prepared for the

Newtown Public Schools
Newtown, Connecticut

H. C. Planning Consultants, Inc.

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August 20, 2010

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Hyung C. Chung, Ph.D.
President

Dr. Janet Robinson
Superintendent
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3 Primrose Street
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August 20, 2010

Dear Dr. Robinson:

We are pleased to submit our final report, entitled *Newtown School Enrollment Dynamics & Projections, 2010-2019*, dated *August 20*, 2010. This comprehensive report can be used as a valuable resource by all those who are committed to the best in education in Newtown. You may be assured that HCPC will maintain a continuing interest in the Newtown's future school enrollments and school facilities development.

Sincerely Yours,

Hyung C. Chung
President, HCPC, Inc.

HC/jc
Encl.

-*SUMMARY REPORT*-
NEWTOWN PUBLIC SCHOOLS
10-YEAR SCHOOL ENROLLMENT PROJECTIONS
2010 - 2019

This report presents ten-year enrollment projections for the Newtown public schools in Connecticut between 2010 and 2019. The enrollment projections include K-12 students who attend Newtown public schools. All projections are as of October 1st for each school year.

1. Leading Indicators of Public School Enrollment Changes

(a) Figure 1 overlays the 18-year trends of four major factors that influence the future Newtown public school enrollments. They include births, annual housing net gains, home sales, and the percent of students attending nonpublic schools. These variables also may be called leading indicators because their ups and downs precede the school enrollment changes. For example, the number of births five years earlier roughly determines the size of kindergarten enrollment in the current year. Similarly the ups and downs of new home construction and housing turnover determine the extent of net migrations of school-age children. Note that the number of births in Newtown peaked first in 1997 with 372 births, which was then followed by peaks of home sales and new housing construction (net gain) in 1998.

FIG. 1
INVERSE RELATIONSHIP OF LEADING INDICATORS OF PUBLIC SCHOOL
ENROLLMENT AND UNEMPLOYMENT RATE, NEWTOWN, CT, 1991-2009
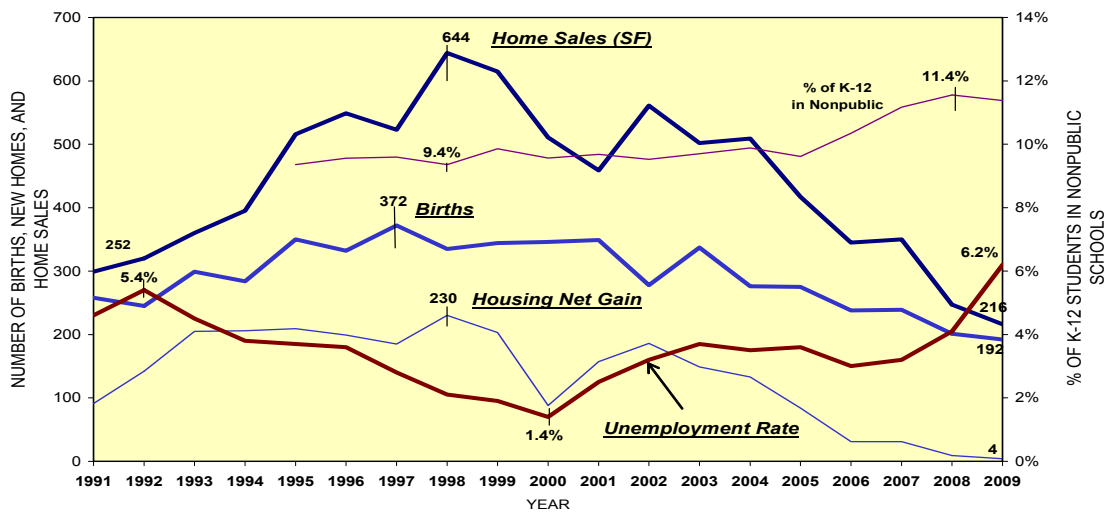
 (b) Why did these leading indicators in Newtown increase during the 1990s and then decline during the 2000s? The reason is clear; as Newtown's unemployment rates fell from 5.4% in 1992 to 1.4% in 2000, all the leading indicators rose; then as the unemployment rates reversed their course and rose to 6.2% in 2009, all the leading indicators fell. This inverse relationship between unemployment rates and growth factors is illustrated in Fig. 1, which shows the mountain-shaped leading indicators and the valley-shaped unemployment rate curves.

(c) The magnitude of declines for the leading indicators has been unprecedented: births declined from 372 births in 1997 to 192 births in 2009, a decrease of 180 births or 48% in eleven years; the annual housing net gain plummeted from 230 units in 1998 to a mere 4 units in 2009, a decline of 226 units or 98% in ten years; and the annual home sales *of single family units* were down from 644 units in 1998 to 216 units in 2009, a reduction of 218 units or -67% in ten years. In contrast, the percent of Newtown resident K-12 students in nonpublic schools increased from 9.4% in 1998 to 11.4% in 2009. All the indicators except the percent of K-12 students in nonpublic schools decreased so

that Newtown public school enrollments began to decline in 2005, a harbinger for the continued decline of public school enrollments.

2. Enrollment Projections and Enrollment Cycles

(a) <u>Past Enrollment Growth and Decline Trends</u>: Figure 2 presents 25-year past trends of school enrollments by grade level between 1984 and 2009, followed by 10-year enrollments projections between 2010 and 2019. Observe the similarity of growth/decline curves for leading indicators from Figure 1 and the enrollment growth/decline curves in Figure 2: all these curves are shaped like mountains or hills but the enrollment peaks are many years behind the peaks of births and other leading indicators. Note that grades K-4 and 5-6 enrollments reached their peaks in 2005, seven years after the peak of births in 1997; also, these enrollments began to decline rapidly following the prior pattern of rapid decline by the leading indicators. *The peaks of K-4 and grades 5-6 enrollments in 2005 were then followed by* the peak of grades 7-8 enrollments in 2007, and subsequently a rise in grades 9-12 enrollments, which are projected to peak in 2012. (See Table 1 on the next page.)

FIG. 2
GRADES K-4, 5-6, 7-8 AND 9-12 ENROLLMENT CYCLES AND PROJECTIONS
NEWTOWN PUBLIC SCHOOLS, 1975-2019
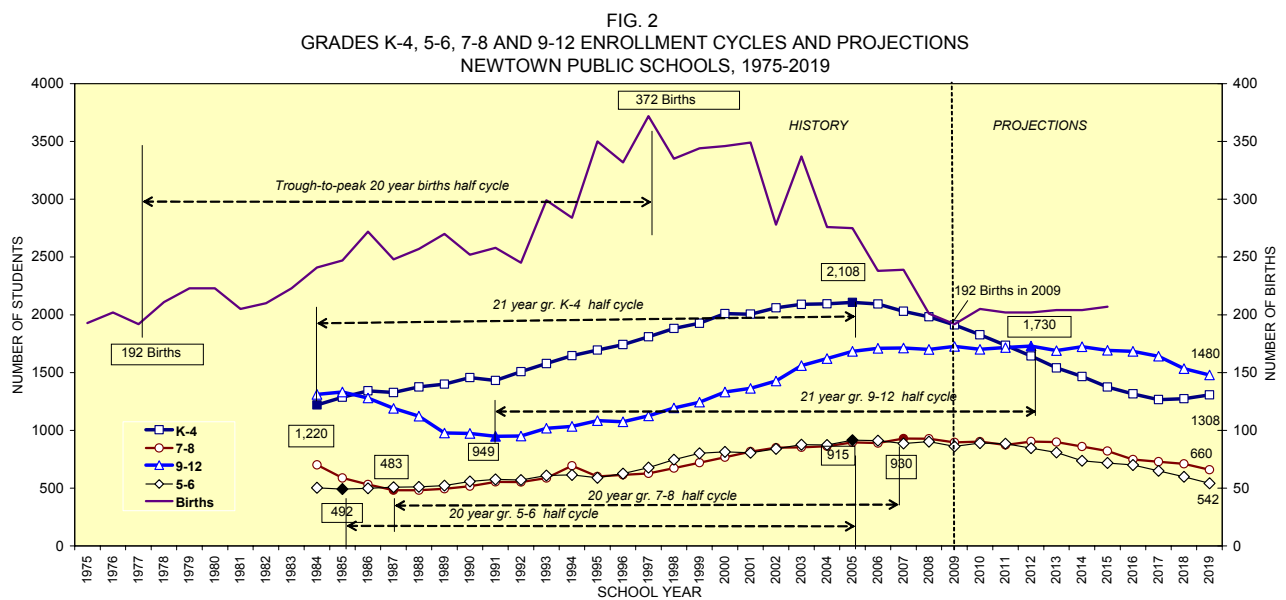
(b) <u>Enrollment Cycles</u>: Observe in Figure 2 that the troughs and peaks of grades K-4, 5-6, 7-8, and 9-12 enrollments followed the births trough that occurred in 1997. That is, Newtown's births were the lowest in 1977 with 192 births and had risen to 372 births in 1997 within a time span of 20 years. Then, the troughs of grades K-4 occurred in 1984, exactly 7 years after the births trough, followed by the trough of grades 5-6 enrollments in 1985, the trough of grades 7-8 enrollments in 1987, and the trough of grades 9-12 enrollments in 1991. Thus, the trough-to-peak half cycles of births and school enrollments took place with a regularity of 20 to 21 years as shown in Table 1. Having passed these enrollment peaks, Newtown public school enrollments are in the midst of a declining phase.

TABLE 1
BIRTHS AND ENROLLMENT CYCLES OF NEWTOWN PUBLIC SCHOOLS, 1970-2009

Grade Level	Year of Trough	Trough Enrollment	Year of Peak	Peak Enrollment	Duration of Half Cycles
Births	1977	192	1997	372	20 year half cycle from trough to peak
K-4	1984	1,220	2005	2,108	21-year half cycle from trough to peak
5-6	1985	492	2005	915	20-year half cycle from trough to peak
7-8	1987	483	2007	930	20-year half cycle from trough to peak
9-12	1991	949	2012*	1,730*	21-year half cycle from trough to peak

* Projected

(c) <u>Enrollment Projections</u>: Table 2 presents projected enrollments. The shaded area of Table 2 shows that:

▪ K-4 enrollments will decline by 23.4% (-447 students) in the first five years, but will decline more slowly by 10.8% (-150 students) in the second five years.

▪ In contrast, intermediate enrollments are projected to decline by 14.4% (-124 students) over the first five years but by 26.4% (-195 students) over the second five years.

▪ Middle school enrollments are projected to decline by 4.1% (-37 students) in the first five years but as much as 23.2% (-199 students) in the second five years.

▪ High school enrollments will decline the least, losing only 0.2% (-3 students) in the first five years but then 14.2% (-244 students) in the subsequent five years.

▪ All in all, total K-12 enrollments in Newtown public schools are forecast to decrease by 26.1% (-1,406 students) over the next ten years.

TABLE 2
NEWTOWN PUBLIC SCHOOL 10-YEAR ENROLLMENT PROJECTIONS,
By GRADE LEVEL AND BY SCHOOL, 2010-2019
Middle Projections

	Hawley Gr. K-4 (1)	Sandy Hook Gr. K-4 (2)	Middle Gate Gr. K-4 (3)	Head O'Meadow Gr. K-4 (4)	K-4 Total (5)	Reed Intermed. Gr. 5-6 (6)	Newtown Middle Gr. 7-8 (7)	Newtown High Gr. 9-12 (8)	K-12 Total (9)
2005	440	666	510	492	2,108	915	896	1,684	5,603
2006	433	670	516	479	2,094	911	890	1,710	5,605
2007	418	639	531	443	2,031	886	930	1,713	5,660
2008	404	635	516	430	1,985	902	928	1,700	5,513
2009	420	625	495	375	1,912	861	896	1,727	5,396
2010	408	586	479	354		889	902	1,701	5,319
2011	388	545	462	342		885	874	1,717	5,213
2012	369	512	446	316		847	903	1,730	5,124
2013	345	482	423	290		809	898	1,691	4,938
2014	324	448	403	291		737	859	1,724	4,786
2015	305	429	374	267		717	821	1,693	4,607
2016	292	411	358	255		700	748	1,684	4,448
2017	280	396	345	246		650	729	1,642	4,287
2018	282	398	347	247		598	710	1,535	4,117
2019	289	408	356	254		542	660	1,480	3,990
Changes:									
Past 5-Years (2005-2009)									
Number	-30	-34	-10	-107	-183		34	105	-56
Percent	-6.7%	-5.2%	-2.0%	-22.2%	-8.7%		3.9%	6.5%	-1.0%
First 5 Years (2009-2014)									
Number	-96	-176	-91	-84	-447		-37	-3	-610
Percent	-22.9%	-28.2%	-18.5%	-22.5%	-23.4%		-4.1%	-0.2%	-11.3%
Second 5 Years (2014-19)									
Number	-35	-40	-46	-37		-195	-199	-244	-796
Percent	-10.7%	-8.9%	-11.5%	-12.7%	-10.8%		-23.2%	-14.2%	-16.6%
10 Years (2009-2019)									
Number	-131	-216	-138	-121	-604		-236	-247	1,406
Percent	-31.1%	-34.5%	-27.9%	-32.3%	-31.6%		-26.3%	-14.3%	-26.1%

* Totals may be one or two off due to rounding.

(d) <u>Elementary School Enrollment Projections by School</u>: Table 2 (columns 1~4) also presents the ten-year enrollment projections for each elementary school in Newtown. Observe that K-4 enrollments for all four elementary schools in Newtown are projected to decline considerably over the next 10 years: Hawley is projected to decline by 131 students (-31.1%); Sandy Hook by 216 students (-34.5%); Middle Gate by 138 students (-27.9%); and Head O'Meadow by 121 students (-32.3%). Most of these K-4 enrollment reductions are projected to take place over the next five years. Note that the second five-year grades K-4 enrollment projections were prepared based on projected births and they are less reliable than the first five-year projections which were based on actual births. Note also that all other ten-year K-12 enrollment projections were prepared based on the actual number of births.

(e) <u>Reasons for Rise and Fall of School Enrollments</u>**:** Growth or decline of births and the net migration of school-age children directly affect the growth and decline of school enrollments. In addition, births and net migration of children are affected by changes in demographic structure and changes in economic conditions. As shown in Figure 2, school enrollments grew until 2005 and then began to decline. The 20 years of uninterrupted growth of school enrollments in Newtown was in part due to an increase in the number of childbearing-age women (aged 15-44 years old) during this period as the baby boomers matured. At the same time, Newtown experienced declining unemployment rates from 5.4% in 1992 to 1.4% in 2000. Both of these favorable factors multiplied the births in Newtown, resulting in a peak in births in 1997. Similarly, other towns in Connecticut experienced growth in the number of births and school children so that an increased number of preschool and school-age children moved into Newtown.

But thereafter the number of childbearing-age female**s** started to decline as baby boomers aged. At the same time, the national economy began to sour, and Newtown's unemployment rates increased from 1.4% in 2000 to 6.2% in 2009. These economic changes meant the number of unemployed Newtown residents increased from 183 persons in 2000 to 961 persons in March 2010 according to the Connecticut Labor Department. Simultaneously, a decline in the number of potential mothers prevailed. Thus, annual births declined both in Newtown and in other towns so that the net migrations of preschool and school-age children into Newtown sharply declined. Indeed, the coupling of changes in demographic structure and economic conditions were the sources of both rapid growth and declines in school enrollments.

5. Assumptions and Three Alternative Projections

We prepared three enrollment projections**:** low, middle**,** and high projections. It was necessary to prepare three alternative projections because the future economic outlook is so uncertain that it is impossible to assume only one economic recovery scenario and one set of enrollment projections.

TABLE 3
FACTORS INFLUENCING NEWTOWN PUBLIC SCHOOL ENROLLMENTS, 2000-2009

Year	Newtown Unemploy-ment Rate (1)	Connecticut Unemployment Rate (2)	Births (3)	Housing Net Gain (4)	Home Sales (5)	% of K-12 in Nonpublic schools (6)	Average K-12 Survival Ratios (7)
2000	1.4	2.3	346	88	511	9.9%	1.0317
2001	2.5	3.4	349	157	459	9.6%	1.0086
2002	3.2	4.4	278	186	561	9.7%	1.0208
2003	3.7	5.5	337	149	502	9.5%	1.0317
2004	3.5	4.9	276	133	509	9.7%	1.0173
2005	3.6	4.9	275	84	417	9.9%	1.0343
2006	3.0	4.9	238	31	345	9.6%	1.0104
2007	3.2	4.6	239	31	350	10.3%	1.0252
2008	4.1	5.7	201	9	247	11.2%	1.0101
2009	6.2	8.9	192	4	216	11.4%	1.0104
Trend Averages:							
W. 3-yr. (Low)	**5.0**	**7.1**	**203**	**10**	**249**	**11.4%**	**1.0128**
3-yr. Trend	4.5	6.4	211	15	271	11.4%	1.0152
W. 5-yr. (Moderate)	**4.4**	**6.4**	**215**	**20**	**282**	**11.1%**	**1.0149**
5-yr. Trend	4.0	5.8	229	32	315	10.8%	1.0181
10-yr. (High)	**3.4**	**5.0**	**273**	**87**	**412**	**10.3%**	**1.0201**

(a) <u>Three Assumption Scenarios</u>: Enrollment projections are made by 'projecting' the past trends into the future. Therefore, the projected enrollments differed depending on which past we projected. We studied five different pasts; 3-, 5-, 10-, weighted 3-, and weighted 5-year trends. These five pasts differed in many ways in terms of economic conditions (e.g., unemployment rates), annual housing net gains, home sales, and net migration of school-age children. Table 3 presents the ten-year trends for leading indicators mentioned earlier as well as the calculated averages of the five past trends. We found the weighted 3-year trend had the highest unemployment rates together with low levels of births, housing net gains, and home sales. In contrast, the 10-year trend had the lowest

unemployment rates and high levels of births, housing net gains, and home sales while the weighted 5-year trend had moderate levels of these factors. Note also that the weighted 3-year trend resulted in the lowest net in-migration rates in terms of average K-12 survival ratios. Thus, we adopted three assumptions: weighted 3-, weighted 5-, and 10-year trends for enrollment projections because we are unsure of which assumptions will turn out to be the most plausible.

A pessimistic view underlies the low assumptions that the recessionary economy will recover *very slowly* and high unemployment rates will persist; an optimistic view underlies the 10-year trend assumptions that the economy will recover *very soon*; and the weighted 5-year trend assumes that the economy will revive at a moderate rate.

(b) Three Alternative Projections.: Consistent with the three assumption scenarios, the weighted 3-year trends produced relatively low projections, the 10-year trend projections produced relatively high projections, and the weighted 5-year trend produced moderate projections. In addition, we produced the middle projections by averaging the high and low projections. (See Appendix Table C)

6. Accuracy of Projections

(a) The Least Error Strategy: Given low, middle and high projections, one may ask which projection is most accurate or most probable. However, it is impossible to know the accuracy of projections ahead of time. We know the accuracy of projections only after the fact. To begin with, we must acknowledge that we prepared alternative assumptions and projections because we do not know the relative plausibility of each economic recovery scenario. Thus, assuming that all three alternative scenarios are equally plausible, we offer *a strategy of choosing the enrollment projection that has a better chance of yielding the smallest errors*. We consider that the middle projections would produce the least errors (+/- 6% for K-12) even if either the low or high projections turn out to be true. In comparison, if we choose the low (or high) projection, but the actual K-12 enrollments turn out to be the high (or low) projection, then the projection error will be two times (+/- 12% for K-12) greater than the middle projection errors. Note also that the deviations from the K-4 middle projections are +/- 11.0%, much greater than the deviations of the upper grade enrollment projections.

TABLE 4

COMPARISON OF LOW, MIDDLE AND HIGH ENROLLMENT PROJECTIONS

	K	K-4	5-6	7-8	9-12	K-12
Actual 2009 Enrollment	290	1912	861	896	1727	5396
2019 Enrollment:						
Low	229	1,164	525	635	1,407	3,731
Middle	254	1,308	542	660	1,480	3,990
High	279	1,452	560	683	1,553	4,249
Difference From middle:						
Low	-25	-144	-17	-25	-73	-259
Middle	--	--	--	--	--	--
High	25	144	17	25	73	259
Low	-9.8%	-11.0%	-3.2%	-3.8%	-4.9%	-6.5%
Middle	--	--	--	--	--	--
High	9.8%	11.0%	3.2%	3.8%	4.9%	6.5%

Source: See Appendix Table C.

(b) Risk Taking: The choice of which projection to use for the purpose of school facilities planning is dependent not only on the perceived accuracy of the projections, but also on the school authority's attitude toward risk-taking. If one assumes that the low and high projections presented in this report are equally plausible, one may choose the low projections if the school system prefers to err on the side of "under-planning". If the school system "under-plans," the short-term costs will be lower and there remains the option of adding more facilities when needed. However, under-planning or an incremental approach risks that educational quality may suffer due to temporary overcrowding and that overall school construction costs may escalate. This escalation will be due to the rising price of construction over the years and the increase in cost and time when expansion is negotiated as a series of jobs rather than as a single construction job. On the other hand, the school system may choose the "high" projections if it

prefers the risk of "over-planning" or building more facilities than needed. Over-planning will build more facilities than required in the short-run, but this strategy foresees that in *a growing community*, schools can always grow into the excess capacity and escalating higher standards of educational space utilization. Though the short-term costs will be higher, educational quality will not be compromised and long-term overall costs may be lower.

For these reasons we recommend the adoption of the middle projections for school facilities planning purposes. *However, it is up to the school authority to determine which projections are most consistent with their risk-taking philosophy and assessment of projection assumptions.*

7. Annual Updating of School Enrollment Projections

The cyclical variations in enrollment can be easily captured by the annual updating of school enrollment projections. Based on the additional data available each year, the annual updating will confirm the validity of assumptions and will allow adjustments that will extend the projection horizon an improve the projection accuracy.

8. Enrollment Growth over the Next Twenty Years

What will be the trend in enrollment growth *beyond* the ten-year projections included in this study? For example, when a new school is built**,** it is going to last for decades and this is a very pertinent question for the school facilities policy makers. They have to manage the excess or shortage of school facilities to maintain desirable educational standards while at the same time achieving financial efficiency. For these reasons, it is quite desirable to have a very long-term glimpse (even if the estimates are very tentative) of future enrollment levels.

Although we wish to have 20-year enrollment projections, in order achieve this objective, we have to project future births for fifteen years, from 2010 to 2024. Clearly, this is an adventurous task. However, there are indirect, rudimentary ways to accomplish this goal. *It is reasonable to believe that the births cycle of Newtown is <u>at least</u> 34 years from a trough in 1977 to 2009.* There were 192 births recorded in both years, and as long as the number of births does not decline any further, then the 34-year birth cycle is a fact. Therefore, the enrollment cycles of K-4, 5-8, and 9-12 will follow the birth cycle with several time lags, one after the other, and they will also have a more or less 34 years cycle. Such enrollment cycles are shown in Figure 3 below. According to this diagram, grades K-4 enrollments' next trough will occur in 2017 with a projected enrollment of 1,200 students, grades 5-8 enrollments' second trough will occur in 2021 with a projected enrollment of 1,024 students, and grades 9-12 enrollments second trough will be take place in 2015 with an estimated enrollment of 955 students. Of course, these numerical values should be considered as rough approximations, which undoubtedly will be modified due to many future events. Although these estimates may not provide fully reliable numbers, they are rationally derived and still offer helpful previews of the future.

TABLE 5
LONG-TERM VIEW OF ENROLLMENT CYCLES
NEWTOWN PUBLIC SCHOOLS, CONNECTICUT 1977-2025

Grade Level	Year of First Trough	Actual Trough Enrollment	Year of Peak	Peak Enrollment	Year of Second Trough	Estimated Enrollments (Tentative)	Trough-to-Trough Cycle
Births	1977	192	1997	372	2009*	192	32-year trough to trough cycle
K-4	1984**	1,220	2005	2,108	2017	1,267	33-year trough to trough cycle**
5-8	1987	975	2008	1,845	2021	1,092	34-year trough to trough cycle
9-12	1991	949	2012	1,730	2025	1,054	34-year trough to trough cycle

 * If the number of births in Newtown declines below 192 births, then the birth cycle will be longer than 3 years.
 ** The Newtown enrollment data prior to 1984 are not at the moment available and we cannot ascertain whether 1983 had K-4
   enrollments lower than those in 1984. If they did, the K-4 trough-to-trough cycle was 34 years instead of 33 years.

FIG. 3
NEWTOWN SCHOOL ENROLLMENT CYCLES
HISTORY (1984-2009) AND PROJECTIONS(2010-2029)
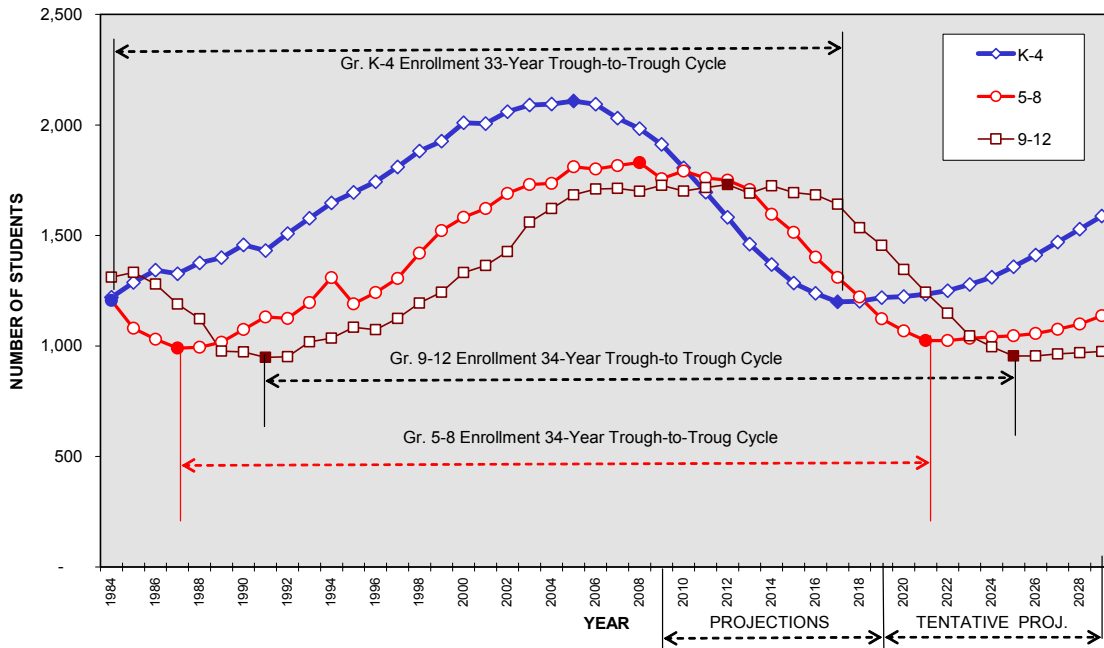
9. Conclusions

This repot foretells that public schools in Newtown are entering into a long period of declining school enrollments. These enrollment forecasts are prepared based on the assumptions stipulated in this report. Accordingly, as the future unfolds, if it reveals that the emerging reality differs significantly from the assumptions, the updating of the enrollment projections are warranted.

Enrollment Projection Methods: We used three enrollment projection methods**:** the cohort-survival method (CSM), the share-ratio method (SRM), and the multiple regression method (MRM). We found that both the CSM and SRM produced more or less the same projections whereas the MRM produced slightly larger projections. By applying different pasts (3-, 5-. 10-, weighted 3-, and weighed 5-year trends) we also produced different projections. Of these, we found the W. 3-year trend produced relatively low projections, and the 10-year trend produced relatively high projections. Then, we derived the middle projections by averaging the high and low projections. In this summary report, we are presenting only the middle projections. The low and high projections can be found in the main report. The CSM is a widely known method and needs no explanation. Under the Share-Ratio method, Newtown's future enrollments were calculated by projecting Newtown's share of enrollments as a percent of the statewide enrollments for each grade. The SRM has the advantage of being capable of showing Newtown's enrollment changes relative to statewide enrollment changes. The MRM is a statistical method and its advantage is that it shows the probability statistics as to how accurate the projections might be.

This report is prepared by Hyung C. Chung, Ph.D., President of H. C. Planning Consultants, Inc. and Professor Emeritus in Economics at the University of Bridgeport.

APPENDIX TABLE A
NEWTOWN TEN-YEAR ENROLLMENT PROJECTIONS BY GRADE, 2010 - 2019
Share Ratio and Cohort Survival Methods, Middle Projections

All enrollments are as of October 1 of each year. Peak enrollments are underlined. Projections are shown in italics. PK enrollments are projected.

	BIRTH YEAR	NEWTOWN BIRTHS	SCHOOL YEAR	K	1	2	3	4	5	6	7	8	9	10	11	12	K-4	5-6	7+8	9-12	K-12	PK	PK-12
HISTORY:	1995	350	2000	398	385	427	400	400	396	418	395	373	360	331	322	319	2010	814	768	1332	4924	17	4941
	1996	332	2001	347	435	382	437	405	402	404	417	399	376	360	339	289	2006	806	816	1364	4992	26	5018
	1997	372	2002	382	392	457	400	429	421	419	424	426	391	378	365	293	2060	840	850	1427	5177	25	5202
	1998	335	2003	381	427	408	467	407	445	431	423	431	425	390	390	355	2090	876	854	1560	5380	23	5403
	1999	344	2004	385	402	438	400	470	417	457	435	427	419	426	406	371	2095	874	862	1622	5453	40	5493
	2000	346	2005	398	432	411	462	405	485	430	454	442	439	432	424	389	2108	915	896	1684	5603	42	5645
	2001	349	2006	361	427	424	419	463	414	497	430	460	435	428	410	437	2094	911	890	1710	5605	60	5665
	2002	278	2007	349	393	442	419	428	464	422	499	431	443	431	420	419	2031	886	930	1713	5560	60	5620
	2003	337	2008	320	401	393	441	428	431	471	436	492	410	436	426	428	1983	902	928	1700	5513	83	5596
	2004	276	2009	290	365	396	413	448	429	432	468	428	465	402	430	430	1912	861	896	1727	5396	86	5482
PROJECTIONS:	2005	275	2010	310	325	368	404	419	453	436	436	466	414	460	400	426	1827	889	902	1701	5319	71	5390
	2006	238	2011	275	347	328	376	411	424	461	440	434	451	410	459	396	1737	885	874	1717	5213	69	5282
	2007	239	2012	268	308	350	335	382	415	431	465	438	420	447	409	454	1644	847	903	1730	5124	68	5192
	2008	201	2013	231	301	311	358	340	387	422	435	463	424	416	445	404	1541	809	898	1691	4938	65	5003
	2009	192	2014	222	259	304	317	363	344	393	426	433	449	420	415	441	1465	737	859	1724	4786	63	4849
	2010	205*	2015	233	249	261	310	322	368	350	396	424	420	444	419	410	1375	717	821	1693	4607	60	4667
	2011	202*	2016	223	260	251	267	315	326	374	353	395	411	416	443	414	1316	700	748	1684	4448	58	4506
	2012	204*	2017	227	249	263	257	271	319	332	377	351	383	407	414	438	1267	650	729	1642	4287	56	4343
	2013	204*	2018	239	253	252	269	260	274	324	334	376	340	379	406	410	1274	598	710	1535	4117	53	4170
	2014	207*	2019	254	268	256	257	273	264	279	327	333	364	337	378	401	1308	542	660	1480	3990	51	4041

*'Middle' births assumption. All Boxed-in figures represent the K-4 enrollment projections, which were based on the projected 'middle' births.

Inter-Grade Survival Ratios

	K	1	2	3	4	5	6	7	8	9	10	11	12
Change Coefficients	1.145*	1.120	1.009	1.021	1.015	1.012	1.016	1.009	0.996	0.968	0.990	0.990	0.990
3-Year Average	1.076	1.126	1.008	1.012	1.020	1.004	1.012	1.010	0.990	0.953	0.985	0.985	1.017
5-Year Average	1.088	1.115	1.005	1.022	1.015	1.013	1.019	1.005	1.000	0.974	0.992	0.980	1.008
10-Year Average	1.091	1.106	1.019	1.011	1.020	1.024	1.009	1.006	0.986	0.997	0.983	1.006	0.965
Weighted 3-Year Avg.	1.048	1.135	1.000	1.023	1.019	1.004	1.009	1.009	0.987	0.950	0.983	0.986	1.015
Weighted 5-Year Avg.	1.068	1.122	1.002	1.020	1.016	1.008	1.014	1.007	0.993	0.961	0.986	0.981	1.014

Projection Summary

	K-4	5-6	7-8	9-12	K-12
2009-14	-447	-124	-37	-3	-610
2014-19	-158	-194	-200	-244	-796
2009-19	-604	-319	-236	-247	-1406
2009-14	-23.4%	-14.4%	-4.1%	-0.1%	-11.3%
2014-19	-10.8%	-26.4%	-23.2%	-14.2%	-16.6%
2009-19	-31.6%	-37.0%	-26.3%	-14.3%	-26.1%

Totals may be one or two off due to rounding. * 2009-2010 one-year ratio based on the 2010 kindergarten registrations as of July, 2010.

APPENDIX TABLE B
NEWTOWN PUBLIC SCHOOL ENROLLMENT PROJECTIONS BY SCHOOL & BY GRADE
Middle Projections

HAWLEY SCHOOL

		PK	K	1	2	3	4	K-4
Actual	2009	--	66	83	83	94	94	420
Projections	2010	--	65	77	81	90	95	408
	2011	--	59	76	75	87	91	388
	2012		57	69	74	81	88	369
	2013		49	67	67	80	81	345
	2014		47	58	65	72	81	324
	2015		50	56	56	71	73	305
	2016		48	58	54	61	71	292
	2017		48	56	56	58	61	280
	2018		51	57	54	61	59	282
	2019		54	60	55	59	62	289

SANDY HOOK SCHOOL

		PK	K	1	2	3	4	K-4
Actual	2009	--	100	111	129	140	145	625
Projections:	2010	--	89	111	114	130	143	586
	2011	--	86	99	114	115	132	545
	2012	--	84	96	101	114	117	512
	2013	--	72	93	98	102	116	482
	2014	--	69	80	96	99	104	448
	2015	--	73	77	82	96	101	429
	2016	--	70	81	79	83	98	411
	2017	--	71	77	83	80	85	396
	2018	--	75	79	80	84	81	398
	2019	--	79	83	81	80	85	408

MIDDLE GATE SCHOOL

		PK	K	1	2	3	4	K-4
Actual	2009	-	83	94	98	104	116	495
Projections:	2010	-	92	88	95	99	105	479
	2011	-	78	98	90	96	100	462
	2012	-	76	83	99	90	97	446
	2013	-	65	82	85	101	91	423
	2014	-	63	70	83	85	102	403
	2015	-	66	67	71	83	86	374
	2016	-	63	71	68	72	84	358
	2017	-	64	68	72	69	73	345
	2018	-	68	69	69	72	70	347
	2019	-	72	73	70	69	73	356

HEAD O'MEADOW SCHOOL

		PK	K	1	2	3	4	K-4
Actual	2009	-	43	77	86	75	94	375
Projections:	2010	-	64	49	79	85	77	354
	2011	-	52	74	50	78	87	342
	2012	-	51	60	75	50	80	316
	2013	-	44	59	62	75	51	290
	2014	-	42	51	60	61	76	291
	2015	-	44	49	52	60	62	267
	2016	-	43	51	50	51	61	255
	2017	-	43	49	52	49	52	246
	2018	-	46	50	50	52	50	247
	2019	-	48	52	51	49	53	254

Totals may be one or two off due to rounding.

REED INTERMEDIATE SCHOOL

		5	6	5-6
Actual	2004	417	457	874
	2005	485	430	915
	2006	414	497	911
	2007	464	422	886
	2008	431	471	902
	2009	429	432	861
Projections:	2010	453	436	889
	2011	424	461	885
	2012	415	431	847
	2013	387	422	809
	2014	344	393	737
	2015	368	350	717
	2016	326	374	700
	2017	319	332	650
	2018	274	324	598
	2019	264	279	542

NEWTOWN MIDDLE SCHOOL

		7	8	7-8
Actual	2004	435	427	862
	2005	454	442	896
	2006	430	460	890
	2007	499	431	930
	2008	436	492	928
	2009	468	428	896
Projections:	2010	436	466	902
	2011	440	434	874
	2012	465	438	903
	2013	435	463	898
	2014	426	433	859
	2015	396	424	821
	2016	353	395	748
	2017	377	351	729
	2018	334	376	710
	2019	327	333	660

NEWTOWN HIGH SCHOOL

		9	10	11	12	9-12
Actual	2004	419	426	406	371	1622
	2005	439	432	424	389	1684
	2006	435	428	410	437	1710
	2007	443	431	420	419	1713
	2008	410	436	426	428	1700
	2009	465	402	430	430	1727
Projections	2010	414	460	400	426	1701
	2011	451	410	459	396	1717
	2012	420	447	409	454	1730
	2013	424	416	445	404	1691
	2014	449	420	415	441	1724
	2015	420	444	419	410	1693
	2016	411	416	443	414	1684
	2017	383	407	414	438	1642
	2018	340	379	406	410	1535
	2019	364	337	378	401	1480

APPENDIX TABLE C
NEWTOWN PUBLIC SCHOOL ENROLLMENT PROJECTIONS BY GRADE LEVEL
LOW, MIDDLE AND HIGH PROJECTIONS

Low Projections (Low Births/ Weighted 3-Yr. Trend)

	K	K-4	5-6	7-8	9-12*	K-12
2009	290	1912	861	896	1727	5396
2010	302	1,822	883	897	1,697	5,299
2011	268	1,725	876	867	1,692	5,160
2012	262	1,625	840	889	1,692	5,046
2013	225	1,519	800	882	1,637	4,837
2014	215	1,435	729	846	1,660	4,670
2015	215	1,335	706	804	1,624	4,469
2016	187	1,246	679	733	1,611	4,270
2017	191	1,164	631	710	1,566	4,071
2018	217	1,151	580	683	1,466	3,881
2019	229	1,164	525	635	1,407	3,731
Changes:						
2009-14	-75	-477	-132	-50	-67	-726
2014-19	13	-271	-204	-211	-253	-939
2009-19	-61	-748	-336	-261	-320	-1665
2009-14	-25.7%	-24.9%	-15.3%	-5.6%	-3.9%	-13.5%
2014-19	6.2%	-18.9%	-28.0%	-24.9%	-15.2%	-20.1%
2009-19	-21.1%	-39.1%	-39.0%	-29.1%	-18.5%	-30.9%

Middle Projections (Middle Births/Average of W3 & 10-Yr.)

	K	K-4	5-6	7-8	9-12*	K-12
2009	290	1912	861	896	1727	5396
2010	310	1827	889	902	1701	5319
2011	275	1737	885	874	1717	5213
2012	268	1644	847	903	1730	5124
2013	231	1541	809	898	1691	4938
2014	222	1465	737	859	1724	4786
2015	233	1375	717	821	1693	4607
2016	223	1316	700	748	1684	4448
2017	227	1267	650	729	1642	4287
2018	239	1274	598	710	1535	4117
2019	254	1308	542	660	1480	3990
Changes:						
2009-14	-68	-447	-124	-37	-3	-610
2014-19	32	-158	-194	-200	-244	-796
2009-19	-36	-604	-319	-236	-247	-1406
2009-14	-23.4%	-23.4%	-14.4%	-4.1%	-0.1%	-11.3%
2014-19	14.2%	-10.8%	-26.4%	-23.2%	-14.2%	-16.6%
2009-19	-12.5%	-31.6%	-37.0%	-26.3%	-14.3%	-26.1%

High Projections (High Births/10-Year Trend)

	K	K-4	5-6	7-8	9-12*	K-12
2009	290	1912	861	896	1727	5396
2010	318	1832	896	907	1705	5340
2011	282	1748	894	882	1742	5265
2012	275	1663	853	918	1769	5202
2013	237	1562	818	915	1745	5040
2014	229	1496	745	873	1789	4903
2015	250	1415	729	837	1763	4744
2016	259	1386	721	762	1757	4626
2017	262	1369	669	747	1718	4503
2018	261	1397	616	737	1603	4353
2019	279	1452	560	685	1553	4249
Changes:						
2009-14	-61	-416	-116	-23	62	-493
2014-19	50	-44	-185	-188	-236	-653
2009-19	-11	-460	-301	-211	-174	-1147
2009-14	-21.0%	-21.8%	-13.5%	-2.5%	3.6%	-9.1%
2014-19	21.7%	-2.9%	-24.8%	-21.6%	-13.2%	-13.3%
2009-19	-3.8%	-24.1%	-35.0%	-23.6%	-10.1%	-21.2%

*Peak enrollments for grades 9-12 are underlined.

FIG. 4
GRADES K-4 ENROLLMENT HISTORY (1984-2009) AND PROJECTIONS (2010-2019)
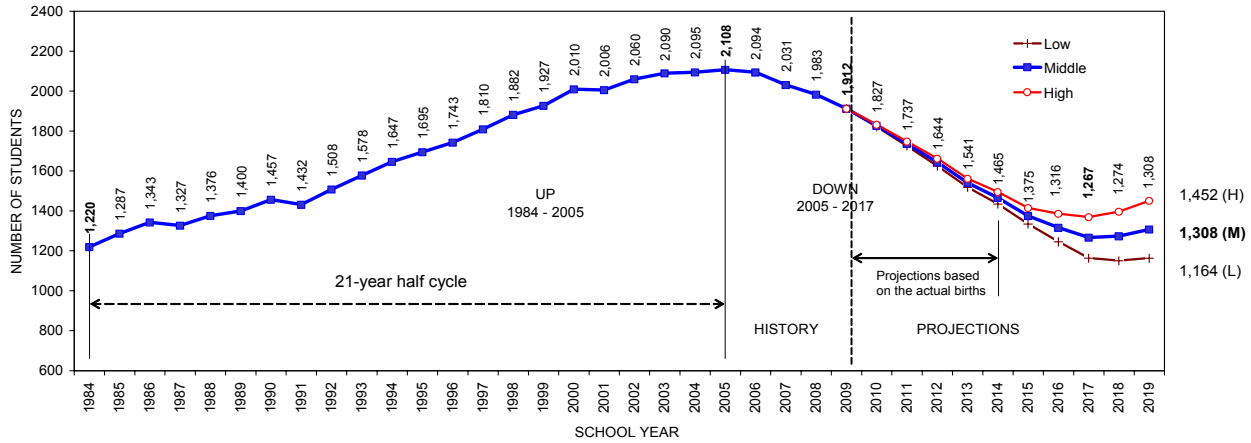NEWTOWN PUBLIC SCHOOLS

FIG. 5
GRADES 5-6 ENROLLMENT HISTORY (1984-2009)AND PROJECTIONS (2010-2019)
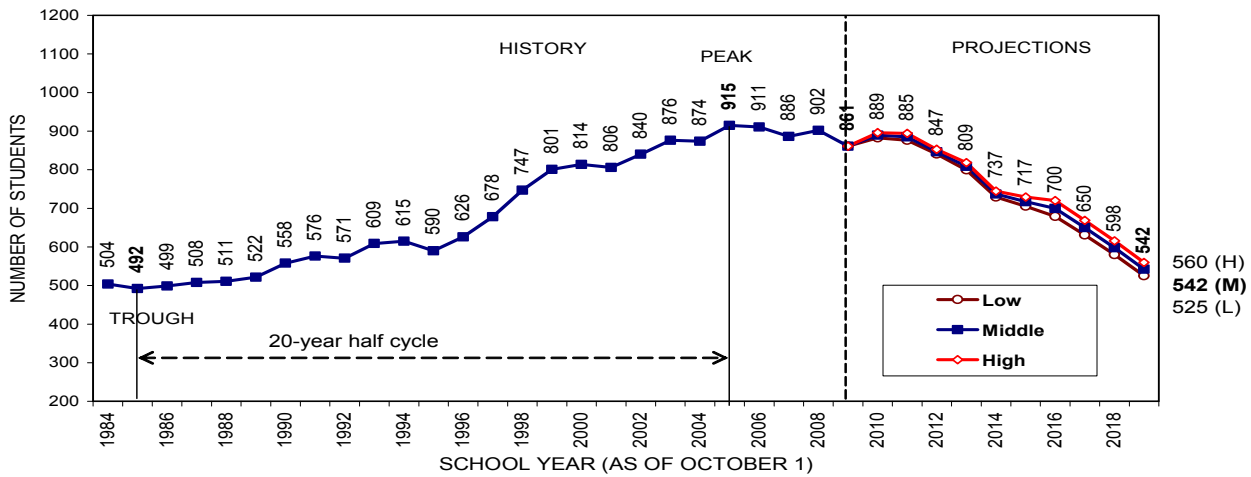NEWTOWN PUBLIC SCHOOLS

FIG. 6
GRADES 7-8 ENROLLMENT HISTORY (1984-2009) AND PROJECTIONS (2010-2019)
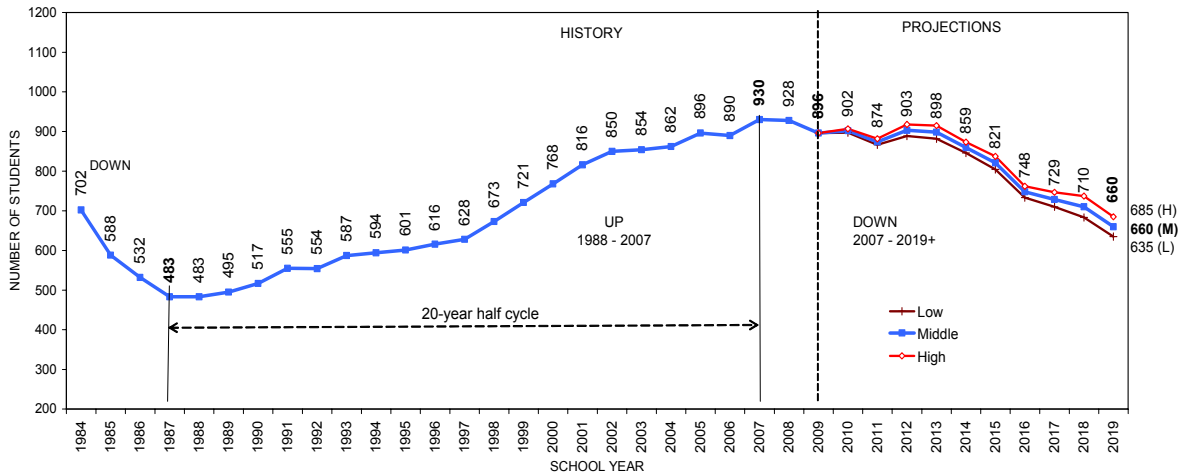NEWTOWN PUBLIC SCHOOLS

FIG. 7
GRADES 9-12 ENROLLMENT HISTORY (1984-2009) AND PROJECTIONS (2010-2019)
NEWTOWN PUBLIC SCHOOLS

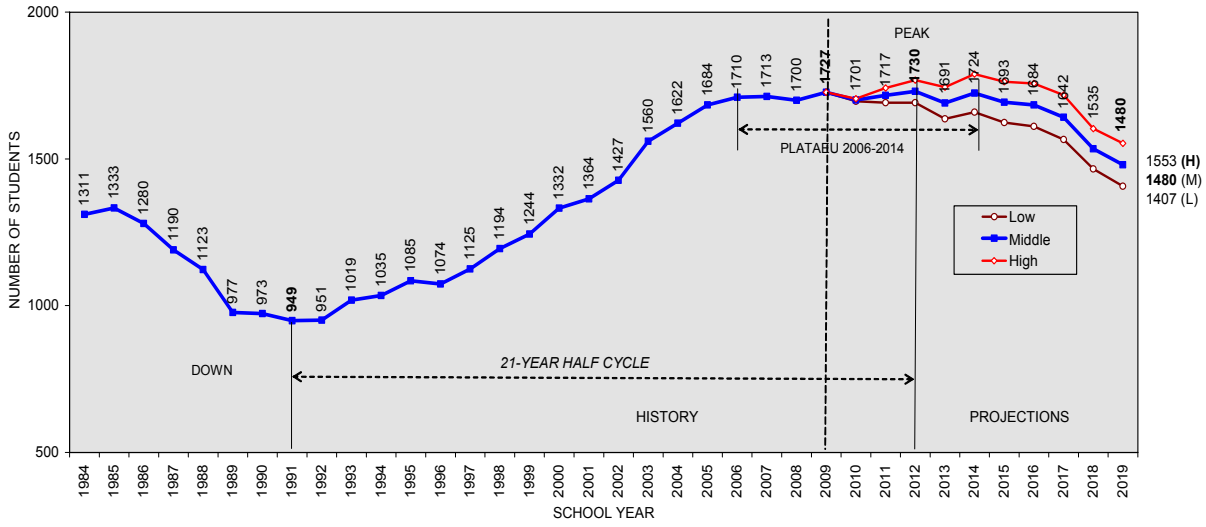FIG. 8
K-12 ENROLLMENT HISTORY (1984-2009) AND PROJECTIONS (2010-2019)
NEWTOWN PUBLIC SCHOOLS
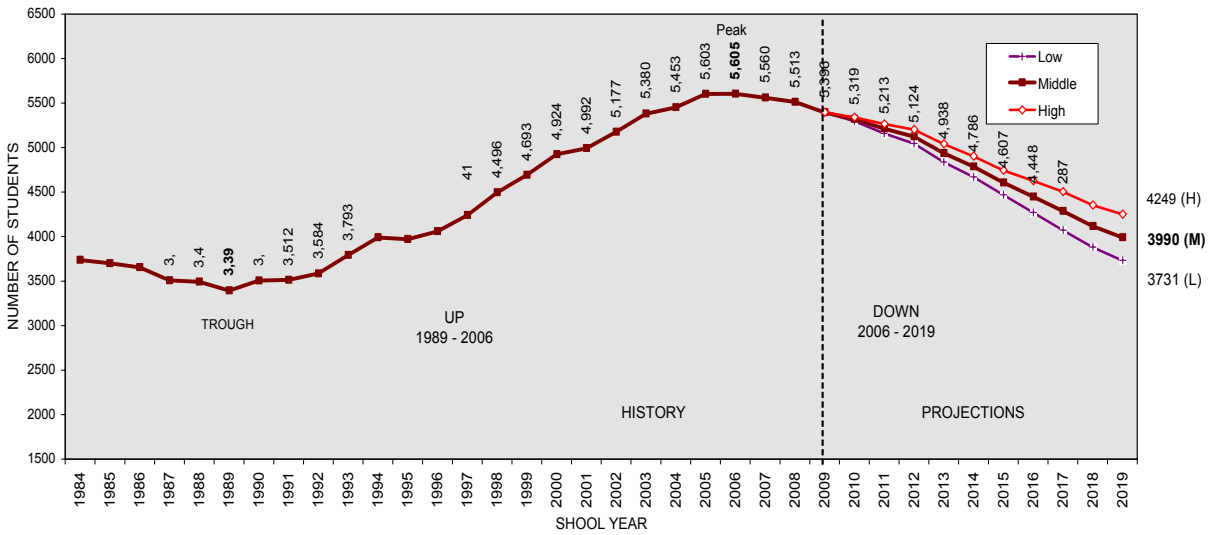
<div style="border:1px solid black; text-align:center;">

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10-YEAR PUBLIC SCHOOL ENROLLMENT PROJECTIONS
OF NEWTOWN PUBLIC SCHOOLS (2010-2019)

Summary Report

SECTION 5:   ENROLLMENT PROJECION ASSUMPTIONS

SECTION :   10-YEAR ENROLLMENT PROJECTIONS
             NEWTOWN PUBLIC SCHOOLS

SECTION 7   SCHOOL-BY-SCHOOL ENROLLMENT PROJECTIONS

1. INTRODUCTION

1.1 Purpose of the Study

Newtown has seven public schools: four elementary schools which serve grades K-4 (Hawley, Sandy Hook, Middle Gate, and Head O'Meadow); one intermediate school which serves grades Pre-K and grades 5-6 (Reed Intermediate School); one middle school which serves grades 7-8 (Newtown Middle School); and one high school (Newtown High School) which serves grades 9 - 12.

The purpose of this report is to present K-12 ten-year enrollment projections by grade **for** over the next ten years **(**between 2010 and 2019**)**.

1.2 Current Enrollment

Newtown public school enrollments by grade as of October 1, 2009 (projection base year) are shown below:

TABLE 1.1
NEWT0WN PUBLIC SCHOOL ENROLLMENT
AS OF OCTOBER 1, 2009

	PK	K	1	2	3	4	5	6	7	8	9	10	11	12	Total
Hawley ES		66	83	83	94	94									420
Sandy Hook ES		100	111	129	140	145									625
Middle Gate ES		83	94	98	104	116									495
Head O'Meadow ES	18	43	77	86	75	94									393
(From Reed IS#)	44														44
Subtotal PK-4															1977
Reed IS.	#						429	432							861
Newtown MS.									468	428					896
Newtown HS											464	402	432	431	1729
TOTAL PK-12	62	292	365	396	413	449	429	432	468	428	464	402	432	431	5463*

Source: Newtown Public Schools (10/13/2009)   *In addition, there are 28 out-of-town special education students. The enrollment data from the Newtown Public Schools are slightly different from the data obtained from the Connecticut State Department of Education. See Table 4.1 on page 4-3. # 44 PK students are housed in Reed Intermediate School.

There were 1,977 PK-4 students in Newtown's elementary Schools, 861 5th and 6th grade students in Reed Intermediate School, 896 7th & 8th grade students in Newtown Middle School**,** and 1,729 9th through 12th grade students in Newtown High School. Altogether there were 5,463 PK through 12th grade students. *

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* In addition, there were 829 PK-12 Newtown resident students (13.1%) who were attending nonpublic schools, consisting of 64 students in public schools in other towns and charter schools, 45 students from Vocational-Technical schools, and 720 students attending private/parochial schools. (See Table 2-7 on page 2-21).

School enrollment data presented in this report are as of October 1st for each school year. October 1st is chosen because very often the school enrollments are unstable during the month of September; for this reason, all school districts in Connecticut are asked to report the enrollment data as of October 1st to the Connecticut State Department of Education.

1.3 Projection Methodology

Three different methods, the Cohort-Survival Method, the Multiple Regression Method, and the ShareRatio[TM] Method, were used to forecast enrollments. These methods will be explained in detail in later sections of this report. Prior to calculating enrollment projections, assumptions for birth trends, level of nonpublic school enrollment, residential development, and the unemployment rate were established. Several multiple regression analyses were constructed to assure the validity of the assumptions adopted for the projections.

1.4 Projections vs. Predictions

Future school enrollments can be estimated because for the most part they are the results of events that have already taken place: for example, most of the children born five years ago will enter kindergarten classes this year, while this year's first graders will become the second graders of next year, and so forth. Moreover, when new housing units are built in a town, they will generate children year after year. There is therefore a clear causal relationship between past events and future outcomes, and the projection methods selected for this study rely on this relationship: future enrollments are estimated by projecting the past trends into the future.

Unfortunately, future outcomes are not based solely on past events. Events, which have not yet taken place, will also have an impact on future outcomes. For instance, the current year's school enrollments are partially determined by other current factors such as the number of new housing units being built, used home sales, economic conditions, and the number of resident students attending nonpublic schools this year. The difficulty of estimating these coincidental indicators brings a certain amount of fallibility into our calculations of how many children will enroll in school each year. Thus, we project, but we do not predict. Projections are inherently limited.

Projections are further limited by such factors as the impossibility of our knowing exactly which past and present events might have an impact on the future, the subsequent difficulty of collecting comprehensive sets of needed data, and the limitations in the ability of models and theories to reveal the exact causal relationship between selected past and future events. In our attempt to overcome these difficulties, more variables affecting future enrollments are identified, more data are collected and analyzed, and more rigorous explanatory models are applied here than in any other comparable set of school enrollment projections.

1.5 Trends, Cycles, and Random Changes

Annual variations in school enrollment may be caused by three types of factors*: cyclical, trend, and random variables. Cyclical changes are those variables that are sensitive to economic or business cycles: enrollments move up when the economy is doing well, and enrollments move down when the economy worsens. Trends are those changes that are consistent with past linear processes so that future changes may be seen as an extension of past trends. Finally, random changes are changes whose roots are so complex that they cannot be anticipated. Wars, natural calamities, or sudden influxes of immigrants may have impacts on enrollment, but we cannot foretell such events ahead of time.

In this report, we are trying to project a trend line; therefore, actual annual enrollment figures are likely to be different from the trend-line projections due to the effects of cyclical and random variables.

1.6 Projections of Small Numbers

Projections of small numbers are prone to yield large percentage errors because random and cyclical factors tend to have a magnified impact on small samples. Thus, the impacts of cyclical and random factors on school enrollments are more likely to be exaggerated in small schools than in large schools. For example, when a single student in a class of fifty students drops out unexpectedly, a 2% reduction in enrollment occurs. In contrast, a reduction of one student in a class of 200 students will reduce enrollment by only 0.5%. A demographic study requires a large amount of computations, and just the numerical rounding a computer makes may alone produce one or two variances in the enrollment projections.

Historically, the significance of random and cyclical factors is exhibited by the considerable fluctuations of school enrollments and many underlying variables such as the number of births, nonpublic school enrollments, home constructions, etc. Thus, small towns' enrollment data fluctuate considerably in terms of percentages from year to year in contrast to the relatively smooth changes shown by the school enrollments of large school districts. Similarly, the projections of individual school enrollments and enrollments by grade are susceptible to larger percentage deviations than the total projections for district-wide enrollments when unexpected cyclical and random factors come **in**to play in the future.

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* In addition, seasonal variables can be observed. School enrollment can undergo considerable change from month to month, particularly in inner city schools. However, suburban and rural school enrollments do not change significantly on a monthly basis.

1-4

2. FACTORS INFLUENCING PUBLIC SCHOOL ENROLLMENT

2.1 Introduction

School enrollment growth is directly related to factors such as the number of births in the town, the net migration of the population (in-migration minus out-migration), the number of new and used or pre-owned home sales, and the percent of resident students attending nonpublic schools. These factors are in turn related to a number of land use and economic variables such as residential development and unemployment rates. Accordingly, data on these factors were collected and their impacts on school enrollment growth were assessed.

2.2 Total Population Growth Trends in Newtown

As shown in Table 2.1 and Figure 2-1, the total population of Newtown hardly increased between 1900 and 1930, even at times slightly declining. But the population grew steadily after WWII, resulting in 25,031 residents being counted by the U. S. Census of Population in 2000. Comparison with the growth pattern of the statewide population shows that Newtown has grown at a faster rate than that of Connecticut since 1970. Results from the 2010 decennial census cannot be included in this report because it was only undertaken on April, 2010, and the preliminary results may not be known until 2011 at the earliest.

However, it is anticipated that the fast population growth rate that Newtown experienced since 1970 cannot be sustained in light of the economic recessions experienced since 2000. The Connecticut Department of Public Health revised downwards its estimates of current town populations, and estimated that Newtown's *2008* population as 26,737 persons, a lesser number than the 26,966 persons estimated originally in 2005*;* second, the number of births has been declining from a peak of 372 births in 1997 to 192 births in 2009, especially due to the severe nationwide recessionary economy of the last three years. As shown in Table 2.1 and Fig. 2-1, Newtown's total populations have been revised to reach 30,583 persons in 2030 instead of the 33,618 persons previously forecast. In short, Newtown grew in the last decade much more slowly than in the previous decade or during the 1990s. Moreover, now that we are in the midst of the Great Recession and its full recovery is uncertain, it is very likely that the future population growth of Newtown and Connecticut will be further curtailed.

TABLE 2.1
PROJECTION OF TOTAL NEWTOWN POPULATION APPLYING
NEWTOWN'S SHARE (%) OF CONNECTICUT'S POPULATION

(Revised Projections)

		30-Yr. Avg. Growth Rate Projections*			Revised Projections		
	Connecticut Population (1)	Newtown Population (2)	Newtown's Share of CT Pop. (3)	Changes in Newtown's Share (4)	Newtown Population (5)	Newtown's Share of CT Pop. (6)	Changes in Newtown's Share (7)
1900	908,420	3,276	0.361%		3,276	0.361%	0.361%
1910	1,114,756	3,012	0.270%	-0.090%	3,012	0.270%	-0.090%
1920	1,380,631	2,751	0.199%	-0.071%	2,751	0.199%	-0.071%
1930	1,606,903	2,635	0.164%	-0.035%	2,635	0.164%	-0.035%
1940	1,709,242	4,023	0.235%	0.071%	4,023	0.235%	0.071%
1950	2,007,280	7,448	0.371%	0.136%	7,448	0.371%	0.136%
1960	2,535,234	11,373	0.449%	0.078%	11,373	0.449%	0.078%
1970	3,032,217	16,942	0.559%	0.110%	16,942	0.559%	0.110%
1980	3,107,576	19,107	0.615%	0.056%	19,107	0.615%	0.056%
1990	3,287,116	20,779	0.632%	0.017%	20,779	0.632%	0.017%
2000	3,405,565	25,031	0.735%	0.103%	25,031	0.735%	0.103%
2005	3,405,565	26,966	0.792%	0.057%	**25,564**	0.751%	0.016%
2008 *	**3,501,252**	--	--	--	**26,737**	**0.764%**	**0.013%**
2010	3,503,185	28,398	0.794%	0.029%	**27,207**	**0.777%**	**0.013%**
2015	3,577,490	29,927	0.823%	0.029%	**28,248**	**0.790%**	**0.013%**
2020	3,635,414	31,287	0.853%	0.029%	**29,178**	**0.803%**	**0.013%**
2025	3,669,544	32,555	0.882%	0.029%	**29,928**	**0.816%**	**0.013%**
2030	3,691,016	33,618	0.911%	0.029%	**30,583**	**0.829%**	**0.013%**

Source: (1) projections by the U. S. Census Bureau; (2) and (5) projections by HCPC, Inc.; Col. (3) = (2) / (1).
^ Revised estimates by the Connecticut Department of Public Health.

FIG. 2-1
POPULATION GROWTH TRENDS OF CONNECTICUT AND NEWTOWN
1900-2030
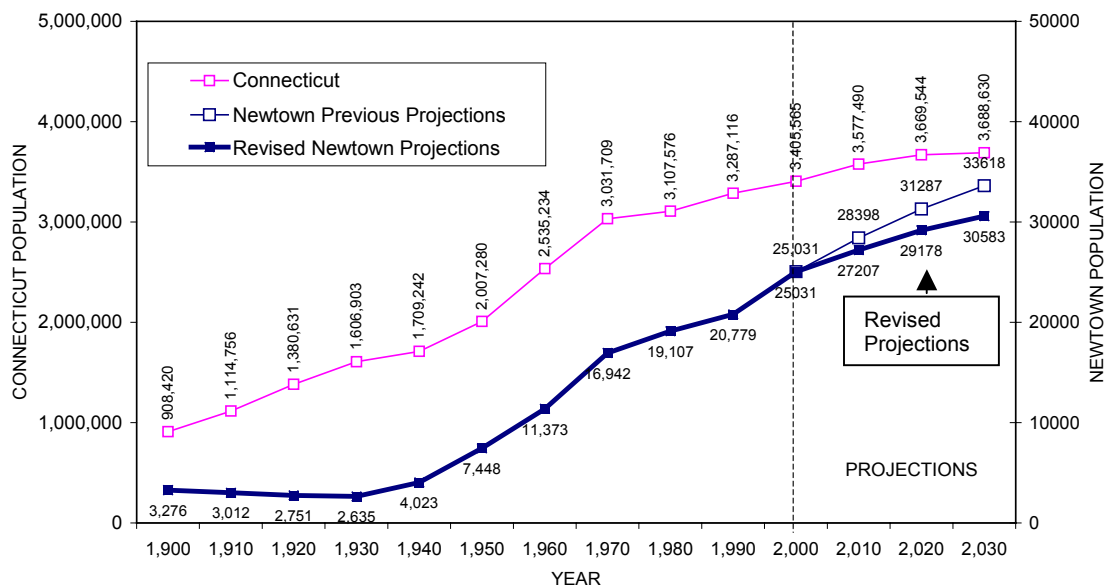
Table 2.2 compares Newtown's population growth trends since 1900 to those of the Housatonic Valley Region and Connecticut populations

▪ Newtown's share of the Housatonic Valley Region (HVR) increased from 8.65% in 1900 to 13.03% in 1960, indicating the rapid population growth of Newtown relative to other towns in the region. Thereafter, other towns in the region also grew fast and Newtown's share declined to 11.06% in 1990. However, during the 1990s, Newtown's population grew by 20.50% while the region as a whole grew by 13.0% so that Newtown's share increased to 11.79% in 2000.

▪ At the same time, Newtown's share of Connecticut's population steadily grew from 0.164% in 1960 to 0.764% in 2008, indicating that Newtown was growing faster than Connecticut as a whole.

▪ In Table 2.2, note also that Newtown grew unusually fast between 1990 and 2000, but subsequently Newtown's population growth rate dwindled from 20.5% in the 1990s to 6.8% between 2000 and 2008 while the population growth rate of HVR dropped from 13.0% to 4.7% and that of Connecticut declined from 3.6% to 2.8% during the same period.

TABLE 2.2
POPULATION GROWTH RATES OF HOUSATONIC VALLEY REGION BY TOWN
1900-2008

	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000	2008	1990-2000 Change	2000-2008 Change
Bethel	3,327	3,792	3,201	3,886	4,105	5,104	8,200	10,945	16,004	17,541	18,067	18,438	3.00%	2.05%
Bridgewater	649	600	481	432	537	639	898	1,277	1,563	1,654	1,824	1,873	10.30%	2.69%
Brookfield	1,046	1,101	896	926	1,345	1,688	3,405	9,688	12,872	14,113	15,664	16,657	11.00%	6.34%
Danbury	19,474	23,502	22,325	26,955	27,921	30,337	39,382	50,781	60,470	65,585	74,848	79,256	14.10%	5.89%
New Fairfield	584	551	468	434	608	1,236	3,355	6,991	11,260	12,911	13,953	14,059	8.10%	0.76%
New Milford	4,804	5,010	4,781	4,700	5,559	5,799	8,318	14,601	19,420	23,629	27,121	28,338	14.80%	4.49%
Newtown	**3,276**	**3,012**	**2,751**	**2,635**	**4,023**	**7,448**	**11,373**	**16,942**	**19,107**	**20,779**	**25,031**	**26,737**	**20.50%**	**6.82%**
Redding	1,426	1,617	1,315	1,599	1,758	2,037	3,359	5,590	7,272	7,927	8,270	8,798	4.30%	6.38%
Ridgefield	2,626	3,118	2,707	3,580	3,900	4,356	8,165	18,188	20,120	20,919	23,643	24,011	13.00%	1.56%
Sherman	658	569	533	391	477	549	825	1,459	2,281	2,809	3,827	4,106	36.20%	7.29%
Region	37,870	42,872	39,458	45,538	50,233	59,193	87,280	136,462	170,369	187,867	212,248	222,273	13.00%	4.72%
Newtown as % of HV Region	**8.65%**	**7.03%**	**6.97%**	**5.79%**	**8.01%**	**12.58%**	**13.03%**	**12.42%**	**11.22%**	**11.06%**	**11.79%**	**12.03%**		
Connecticut (In thousands)	908	1,115	1,381	1,607	1,709	2,007	2,535	3,032	3,108	3,287	3,406	3,501	3.60%	2.81%
Newtown as % of CT	**0.361**	**0.270**	**0.199**	**0.164**	**0.235**	**0.371**	**0.449**	**0.559**	**0.615**	**0.632**	**0.735**	**0.764**		

Source: U.S. Census Bureau. 2008 estimates by the Connecticut Department of Public Health.

2.3 Births Trend

Annual birth data are essential for projecting the size of kindergarten enrollment, which in turn largely determines the enrollment sizes of subsequent grades. Past data on births up to the year 2009 are available from the Connecticut Department of Public Health. Figure 2-2 compares the growth trends of births in Newtown and Connecticut between 1980 and 2009. Connecticut's births steadily increased in the 1980's to reach a peak in 1990 because the number of potential mothers or childbearing age females aged between 15 and 44 years old, who were mostly born during the baby boom period, reached its maximum in 1990. Since then, the number of births has been declining in Connecticut.

FIG. 2-2
TRENDS OF NEWTOWN AND CONNECTICUT BIRTHS
1975-2014
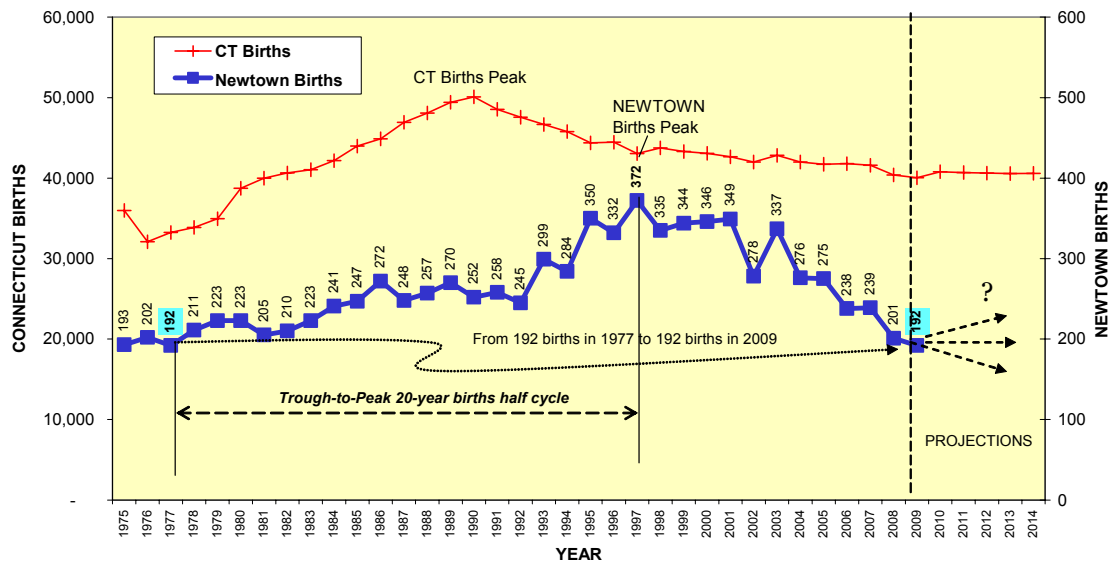
In Newtown, the number of births increased from a low point of 192 births in 1977 to a high of 372 births in 1997, that is, births in Newtown peaked in 1997, seven years after Connecticut's births peaked in 1990. This peak means that Newtown gained 180 births during the past 20 years, between 1977 and 2007. From then on, the number of births in Newtown declined from 372 births in 1997 to 192 births in 2009, losing 180 births or decreasing by 48.4% during the past twelve years. In sum, Newtown lost within 12 years what it gained in the past 20 years. In terms of the number of births, Newtown returned in 2009 to where it was 32 years ago. The decline in Newtown's births during this period was especially severe due to the combined effects of a declining number of childbearing age (baby boomer) females, and rising unemployment rates in this period, especially over the last three years.

Newtown's Share of Connecticut's Births: In 1997 when Newtown's births peaked with 372 births, Newtown's births represented 0.864% of total births in Connecticut. However, as the number of births in Newtown plummeted to 192 births in 2009, Newtown's births were only 0.479% of statewide births (see Table 2.3 column 3). This implies that the decline of births in Newtown was significantly faster than the decline of births in Connecticut as a whole. *Observe also in Figure 2-2 that Newtown's births trend curve diverges far away from Connecticut's births trend curve since 1997.*

TABLE 2.3
LIVE BIRTHS TO NEWTOWN AND CONNECTICUT RESIDENTS
1980-2009

Year	Births to Newtown Residents, State Data	Births to Connecticut Residents, State Data*	Newtown's Births as % of Connecticut's Births	Connecticut Unemploy-ment Rate (Not Seas. Adjusted)	Newtown Unemploy-ment Rate (Not Seas. Adjusted)
	(1)	(2)	(3)	(4)	(5)
History:				%	%
1980	223	38,750	0.575%	5.9	3.9
1981	205	39,999	0.513%	6.2	4.3
1982	210	40,632	0.517%	6.9	5.2
1983	223	41,056	0.543%	6.0	4.4
1984	241	42,184	0.571%	4.6	3.3
1985	247	43,968	0.562%	4.8	3.6
1986	272	44,881	0.606%	3.8	2.8
1987	248	46,941	0.528%	3.3	3.1
1988	257	48,080	0.535%	5.5	2.5
1989	270	49,418	0.546%	3.7	3.0
1990	252	50,098	0.503%	5.1	3.5
1991	258	48,542	0.531%	6.7	4.6
1992	245	47,574	0.515%	7.5	5.4
1993	299	46,658	0.641%	6.2	4.5
1994	284	45,795	0.620%	5.6	3.8
1995	350	44,387	0.789%	5.5	3.7
1996	332	44,455	0.747%	5.7	3.6
1997	372	43,048	0.864%	5.1	2.8
1998	335	43,741	0.766%	3.8	2.1
1999	344	43,299	0.794%	3.2	1.9
2000	346	43,075	0.803%	2.3	1.4
2001	349	42,659	0.818%	3.4	2.5
2002	278	41,996	0.662%	4.4	3.2
2003	337	42,826	0.787%	5.5	3.7
2004	276	42,005	0.657%	4.9	3.5
2005	275	41,722	0.659%	4.9	3.6
2006	238	41 789	0.570%	4.9	3.0
2007	239	41,597	0.575%	4.6	3.2
2008	201	40,388	0.498%	5.7	4.1
2009	192	40,050	0.479%	8.9	6.2
2000-2009:					
3-yr. Ave.	211	40,678	0.52%	6.4	4.5
5-yr. Ave.	229	41,109	0.56%	5.8	4.0
10-yr. Ave.	273	41,811	0.65%	5.0	3.4
W. 3-yr. Ave.	203	40,421	0.50%	7.1	5.0
W. 5-yr. Ave.	215	40,793	0.53%	6.4	4.4

Sources: Columns (1) AND (2): Connecticut Department of Public Health; Columns (4) and (5): Connecticut Department of Labor.

2.4 Birth Projections

In order to calculate ten-year kindergarten enrollment projections, we need the number of births for ten years. However, the birth data are available only for the past five years, between 2005 and 2009; thus, the numbers of births for the next five years (between 2010 and 2014) have to be estimated or forecasted. We used two methods to estimate annual births between 2010 and 2014. First, we used the demographic method in which we applied a general fertility rate (births per 1,000 women between 15 and 44 years old) to the projected number of childbearing age women; next, we projected the number of births with multiple regression analysis.

(a) <u>Demographic Method of Births Projections</u>: We calculated the number of childbearing age females aged from 15 to 44 years old from the Newtown population projections conducted earlier.*

TABLE 2.4
NUMBER OF CHILDBEARING AGE FEMALES
AND BIRTH ESTIMATES
NEWTOWN, CONNECTICUT, 1980-2015

| | Age (in years) | | | | | | 15-44 | Births |
	15-19	20-24	25-29	30-34	35-39	40-44	Total	Estimates*
1990 Census	707	504	636	914	1028	1023	4812	--
1995 Estimate	649	486	434	799	1119	1085	4572	--
2000 Census	683	274	406	922	1356	1263	4904	--
2005 Est.	777	358	446	819	1250	1337	4987	214
2010 Proj.	797	415	535	845	1076	1212	4880	<u>207</u>
2015 Proj.	780	449	600	978	1109	1060	4976	<u>213</u>
% Change:								
1990-1995	-8.2%	-3.6%	-31.8%	-12.6%	8.9%	6.1%	-5.0%	-4.4%
1995-2000	5.2%	-43.6%	-6.5%	15.4%	21.2%	16.4%	7.3%	7.6%
2000-2005	13.8%	30.7%	9.9%	-11.2%	-7.8%	5.9%	1.7%	-0.3%
2005-2010	2.6%	15.9%	20.0%	3.2%	-13.9%	-9.3%	-2.1%	-3.0%
2010-2015	**-2.1%**	**8.2%**	**12.1%**	**15.7%**	**3.1%**	**-12.5%**	**2.0%**	**2.8%**

*Assuming the fertility rate of 50.8 births per 1000 non-Hispanic white women aged 15 to 44 years old. This rate is 8 births less than the overall average fertility rate of Connecticut (58.8 births) between 2000-2003 according to the National Center for Health Statistics, National Vital Statistics Reports, vol. 53, no. 9, Nov. 23, 2004

As shown in Table 2.4 above, the number of women aged 15 and 44 years old was projected to increase from 4,880 persons in 2010 to 4,976 persons in 2015, an increase of 96 women or +2.0%. To this number we multiplied the fertility rate (50.8 births/1000 Connecticut non-Hispanic white women) to the projected number of childbearing-age women. As a result, the births in Newtown were projected to increase from 207 births in 2010 to 213 births in 2015 (last column of Table 2.4), an increase of 6 births in five years.

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*Although this table is prepared based on the earlier Newtown population projections which estimated a higher population in 2010 and 2015, the populations by age and sex would be smaller due to revision of the population projections. Such revisions would certainly reduce the number of women aged 15 to 44 years old. The 2010 U.S. Census of Population was completed last April 1, 2010 and it would be wise to wait for the census results to fully revise the population projections.

(b) <u>Birth Projections by Regression Analysis</u>: the previous births projections are based on demographic trends and do not explicitly take into account the impact of economic changes. Accordingly, we conducted a statistical analysis of birth trends in Newtown to project future births.

Figure 2-1 below shows that BNT, the birth trend of Newtown during the past 23 years **(**between 1987 and 2009**)** was positively influenced by BCT(-7), Connecticut's births seven years ago, and NETG(T) as well as NETG(-2), the annual net housing gain in the year T and also two years prior to T, respectively. The figures in parentheses shown in the second row are**:** t-ratios; R^2 (adjusted R squared), the coefficient of determination; SEE, Standard Error of Estimates; D.W., Durbin Watson statistics; and MVD, the mean value of the dependent variable.* The value of R^2 denotes that 83.5% of variations in Newtown's annual births is explained by the three independent variables included in the equation. The value of SEE indicates that 95% of the variations in annual births of Newtown are within +41 births of MVD, mean value of the regression line. The margin of error is calculated to be +14.4%, implying that the equation is a moderately accurate description of the highly fluctuating annual births of Newtown.

[2.1]   BNT(T) = 0.004639 BCT(-7) + 0.179677 NETG(T) + 0.432659 NETG(-2)   1987-2009]

            (17.18)   (2.33)   (4.32)

      R^2 = 0.835   SEE = 20.59   D.W. = 2.07   MV D= 285.96

The above equation is further modified into equation 2.2 below by adding one more variable, UCT(-2), Connecticut's unemployment rate two years prior to T:

[2.2]   BNT(T) = 0.00556 * BCT(-7) + 0.21275 * NETG(T) + 0.39728 * NETG(-2) – 8.3728 UCT(-2)

            (11.92)   (2.98)   (4.80)   (-2.32)

      R^2 = 0.866   SEE = 18.66   D.W. = 2.57   MV D= 285.96

In equation 2.2, BNT(t) = the number of births to Newtown residents in the year t**;** NETG(t) and NETG(-2) = the number of housing units added to Newtown's housing inventory in the year T and two years prior to T, respectively. Note that Newtown's births are negatively affected by Connecticut's unemployment rate two years earlier. Note also that the inclusion of the variable UCT improved the R bar squared compared to that in equation 2.1; also, the SEE value is smaller so that the margin of error is calculated to be +13.1%.

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* See Appendix 2-A on page 2-22 for an explanation of statistical terminology.

FIG. 2--3
ANNUAL BIRTHS AND UNEMPLOYMENT RATE IN NEWTOWN
1980-2009 (ACTUAL) AND 2010-2014 (ASSUMPTION)
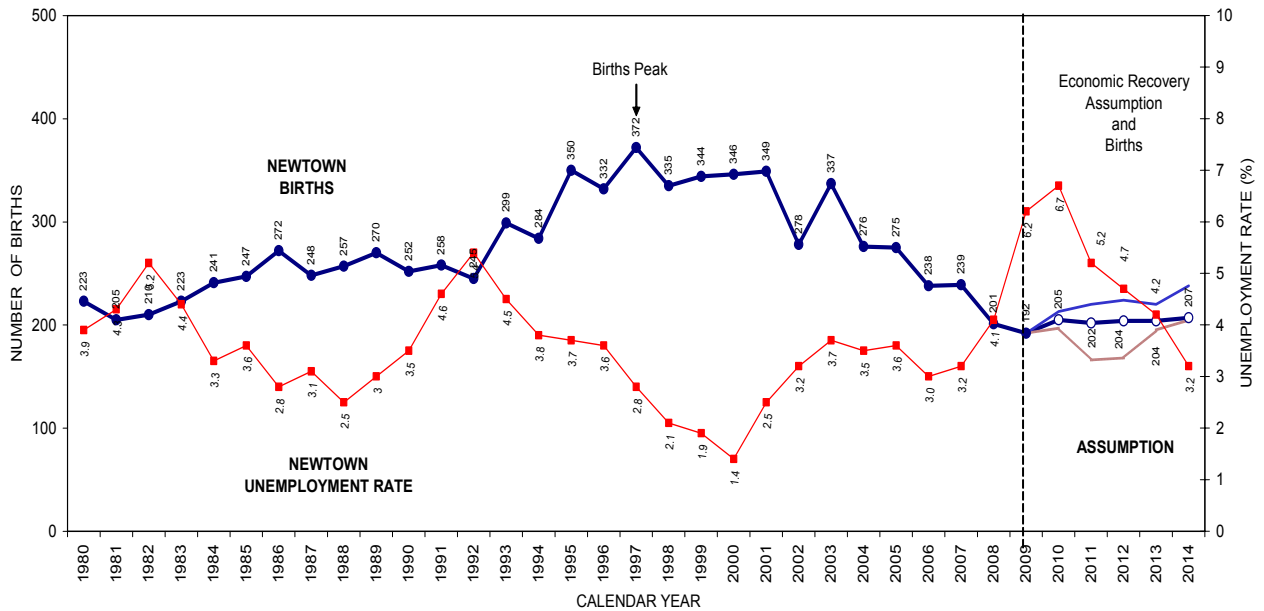
Equation 2.2 captures our observation that Newtown's birth trend has been negatively impacted by Newtown's unemployment rate (on average a one percent increase in the unemployment rate led to a reduction of more than 8.4 births in Newtown).

Newtown's births during the 2010-2014 period were estimated using equations 2.1 and 2.2. Equation 2.1 projects that Newtown's births will slightly increase from 192 births in 2009 to 207 births in 2014, adding 15 births in five years. Equation 2.2 projected a somewhat lower level of births than Equation 2.1, but because of the high unemployment rates since 2007, the negative impact of the very high unemployment rate of 2008 and 2009 considerably lowered the number of births in 2010 and 2011.

TABLE 2.3
PROJECTED BIRTHS IN NEWTOWN UNDER THREE GROWTH SCENARIOS
2010-2014

Birth Year	Birth Projection Scenarios (Assumptions)		
	Low Births*	Middle Births**	High Births[#]
2010	197	205	213
2011	166	202	220
2012	168	204	224
2013	195	204	220
2014	205	207	238
2009-2014 Change	+13 births	15 births	+46 births

* Projected by regression equation 2.2. ** Projected by regression equation 2.1.
[#] Projections assuming national and regional economies fully improve by 2014.

2.5 Residential Development in Newtown

New residential development is likely to increase public school enrollment as it attracts new people to a town, including families with school-age children. Therefore, many school districts watch residential growth trends very closely, particularly with respect to their potential impact on public school enrollment growth. Table 2.4 on page 2-12 presents the number of new dwelling units built and the net gains in housing units (the number of housing units added net of demolitions) in Newtown since 1980.

FIG. 2-4
ANNUAL HOME CONSTRUCTION AND UNEMPLOYMENT RATE
NEWTOWN, CT, 1980-2009
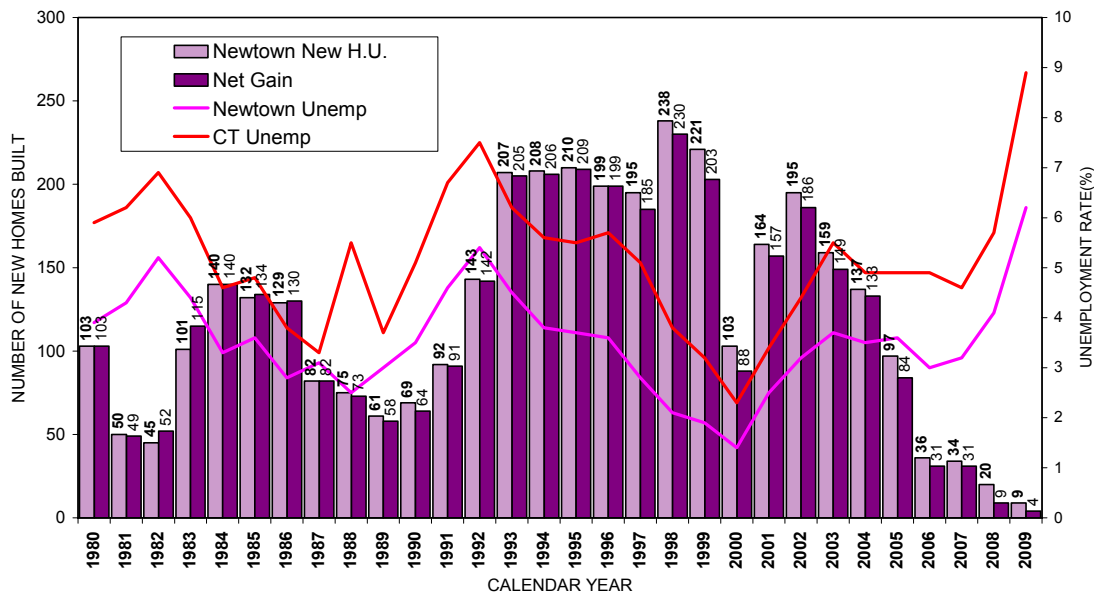
Figure 2-4 shows that Newtown experienced a moderately high degree of construction activity during the real estate boom of the mid 1980s, building as many as 140 new homes in 1984 when the unemployment rate in Newtown was declining. New home construction activity dwindled between 1984 and 1992 so that only 58 units were built in 1989 as the town's unemployment rate began to rise reaching as high as 5.9% in 1992. As the unemployment rates once again declined when the economy recovered, housing construction in Newtown substantially increased, hovering at the level of more or less 200 units per year for five years between 1993 and 1997. Then, Newtown built as many as 238 units in 1998, the largest number recorded since 1980. At the start of the 21st century, the economy soured once again as the nation experienced an economic recession in March 2001 and during the 9/11 disaster. In spite of the gradual economic recovery in the nation and Connecticut, most of the communities in Connecticut, including Newtown, suffered low levels of housing construction. During the past ten years, Newtown built an average of 124 units, but this average dropped to 111 units over the past five years and further to 94 units during the past three years, indicating that the pace of new home construction has decreased in recent years. Since 2006, new home construction in the nation has been adversely affected by

the so-called 'sub prime mortgage rate' fiasco, which has resulted in an increased number of foreclosures and a drop in home sales elsewhere in the nation. As the nation's economy worsened, Newtown built 36 new units in 2006, and the number dwindled to a mere 9 units in 2009.

Residential Construction and the Unemployment Rate: The residential construction activities in an area are highly cyclical, and they are inversely related to the area's economic conditions as measured by the unemployment rate. This relationship is captured by the following regression equation in which the logarithm of the number of new homes built in Newtown (LNHU) was reduced by 0.32% when the unemployment rate in Newtown in current year T increased by one percent. However, the R^2 is very small indicating many factors other than the unemployment rates have contributed to the variations in annual new home construction in Newtown.

[2.3] $LNHU(T) = 5.7283 - 0.3225 \, UNT(T)$ [1984 – 2007]
                  (12.07)   (-2.51)

         $R^2 = 0.154$ SEE = 0.715   DW = 0.380   MVD = 4.585

Average Number of K-12 Students per Housing Unit: Figure 2-5 and Table 2.4 (column 5) show that the average number of K-12 public school children per housing unit increased from 0.475 K-12 students per housing unit in 1989 to 0.602 K-12 students in 2005 because of rapidly increasing K-12 enrollments until 2006. However, the average enrollment multipliers (average number of K-12 students per housing unit) began to decrease gradually from 0.602 students per housing unit in 2005 to 0.571 students in 2009 when the K-12 enrollments declined as shown in Fig. 2-5.

FIG. 2-5
K-12 ENROLLMENT MULTIPLIER PER HOUSING UNIT*
NEWTOWN, CONNECTICUT, 1984-2009
(* Average number of K-12 students per total housing unit)
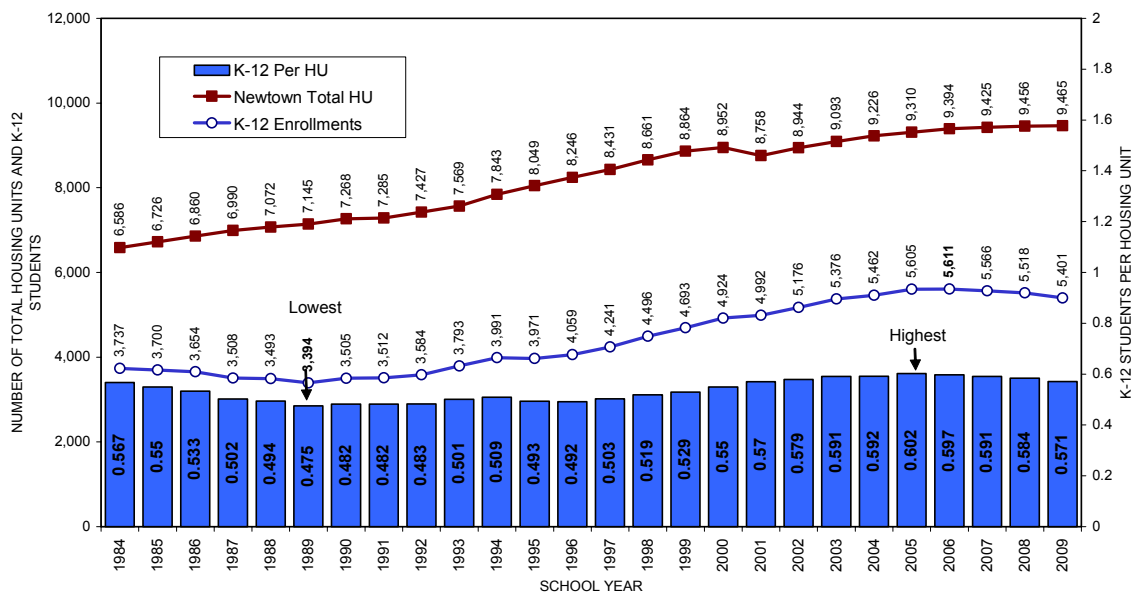
It is likely that the K-12 enrollment multiplier in Newtown will further diminish because the average number of students per housing unit is the result of the shrinking size of households and an increasing share of households without children (e.g. single-person households and elderly empty nesters) and families with a lone child. In light of the declining number of births, future K-12 enrollments in Newtown are likely to decline further resulting in a further decline of enrollment multipliers per housing unit. *

As expected, the K12 enrollment multiplier is positively affected by the size of K-12 enrollments but negatively affected by the number of total housing units in Newtown in a given year. And the equation 2.5 below indicates that the multiplier has been diminishing since 1984.

[2.5] $K12HU(T) = 0.1768 + 0.0001118 \ K12 - 6.5343 \ e\text{-}05 \ HU - 0.00766 \ T$ [1984 – 2007]
                              (9.83)   (18.12)   (-2.58)   (-11.50)

$R^2 = 0.963$ SEE = 0.08439   DW = 0.753   MVD = 0.536

---

* If we assume that there will be a total of 10,265 housing units in 2019 (at the rate of adding 80 new housing units per year) and K-12 enrollments will be approximately 4,000 students in 2019, then the K-12 multiplier per housing unit in 2019 is calculated to be 0.390 K-12 students per housing unit. (See page 6-25.)

TABLE 2.4
NEW DWELLING UNITS BUILT AND HOUSING NET GAIN
NEWTOWN, CONNECTICUT 1980-2009

Calendar Year	New Construction Jan.-Dec. (State Data)	Annual Housing Net Gain	Total Housing Units* (Dec. 31)	K-12 Public School Enrollment	Public School K-12 Children Per Unit*
	(1)	(2)	(3)	(4)	(5)
1980	103	103	6,271	--	--
1981	50	49	6,370	--	--
1982	45	52	6,419	--	--
1983	101	115	6,471	--	--
1984	140	140	6,586	3,737	0.567
1985	132	134	6,726	3,700	0.550
1986	129	130	6,860	3,654	0.533
1987	82	82	6,990	3,508	0.502
1988	75	73	7,072	3,493	0.494
1989	61	58	7,145	3,394	0.475
1990	69	64	7,268	3,505	0.482
1991	92	91	7,285	3,512	0.482
1992	143	142	7,427	3,584	0.483
1993	207	205	7,569	3,793	0.501
1994	208	206	7,843	3,991	0.509
1995	210	209	8,049	3,971	0.493
1996	199	199	8,246	4,059	0.492
1997	195	185	8,431	4,241	0.503
1998	238	230	8,661	4,496	0.519
1999	221	203	8,864	4,693	0.529
2000	103	88	8,952	4,924	0.550
2001	164	157	8,758	4,992	0.570
2002	195	186	8,944	5,176	0.579
2003	159	149	9,093	5,376	0.591
2004	137	133	9,226	5,462	0.592
2005	97	84	9,310	5,605	0.602
2006	36	31	9,394	5,611	0.597
2007	34	31	9,425	5,566	0.591
2008	20	9	9,456	5,518	0.584
2009	9	4	9,465	5,401	0.571
3-Year Avg.	21	15	9,449	5,495	0.582
5-Year	39	32	9,410	5,540	0.589
10-Year	95	87	9,202	5,363	0.583
W. 3-Yr.	17	10	9,455	5,468	0.578
W. 5-Yr.	26	20	9,435	5,507	0.584

Sources: Column (1), (2) and (3) data are from the Connecticut Department of Economic
and Community Development. Column (4) data are from Newtown Public Schools.
Column (5) = (4) / (3). *Total housing units include both occupied and vacant units.

2.6 Home Sales in Newtown

As shown in Figure 2-6 below and Table 2.5 on the next page, the number of home sales in Newtown increased rapidly from a low level of 261 units in 1990 to 672 units in 1998 during the economic growth experienced in the 1990's. However, as the economy soured beginning in 2000, home sales began to decrease and plummeted to a low level of 498 units in 2001 in response to a mild economic recession and the 9/11 disaster, only increasing again to 614 units in 2002 with the prospect of improved economic conditions. Nonetheless, nationwide economic problems began to emerge and home sales slipped back to a decline to reach a low of 237 home sales in 2009. On average, 638 homes (new and pre-owned homes) were sold yearly during the past ten years.

As the regression equation below indicates, the number of homes sold in Newtown (HSALES(T)) since 1988 is inversely related to UNT(-2), the unemployment rate of Newtown from two years prior, and the time variable T. The equation says that on average, a one percent increase in Newtown's unemployment rate led to a reduction of 92 home sales in Newtown, or vice versa. The value of R^2 also implies that 74.1% of the home sales trend can be explained by two independent variables, UNT and T.

[2.6]   HSALES (T) = 644.945 - 91.9195 UNT(2) + 7.6315 T   1988 – 2009]

                              (11.36)   (-7.75)   (3.17)

     R^2 = 0.741   SEE = 69.49   D.W. = 1.49   MDV = 442.68

FIG. 2-6
ANNUAL HOME SALES IN NEWTOWN, CT 1988-2009
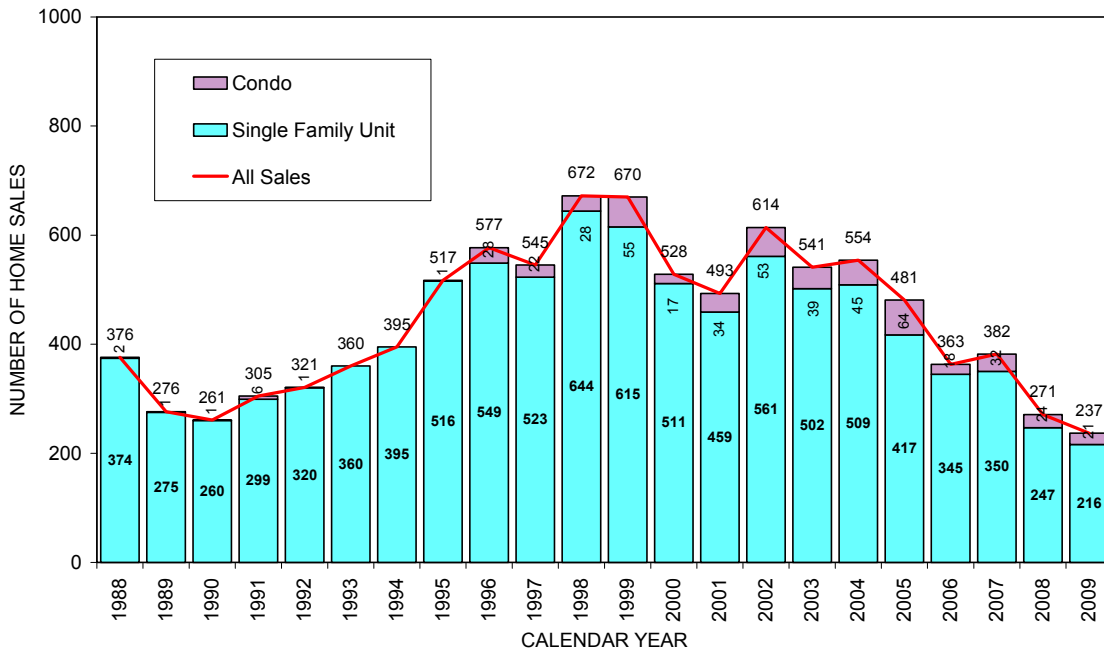
TABLE 2.5
ANNUAL HOME SALES IN NEWTOWN
1988-2009

Year	Number of Homes Sold (Units)			Median Price ($)	
	Single F.	Condo	Total	Single F.	Condo
1998	374	2	376	$217,700	
1999	275	1	276	$225,000	
1990	260	1	261	$203,250	
1991	299	6	305	$200,000	$114,250
1992	320	1	321	$200,000	
1993	360		360	$191,000	
1994	395		395	$200,000	
1995	516	1	517	$225,000	
1996	549	28	577	$237,000	$163,000
1997	523	22	545	$245,000	$180,250
1999	644	28	672	$267,770	$207,000
1999	615	55	670	$289,000	$194,900
2000	511	17	528	$330,000	$204,900
2001	459	34	493	$322,000	$235,000
2002	561	53	614	$362,500	$264,000
2003	502	39	541	$395,000	$287,000
2004	509	45	554	$450,000	$347,000
2005	417	64	481	$450,000	$526,350
2006	345	18	363	$490,000	$562,075
2007	350	32	382	$474,500	$363,500
2008	247	24	271	$455,000	$357,250
2009	216	21	237	$450,000	$396,583
3-Year Avg.	271	26	297	$459,833	$372,444
5-Year Avg.	315	32	347	$463,900	$441,152
10-Year Avg.	412	35	446	$417,900	$354,366
W. 3-Year Avg.	249	24	273	$455,750	$377,958
W. 5-Year Avg.	282	26	308	$461,567	$410,194

Source: Warren Information Services

Note also that the median sale price of single-family homes in Newtown increased from $191,000 in 1993 when Newtown's unemployment rate was relatively high at 4.5% (it was 5.4% the previous year) to $490,000 in 2006 when the unemployment rate dropped to 3.0%. Subsequently, the median price of homes dropped again to $450,000 in 2009, when the unemployment rate surged to 6.2% in Newtown.

2.7 Concluding Observations

In this section, it was demonstrated that family decisions are affected by the parents' sense of economic security and well-being. It was found that economic conditions (as represented by the unemployment rate) turned out to be the underlying factor that regulated four major factors (births, new home construction, home sales, and nonpublic school enrollments), which in turn most powerfully influenced enrollments in public schools.

For example, a low unemployment rate in an area increases the number of births, which in turn enlarges the kindergarten enrollment five years later. At the same time, a low unemployment rate boosts new home construction and home sales, bringing more families with children (an increase in net in-migration) into the town and adding yet more children to the public schools. However, a low unemployment rate also encourages more families to send their children to private schools, thus reducing public school enrollments. According to the Family Cycle Model (see Appendix 2-B), what happens in one year will have long-term multi-year effects on school enrollments. The size of the public school student population in a given year is therefore a cumulative result of events taking place in all previous years.

FIGURE 2-12

THE IMPACT OF THE ECONOMY ON PUBLIC SCHOOL ENROLLMENTS
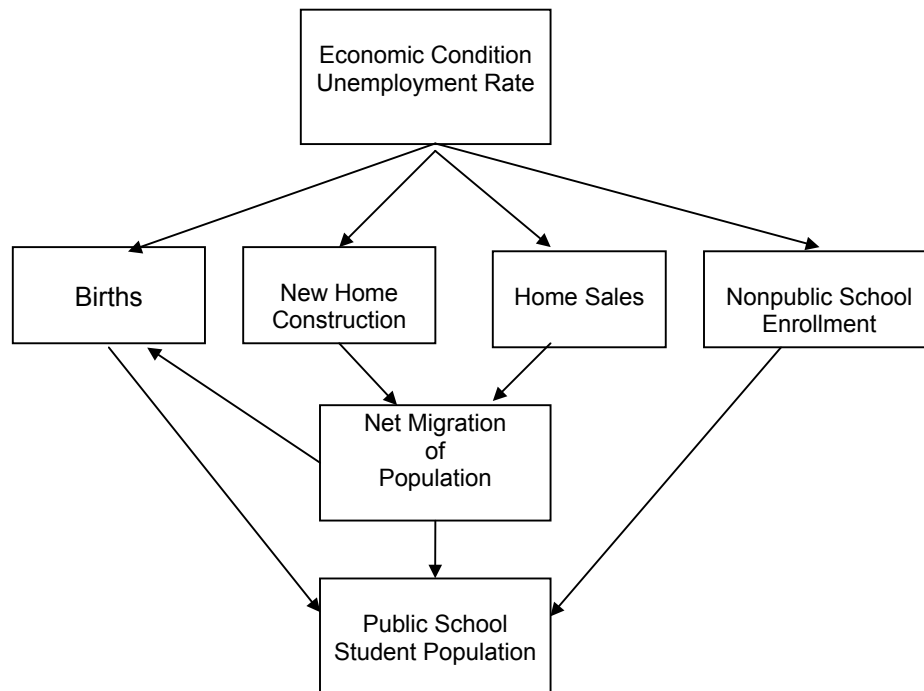
APPENDIX 2-A
REGRESSION CONCEPTS AND TERMINOLOGY

Regression Equation: A method of Least Squares is used. This method develops an equation that relates one variable (such as enrollment) to one or more other variables (such as births, unemployment rate, etc.) that should explain the first variable. This method is mathematically derived so that the resulting combination of explanatory variables produces the smallest error between the historic actual values and those estimated by the regression.

R Squared: R^2 is the best-known indicator of the success of a regression equation's fit. The R squared measures the percentage of the change in the dependent variable, which the equation explains by changes in the explanatory variables.

Standard Error of the Estimates: The S.E.E. gives a measure of how close the fitted values are to the actual values from the past. When a regression analysis is being used to develop an equation, it is desirable to have as small an S.E.E. as possible. In addition, these statistics may be used to gain some idea of the degree of forecasting accuracy that can be expected.

T-Ratio: The t-ratio shows the significance of each explanatory variable in predicting the dependent variable. It is desirable to have as large (either positive or negative) a t-ratio as possible for each explanatory variable. Generally, any statistic greater than +2.0 or less than -2.0 is acceptable. The t-ratio is derived by dividing the estimated coefficient for a variable by its Standard Error.

Durbin-Watson Statistics: One principal assumption of regression analysis is that the errors (between the fitted and actual values) are independent from one observation to the next. That is, knowledge of the error in one year will not help us anticipate the error in the next year. Autocorrelation is the case where there is a correlation between successive errors. The D.W. Statistic provides the standard test for autocorrelation. Generally, if the D.W. Statistic is between 1.5 and 2.5, there is no serious autocorrelation in a regression equation.

APPENDIX 2-B

FAMILY CYCLE MODEL OF SCHOOL ENROLLMENT MULTIPLIERS

H. C. Planning Consultants (HCPC) has developed a unique model called the Family Cycle Model. The FamilyCycle^{TM} Model is based on the premise that the enrollment impact of a residential unit on a town varies from year to year. This variation over time in the number of schoolchildren living in the unit is determined by the composition of the family living in the unit, which is determined in turn by the family's length of residence in the unit. Through surveys of various towns, it was found that the average number of schoolchildren generated by a household varies depending on the number of years that the household has lived in the town. In general, the changing pattern of schoolchildren produced per residence can be represented by a bell curve showing fewer schoolchildren in the early period of a household's residence in a town, and a greater number of children after 8 to 12 years of residency. This bell curve describes a family's life cycle: when a young family moves into a town, it has one or two pre-school children; the children then attend an elementary school, middle and a high school, before leaving for college or independent life.

The application of the Family Cycle Model demands detailed data. In order to obtain the required data, a town-wide survey of households is normally undertaken to ascertain the relationships between housing types, household sizes, the number of school age children, and public school enrollment. With these survey data, it is possible to estimate the long-term impact of home sales in a school district. Of course, home sales are not the only variables that may affect the future school enrollment size, and the actual figures will be the outcome of a combination of other factors, as well.

2-18

3. NONPUBLIC SCHOOL ENROLLMENT

3.1 Introduction

The nonpublic school enrollments are another important factor influencing the public school enrollments. As of 2009, there were a total of 6,311 PK-12 students residing in Newtown. Of these, 5,482 students (86.9%) were attending Newtown public schools, and the remaining 829 students (13.1%) were attending various schools termed as 'nonpublic'. Newtown's public school enrollment is affected by the number of students who live in Newtown but attend nonpublic schools. Obviously, when a large proportion of Newtown resident students attend nonpublic schools, commensurately fewer students attend public schools, and vice versa.

3.2 Definition of Nonpublic Schools

Nonpublic schools include various types of schools. They consist of in major part private/parochial schools, but also public schools in other towns, state-run regional vocational-technical schools, special education centers, home schools, and charter schools.

3.3 Newtown Resident Pupils Attending Nonpublic Schools

(a) From Figure 3-1, shown below, we observe the trends of Newtown's K-12 students attending nonpublic schools since 1995:

FIG. 3-1
NEWTOWN'S K-12 RESIDENT STUDENTS ATTENDING
NONPUBLIC SCHOOLS, 1995-2009
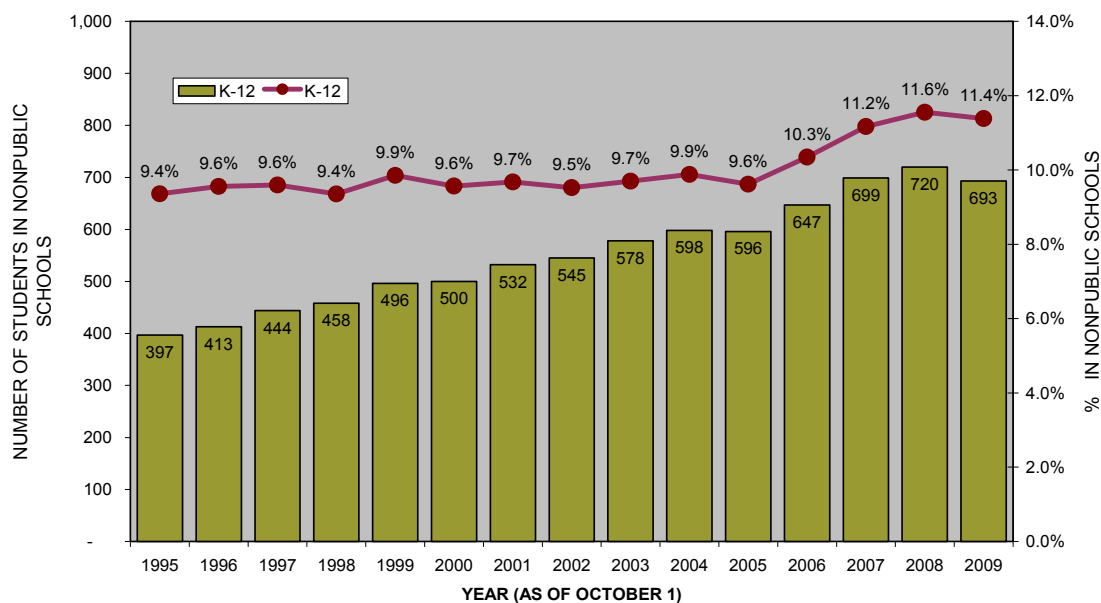
Overall, the percent of <u>K-12 students</u> in nonpublic schools hardly changed between 1995 and 2005: 9.4% of Newtown's resident students attended nonpublic schools in 1995 and 9.6% were in nonpublic schools in 2005. However, note that the number of Newtown resident students in nonpublic schools increased from 397 students in 1995 to 596 students in 2005. The percent of Newtown students in nonpublic schools began to increase in 2006 and reached to 11.6% in 2008 with 720 students in nonpublic schools. The percent and the number of Newtown resident students dropped to 11.4% (683 students) in 2009 as a result of very high unemployment rates. It is clear that an increasing number and percent of Newtown resident students ha**ve** been attending nonpublic schools.

When the proportion of K-12 nonpublic school students as a percent of the total resident K-12 students *increases* by one percent, the K-12 *public* school enrollment in Newtown *decreases* by one percent. In 2009, a total of 6,089 K-12 students attended both public and nonpublic schools, consisting of 5,396 students (88%) in Newtown public schools and 693 students (12%) in nonpublic schools. Of the 693 students in nonpublic schools, 64 students went to non-Newtown public schools, 45 students to voc-tech schools, and 584 students to private/parochial schools (see Table 3-1 on page 3-7). Note that a 1% increase in nonpublic school enrollments amounts to 61 fewer students in Newtown public schools, all other factors remaining constant.

FIG. 3-2
NEWTOWN'S PK-12 RESIDENT STUDENTS
ATTENDING NEWTOWN PUBLIC SCHOOLS
AND NONPUBLIC SCHOOLS, 2009
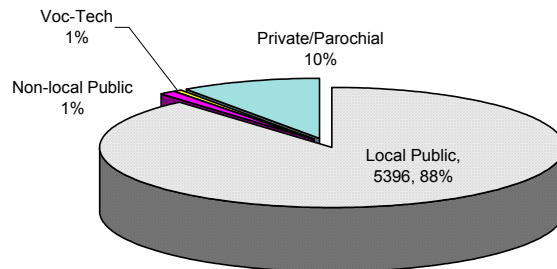
- In Connecticut, most school districts show that the percentages of residents attending nonpublic schools are inversely affected by economic conditions in Connecticut. In other words, a low percentage of residents attend nonpublic school when the unemployment rate is high, and vice versa. Such a relationship was also evident in our statistical analyses of Newtown's grades K-12 enrollments. That is, the number and percent of Newtown's K-12 students attending nonpublic schools were inversely affected by the fluctuating unemployment rates of Connecticut as shown by Equation 3.1 below:

[3.1] NPK12(T) = 0.1353 - 0.0000262 GK12(T) – 0.001691 UCT(T) + 0.00473T   [1995-2009]
            (13.22)   (-6.78)   (-2.87)   (8.72)
            R^2 = 0.921   SEE = 0.0021   D.W. = 2.16   MV D= 0.1003

Equation 2.7 indicates that NPK12 (the percent of K-12 Newtown students in nonpublic schools) is negatively impacted by the variable UCT(T), Connecticut's unemployment rates in the year T, and also by GK12(T), the number of K-12 students in Newtown in the year T. It is also positively impacted by the time variable T, indicating that NPK12 has been increasing over time. A similar relationship can be found when the dependent variable is the *number* of K-12 Newtown students in nonpublic schools as shown in Equation 3.2 below**:**

[3.2]   NNPK12(T) = 174.32 - 0.0490 GK12(T) – 8.0235 UCT(T) + 30.194T   [1995-2009]
              (2.46)   (-1.86)   (-1.97)   (8.04)
              R^2 = 0.981   SEE = 14.55   D.W. = 1.92   MV D= 554.40

(b) Trends for Newtown's Resident Students in Nonpublic Schools by Grade Level: The extent that Newtown's resident students attend nonpublic schools varies a great deal by grade level. The historical trends for the percent of Newtown students in private/parochial schools are shown in Figure 3-3 through Figure 3-6.

▪   Grades K-4 students attending nonpublic schools maintained a level of about 11% ($\pm$240 students) until 2002. The percent and the number gradually increased each year reaching 14.4% (342 students) in 2007, and then dropped to 13.4% (297 students) over the next two years, 2008 and 2009, when the unemployment rates surged.

FIG. 3-3
NUMBER AND PERCENT OF NEWTOWN'S RESIDENT STUDENTS
ATTENDING K-4 NONPUBLIC SCHOOLS, 1995-2009
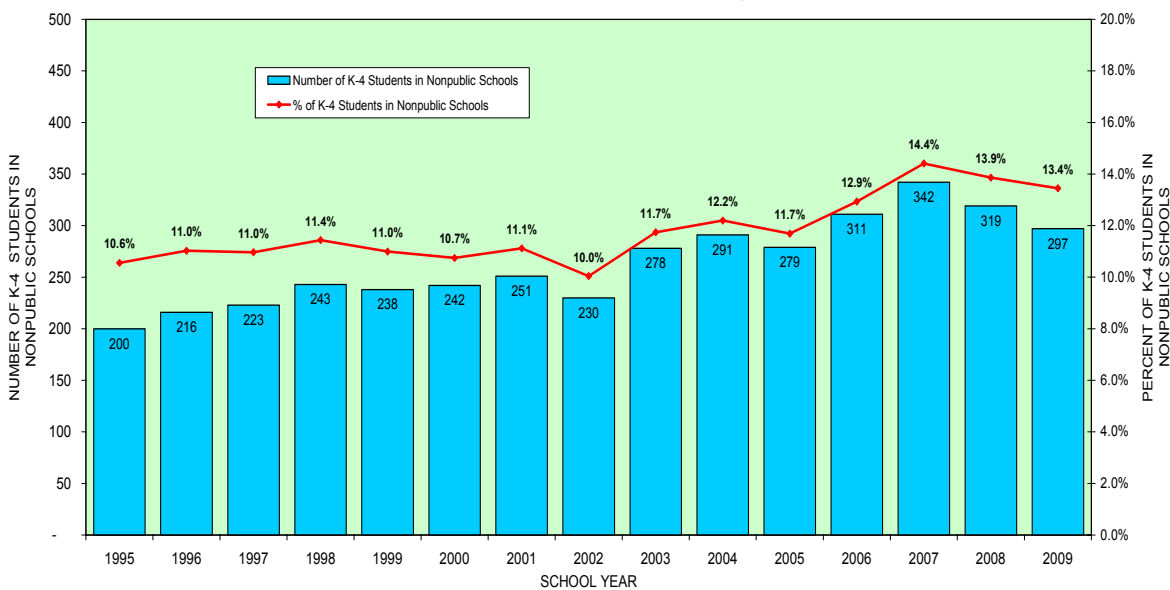
▪   The *percent* of grades 5-6 intermediate school children decreased from 10.1% (66 students) in 1995 to 6.9% (65 students) in 2003 although the *number* of students in nonpublic schools gradually increased from 66 students in 1995 to 86 students in 2002. But, the trend reversed itself and the percent in nonpublic schools rapidly increased to 11.8% in 2009, almost doubling the number in 2003 of 65 students to 115 students in 2009.

FIG. 3-4
GRADES 5 & 6 NEWTOWN STUDENTS IN NONPUBLIC SCHOOLS
1995-2009
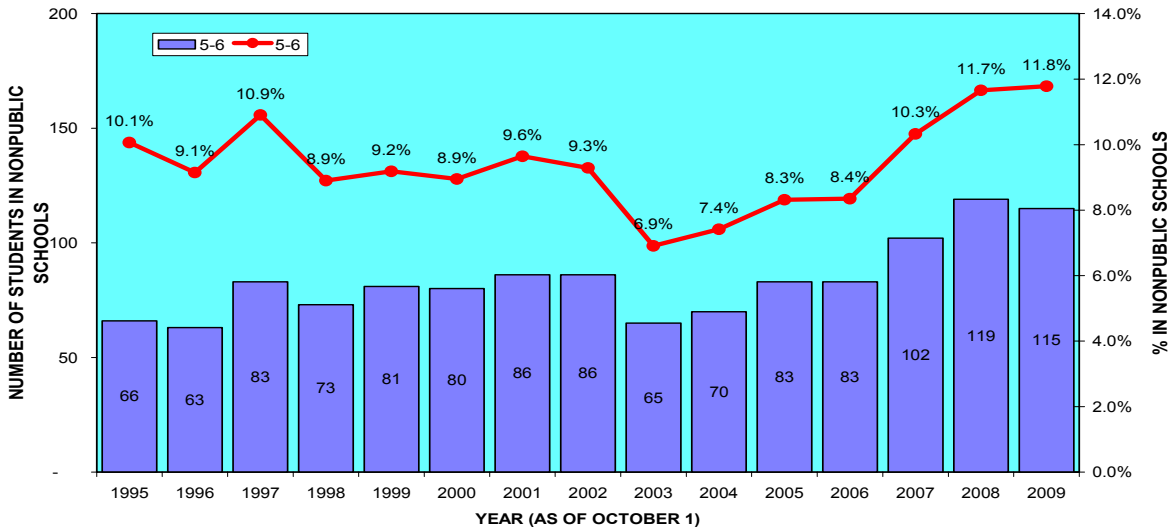
▪   The percent of grades 7-8 middle school children attending nonpublic schools increased from 6.5% (42 students) in 1995 to 9.4% (75 students) in 1999. However, the percent in nonpublic schools hardly changed between 2000 and 2009 although the percentages annually fluctuated between 7 to 9%or 65 to 84 students.

FIG. 3-5
NUMBER AND PERCENT OF NEWTOWN'S GRADES 7-8 STUDENTS
ATTENDING NONPUBLIC SCHOOLS, 1995 - 2009
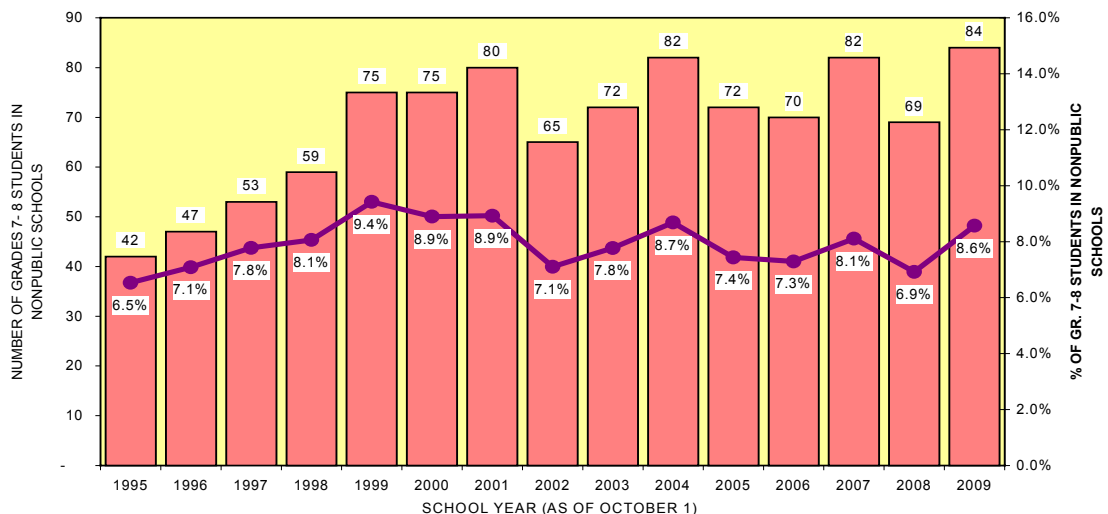
▪ The <u>grades 9-12</u> high school students attending nonpublic high schools declined from 8.6% in 1995 to 6.9% in 1998, then gradually increased to 11.1% in 2008 and dropped to 10.2% in 2009 in spite of moderate annual fluctuations.

FIG. 3-6
NEWTOWN RESIDENTS ATTENDING
NONPUBLIC HIGH SCHOOLS,1995-2009
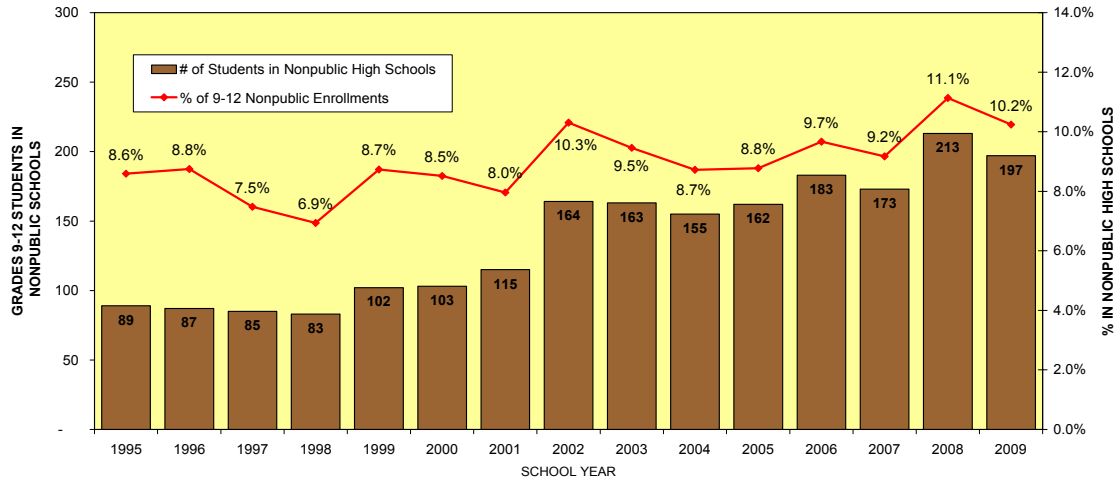
(c) <u>Comparison of Percent of Students in Nonpublic Schools by Grade</u>: In general, most towns in Connecticut tend to show a higher percent of high school students attending nonpublic schools compared to lower grade students. In Newtown, we found that grades K-4 (on average 13.6%) and 5-6 students (11.6%) exhibit a higher percentage of nonpublic school enrollments than high school students do (10.1%). We also found that the grades 7&8 students had the lowest percent (8.6%) of students in nonpublic schools. Note that as high as 22.3% of Newtown resident kindergartners are attending nonpublic schools because the Newtown public schools do not offer full-day kindergarten programs.

FIG 3-7
PERCENT OF NEWT0WN RESIDENT STUDENTS ATTENDING NONPUBLIC
SCHOOLS BY GRADE, 2009
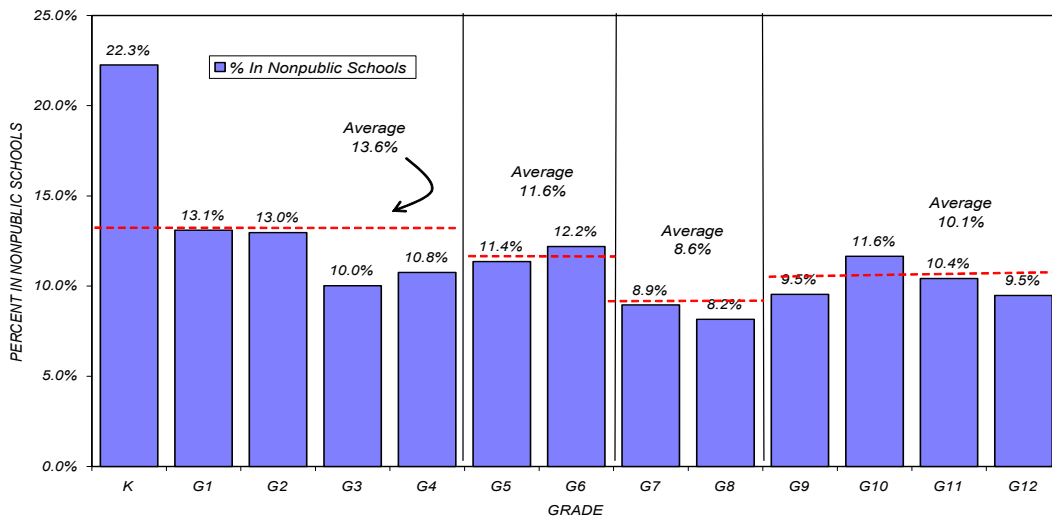
TABLE 3-1
NEWTOWN RESIDENT PUPILS ATTENDING NONPUBLIC SCHOOLS BY GRADE, 2000-2009

		K	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12
2000	Public	398	385	427	400	400	396	418	395	373	360	331	322	319
	Private/Parochial	61	48	40	44	49	40	40	39	36	31	24	32	16
	Voc-Tech										7	4	5	5
	Total Nonpublic	61	48	40	44	49	40	40	39	36	38	28	37	21
	% Nonpublic*	13.3%	11.1%	8.6%	9.9%	10.9%	9.2%	8.7%	9.0%	8.8%	9.5%	7.8%	10.3%	6.2%
2001	Public	347	435	382	437	405	402	404	417	399	376	360	339	289
	Private/Parochial	73	50	46	37	45	49	37	37	43	33	31	23	28
	Voc-Tech										1	1	1	0
	Total Nonpublic	73	50	46	37	45	49	37	37	43	34	32	24	28
	% Nonpublic*	17.4%	10.3%	10.7%	7.8%	10.0%	10.9%	8.4%	8.1%	9.7%	8.3%	8.2%	6.6%	8.8%
2002	Local Public	382	392	457	400	429	421	419	424	426	391	378	365	293
	Non-local Public	0	0	0	0	0	0	0	0	0	3	3	4	20
	Voc-Tech										6	3	9	5
	Private/Parochial	73	40	41	40	36	40	46	28	37	30	25	32	24
	Total Nonpublic	73	40	41	40	36	40	46	28	37	39	31	45	49
	TOTAL (Pub+Nonpub)	455	432	498	440	465	461	465	452	463	430	409	410	342
	% Nonpublic*	16.0%	9.3%	8.2%	9.1%	7.7%	8.7%	9.9%	6.2%	8.0%	9.1%	7.6%	11.0%	14.3%
2003	Local Public	381	427	408	467	407	445	431	423	431	425	390	390	355
	Non-local Public	0	2	0	0	1	1	0	0	1	2	3	4	5
	Voc-Tech										7	6	4	8
	Private/Parochial	79	69	39	41	47	26	38	42	29	33	31	31	29
	Total Nonpublic	79	71	39	41	48	27	38	42	30	42	40	39	42
	TOTAL (Pub+Nonpub)	460	498	447	508	455	472	469	465	461	467	430	429	397
	% Nonpublic*	17.2%	14.3%	8.7%	8.1%	10.5%	5.7%	8.1%	9.0%	6.5%	9.0%	9.3%	9.1%	10.6%
2004	Local Public	385	402	438	400	470	417	457	435	427	419	426	406	371
	Non-local Public	0	0	2	1	0	1	1	1	1	3	2	2	2
	Voc-Tech										6	6	6	3
	Private/Parochial	80	57	67	41	43	44	24	39	41	36	36	29	24
	Total Nonpublic	80	57	69	42	43	45	25	40	42	45	44	37	29
	TOTAL (Pub+Nonpub)	465	459	507	442	513	462	482	475	469	464	470	443	400
	% Nonpublic*	17.2%	12.4%	13.6%	9.5%	8.4%	9.7%	5.2%	8.4%	9.0%	9.7%	9.4%	8.4%	7.3%
2005	Local Public	398	432	411	462	405	485	430	454	442	439	432	424	389
	Non-local Public	0	0	0	1	0	0	1	1	0	1	2	2	2
	Voc-Tech										7	7	3	6
	Private/Parochial	67	54	53	62	42	42	40	28	43	39	34	35	24
	Total Nonpublic	67	54	53	63	42	42	41	29	43	47	43	40	32
	TOTAL(Pub+Nonpub)	465	486	464	525	447	527	471	483	485	486	475	464	421
	% Nonpublic*	14.4%	11.1%	11.4%	12.0%	9.4%	8.0%	8.7%	6.0%	8.9%	9.7%	9.1%	8.6%	7.6%
2006	Local Public	361	427	424	419	463	414	497	430	460	435	428	410	437
	Non-local Public	4	4	4	6	4	0	0	2	1	3	1	2	5
	Voc-Tech										12	8	4	4
	Private/Parochial	74	46	52	56	61	46	37	41	26	38	34	36	36
	Total Nonpublic	78	50	56	62	65	46	37	43	27	53	43	42	45
	TOTAL (Pub+Nonpub)	439	477	480	481	528	460	534	473	487	488	471	452	482
	% Nonpublic*	17.8%	10.5%	11.7%	12.9%	12.3%	10.0%	6.9%	9.1%	5.5%	10.9%	9.1%	9.3%	9.3%
2007	Local Public	349	393	442	419	428	464	422	499	431	443	431	420	419
	Non-local Public	7	5	5	6	7	4	0	1	1	3	2	1	3
	Voc-Tech										13	17	9	4
	Private/Parochial	88	56	50	59	59	56	42	41	39	31	35	28	27
	Total Nonpublic	95	61	55	65	66	60	42	42	40	47	54	38	34
	TOTAL (Pub+Nonpub)	444	454	497	484	494	524	464	541	471	490	485	458	453
	% Nonpublic*	21.4%	13.4%	11.1%	13.4%	13.4%	11.5%	9.1%	7.8%	8.5%	9.6%	11.1%	8.3%	7.5%
2008	Local Public	320	401	393	441	428	431	471	436	492	410	436	426	428
	Non-local Public	11	8	6	6	6	5	2	0	3	1	3	2	3
	Voc-Tech										8	14	13	7
	Private/Parochial	77	53	45	49	58	65	47	36	30	49	37	38	38
	Total Nonpublic	88	61	51	55	64	70	49	36	33	58	54	53	48
	TOTAL (Pub+Nonpub)	408	462	444	496	492	501	520	472	525	468	490	479	476
	% Nonpublic*	21.6%	13.2%	11.5%	11.1%	13.0%	14.0%	9.4%	7.6%	6.3%	12.4%	11.0%	11.1%	10.1%
2009	Local Public	290	365	396	413	448	429	432	468	428	465	402	430	430
	Non-local Public	14	9	7	5	7	4	3	2	2	2	2	2	5
	Voc-Tech										13	7	14	11
	Private/Parochial	69	46	52	41	47	51	57	44	36	34	44	34	29
	Total Nonpublic	83	55	59	46	54	55	60	46	38	49	53	50	45
	TOTAL (Pub+Nonpub)	373	420	455	459	502	484	492	514	466	514	455	480	475
	% Nonpublic*	22.3%	13.1%	13.0%	10.0%	10.8%	11.4%	12.2%	8.9%	8.2%	9.5%	11.6%	10.4%	9.5%

Source: Prepared by HCPC, Inc. based on data obtained from the Connecticut State Department of Education (CSDE).
The number of public school enrollments provided by the CSDE may differ slightly from corresponding figures shown in Table 2.4.

TABLE 3-1 (CONTINUED)
NEWTOWN RESIDENT PUPILS ATTENDING NONPUBLIC SCHOOLS BY GRADE LEVEL
2000-2009

		K	K-4	5-6	7-8	9-12	K-12	PK-12
2000	Public	398	2010	814	768	1332	4924	4941
	Private/Parochial	61	242	80	75	103	500	580
	Voc-Tech		0	0	0	21	21	21
	Total Nonpublic	61	242	80	75	124	521	601
	% Nonpublic*	13.3%	10.7%	8.9%	8.9%	8.5%	9.6%	10.8%
2001	Public	347	2006	806	816	1364	4992	5018
	Private/Parochial	73	251	86	80	115	532	605
	Voc-Tech		0	0	0	3	3	3
	Total Nonpublic	73	251	86	80	118	535	608
	% Nonpublic*	17.4%	11.1%	9.6%	8.9%	8.0%	9.7%	10.8%
2002	Local Public	382	2060	840	850	1427	5177	5202
	Non-local Public	0	0	0	0	30	30	30
	Voc-Tech		0	0	0	23	23	23
	Private/Parochial	73	230	86	65	111	492	660
	Total Nonpublic	73	230	86	65	164	545	713
	TOTAL (Pub+Nonpub)	455	2290	926	915	1591	5722	5915
	% Nonpublic*	16.0%	10.0%	9.3%	7.1%	10.3%	9.5%	12.1%
2003	Local Public	381	2090	876	854	1560	5380	5403
	Non-local Public	0	3	1	1	14	19	19
	Voc-Tech		0	0	0	25	25	25
	Private/Parochial	79	275	64	71	124	534	697
	Total Nonpublic	79	278	65	72	163	578	741
	TOTAL (Pub+Nonpub)	460	2368	941	926	1723	5958	6144
	% Nonpublic*	17.2%	11.7%	6.9%	7.8%	9.5%	9.7%	12.1%
2004	Local Public	385	2095	874	862	1622	5453	5493
	Non-local Public	0	3	2	2	9	16	16
	Voc-Tech		0	0	0	21	21	21
	Private/Parochial	80	288	68	80	125	561	739
	Total Nonpublic	80	291	70	82	155	598	776
	TOTAL (Pub+Nonpub)	465	2386	944	944	1777	6051	6269
	% Nonpublic*	17.2%	12.2%	7.4%	8.7%	8.7%	9.9%	12.4%
2005	Local Public	398	2108	915	896	1684	5603	5645
	Non-local Public	0	1	1	1	7	10	10
	Voc-Tech		0	0	0	23	23	23
	Private/Parochial	67	278	82	71	132	563	632
	Total Nonpublic	67	279	83	72	162	596	665
	TOTAL(Pub+Nonpub)	465	2387	998	968	1846	6199	6310
	% Nonpublic*	14.4%	11.7%	8.3%	7.4%	8.8%	9.6%	10.5%
2006	Local Public	361	2094	911	890	1710	5605	5665
	Non-local Public	4	22	0	3	11	36	36
	Voc-Tech		0	0	0	28	28	28
	Private/Parochial	74	289	83	67	144	583	652
	Total Nonpublic	78	311	83	70	183	647	716
	TOTAL (Pub+Nonpub)	439	2405	994	960	1893	6252	6381
	% Nonpublic*	17.8%	12.9%	8.4%	7.3%	9.7%	10.3%	11.2%
2007	Local Public	349	2031	886	930	1713	5560	5620
	Non-local Public	7	30	4	2	9	45	46
	Voc-Tech		0	0	0	43	43	43
	Private/Parochial	88	312	98	80	121	611	755
	Total Nonpublic	95	342	102	82	173	699	844
	TOTAL (Pub+Nonpub)	444	2373	988	1012	1886	6259	6464
	% Nonpublic*	21.4%	14.4%	10.3%	8.1%	9.2%	11.2%	13.1%
2008	Local Public	320	1983	902	928	1700	5513	5596
	Non-local Public	11	37	7	3	9	56	56
	Voc-Tech		0	0	0	42	42	42
	Private/Parochial	77	282	112	66	162	622	774
	Total Nonpublic	88	319	119	69	213	720	872
	TOTAL (Pub+Nonpub)	408	2302	1021	997	1913	6233	6468
	% Nonpublic*	21.6%	13.9%	11.7%	6.9%	11.1%	11.6%	13.5%
2009	Local Public	290	1912	861	896	1727	5396	5482
	Non-local Public	14	42	7	4	11	64	64
	Voc-Tech		0	0	0	45	45	45
	Private/Parochial	69	255	108	80	141	584	720
	Total Nonpublic	83	297	115	84	197	693	829
	TOTAL (Pub+Nonpub)	373	2209	976	980	1924	6089	6311
	% Nonpublic*	22.3%	13.4%	11.8%	8.6%	10.2%	11.4%	13.1%

* Nonpublic includes private/parochial school students.
Source: Prepared by HCPC, Inc. based on data obtained from the Connecticut State Department of Education (CSDE).
The number of public school enrollments provided by the CSDE may differ slightly from corresponding figures provided by the Newtown Public Schools.

3.4 Nonpublic School Enrollment Assumption

Implicit to the public school enrollment projections is that a certain number or percent of total area residents attending nonpublic schools is assumed. We explicitly state the following nonpublic school enrollment assumptions: 13.7% for K-4, 10.7% for grades 5-6, 7.8% for grades 7-8, 10.1% for grades 9-12, and 11.0% for grades K-12. These percentages are weighted 5-year trend averages.

TABLE 3-2

PAST TRENDS OF NEWTOWN RESIDENTS ATTENDING

NONPUBLIC SCHOOLS AND PROJECTION ASSUMPTIONS

	Percent in Nonpublic Schools				Number of Students in Nonpublic Schools				
	K-4	5-6	7-8	9-12	K-12	K-4	5-6	7-8	9-12	K-12
1995	10.6%	10.1%	6.5%	8.6%	9.4%	200	66	42	102	410
1996	11.0%	9.1%	7.1%	8.8%	9.6%	216	63	47	103	429
1997	11.0%	10.9%	7.8%	7.5%	9.6%	223	83	53	91	450
1998	11.4%	8.9%	8.1%	6.9%	9.4%	243	73	59	89	464
1999	11.0%	9.2%	9.4%	8.7%	9.9%	238	81	75	119	513
2000	10.7%	8.9%	8.9%	8.5%	9.6%	242	80	75	124	521
2001	11.1%	9.6%	8.9%	8.0%	9.7%	251	86	80	118	535
2002	10.0%	9.3%	7.1%	10.3%	9.5%	230	86	65	164	545
2003	11.7%	6.9%	7.8%	9.5%	9.7%	278	65	72	163	578
2004	12.2%	7.4%	8.7%	8.7%	9.9%	291	70	82	155	598
2005	11.7%	8.3%	7.4%	8.8%	9.6%	279	83	72	162	596
2006	12.9%	8.4%	7.3%	9.7%	10.3%	311	83	70	183	647
2007	14.4%	10.3%	8.1%	9.2%	11.2%	342	102	82	173	699
2008	13.9%	11.7%	6.9%	11.1%	11.6%	319	119	69	213	720
2009	13.4%	11.8%	8.6%	10.2%	11.4%	297	115	84	197	693
	*Projection Assumptions**					*Estimates based on the middle projections*				
2010	*13.6%*	*10.8%*	*7.8%*	*10.1%*	*11.0%*	*285*	*106*	*78*	*192*	*662*
2011	*13.5%*	*10.7%*	*7.8%*	*10.1%*	*11.0%*	*268*	*104*	*76*	*193*	*641*
2012	*13.5%*	*10.8%*	*7.8%*	*10.1%*	*10.9%*	*252*	*101*	*77*	*195*	*626*
2013	*13.4%*	*10.7%*	*7.8%*	*10.1%*	*10.8%*	*232*	*97*	*75*	*192*	*596*
2014	*13.4%*	*10.7%*	*7.8%*	*10.1%*	*10.8%*	*217*	*89*	*73*	*195*	*574*
2015	*13.6%*	*10.8%*	*7.8%*	*10.1%*	*10.8%*	*207*	*86*	*70*	*190*	*553*
2016	*13.7%*	*10.7%*	*7.8%*	*10.1%*	*10.9%*	*200*	*80*	*65*	*188*	*532*
2017	*13.7%*	*10.8%*	*7.8%*	*10.1%*	*10.9%*	*194*	*74*	*62*	*183*	*513*
2018	*13.7%*	*10.7%*	*7.8%*	*10.1%*	*10.9%*	*194*	*68*	*58*	*173*	*492*
2019	*13.7%*	*10.7%*	*7.8%*	*10.1%*	*11.0%*	*195*	*61*	*54*	*165*	*476*

*Weighted 5-year trend averages.

3.5 Concluding Notes

Since we assumed **a** constant percent of Newtown resident students will attend nonpublic schools over the next ten years, it is expected that the number of students in nonpublic schools will decline as the total school-age children decreases in Newtown (see Table 3-2). This may create enrollment shortage problems for many private and parochial schools so that some may

even close their doors and cause a slight increase in public school enrollments. When the Newtown public schools institute a full-day kindergarten, when Newtown High School undergo capital improvement, when the existing private/parochial schools close their doors, and most of all when future economic conditions drastically change, the extent of students enrolled in private/parochial schools will change and so in turn will public school enrollments.

3-10

4. NEWTOWN PUBLIC SCHOOL ENROLLMENT GROWTH TRENDS
1984 - 2009

4.1 Newtown Public School Enrollment Growth Trends

In this section, we try to understand the ways in which the factors identified in Section 2 have actually affected enrollment in Newtown public schools over the past 25 years, between 1984 and 2009. As we already discussed the trends in births in Section 2, we begin this section with an analysis of kindergarten enrollment because all upper grade enrollments are derived from the kindergarten enrollment. Obviously, the kindergarten cohort of today will grow up to become the twelfth-graders of tomorrow.

4.2 Births and Kindergarten Enrollment

Figure 4-1 superimposes the trends of births (5 years prior) and the kindergarten enrollments in Newtown since 1984. In spite of annual fluctuations in both trends, observe that the trend lines are more or less parallel to each other indicating that the annual changes in kindergarten enrollments closely followed the ups and downs of the number of births in Newtown five years earlier. Generally, kindergarten enrollments exceeded the number of births five years ago in Newtown mainly due to a net in-migration of preschool children during the five years preceding their entry into kindergarten classes.

FIG. 4-1
BIRTHS AND KINDERGARTEN ENROLLMENTS
NEWTOWN PUBLIC SCHOOLS, 1984-2019

4-1
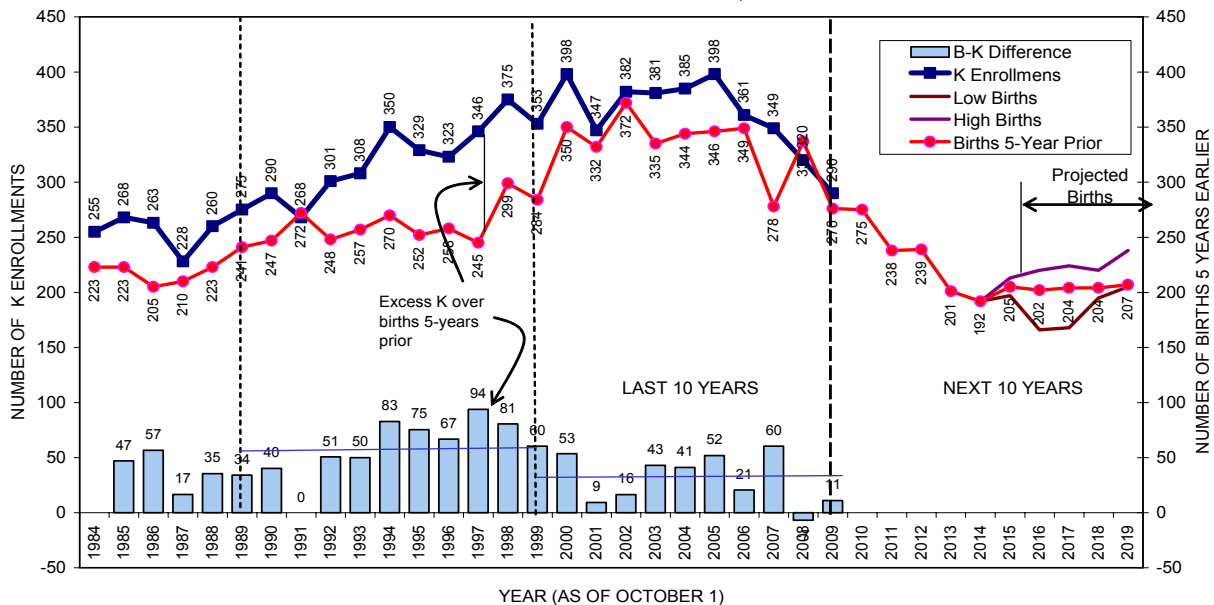
In spite of considerable annual fluctuations, the long-term trend of births has been declining since 1997 and Kindergarten enrollments have been declining since 2000. *

Figure 4-1 also shows at the bottom of the chart (the bar graph) this excess of K enrollments over births from five-year prior. Note that these additional K enrollments over B (births) five years ago are primarily due to a net in-migration of preschool children, and that these additional numbers of kindergartners over births have been declining: the excess K over B during the recent decade (2000-2009) were on average 30 children, one-half of the 60 more K per year than B during the 1990s. *Observe in Figure 4-1 that the excess K over B dwindled so much during the last few years of economic turmoil* that kindergarten enrollment in 2009 was even less than the births from five years prior. In short, the net in-migration of preschool children into Newtown has been diminishing since 1997 when kindergarten enrollment was 94 students larger than the births from five years prior.

Over the next five years, it is likely that kindergarten enrollments will continue to decline because the number of births in Newtown declined considerably during the past five years, between 2005 and 2009. Furthermore, the net in-migration of preschool children will most likely continue to be relatively low as long as the high unemployment rates in the nation and Connecticut persist. As far as the K enrollments over the second five years (between 2014 and 2019) are concerned, the three birth scenarios, low, flat and high births, will dictate the size of K enrollments.

According to regression equation 4.1, shown below, the dependent variable K(T), kindergarten enrollment in a given year T, is positively affected by independent variables BNT(-5), the number of births in Newtown five years ago; NETG(T), annual net housing gain; and T, the time variable, but negatively impacted by UCT(T), Connecticut's unemployment rate in the year T. ** The figures in parentheses in the second row are t-ratios; R^2 = the coefficient of determination; SEE = Standard Error of Estimates; and D.W. = Durbin-Watson statistics. The R^2 is 0.8**54** indicating that 85.4% of the variability of kindergarten enrollments during the last ten years is explained by the variables included in the equation.

[4.1]   K(T) = 139.7158 +0.4419 BNT(-5) + 0.2850 NETG(T) – 5.8278 UCT(T) + 3.244 T   [1984-2009]
                    (3.74)   (3.01)   (4.78)   (-1.91)   (3.27)
          R^2 (Bar Squared) = 0.854   SEE = 19.04   D.W. = 2.35   MVD = 323.19

According to the equation above, the kindergarten enrollment in Newtown annually deviated from the trend line within a range of $\pm$38 students or $\pm$11.8% (2 S.E.E.s) for 95% of the time. These statistics imply that the above equation depicts the past trends of kindergarten enrollments with moderate accuracy.***

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*Note in Table 4.1 (Col. 1) the peak enrollment of 398 kindergartners were recorded in both 2000 and 2005. However, according to Table 4.1, 2000's K enrollment set the pace for the subsequent grades' peak enrollments (i.e., the 1st grade peak enrollment in 2001, the 2nd grade peak enrollment in 2002, and so forth).

** While BNT represents births, NETG represents net migration of students, two important components of K enrollments.

*** The margin of error of equation 4.1 is moderately less than the $\pm$15.1% margin of error of a simple regression equation shown in Table 4.3 on page 4-11.

4.3 Historical Enrollment Data by Grade and Grade Level

Table**s** 4.1A and B below present the annual enrollment data by grade and grade level since 1984. In this table, grade enrollments include all special education and special needs (ESL and bilingual) students**;** i.e**.,** they are not separately listed as un-graded.* We will use these enrollments in projecting future enrollments in Section 6 of this report.

TABLE 4.1A
HISTORY OF NEWTOWN PUBLIC SCHOOLS ENROLLMENT BY GRADE
1984-2009 (AS OF OCTOBER 1)

Trough enrollments are underlined and the peak enrollments are framed.

As of Oct. 1	PK	K	1	2	3	4	5	6	7	8	9	10	11	12
1984	0	255	241	238	253	233	247	257	317	385	309	355	357	290
1985	0	268	270	255	234	260	235	257	276	312	354	314	372	293
1986	24	263	282	278	259	261	258	241	256	276	276	354	325	325
1987	28	228	294	293	258	254	250	258	231	252	256	275	374	285
1988	29	260	264	297	290	265	263	248	257	226	251	249	288	335
1989	21	275	276	265	300	284	259	263	243	252	200	243	269	265
1990	19	290	295	305	272	295	292	266	272	245	256	210	263	244
1991	21	268	299	294	305	266	296	280	277	278	231	265	204	249
1992	33	301	314	295	294	304	273	298	280	274	264	232	261	194
1993	25	308	340	333	302	295	322	287	309	278	282	264	248	225
1994	17	350	333	340	324	300	300	315	388	306	275	278	256	226
1995	12	329	371	340	336	319	296	294	322	279	297	272	281	235
1996	14	323	349	371	347	353	314	312	295	321	274	272	277	251
1997	18	346	365	356	380	363	355	323	322	306	327	267	280	251
1998	17	375	374	377	360	396	376	371	346	327	318	331	279	266
1999	23	353	405	393	392	384	406	395	372	349	330	308	343	263
2000	17	398	385	427	400	400	396	418	395	373	360	331	322	319
2001	26	347	435	382	437	405	402	404	417	399	376	360	339	289
2002	25	382	392	457	400	429	421	419	424	426	391	378	365	293
2003	23	381	427	408	467	407	445	431	423	431	425	390	390	355
2004	40	385	402	438	400	470	417	457	435	427	419	426	406	371
2005	42	398	432	411	462	405	485	430	454	442	439	432	424	389
2006	60	361	427	424	419	463	414	497	430	460	435	428	410	437
2007	60	349	393	442	419	428	464	422	499	431	443	431	420	419
2008	83	320	401	393	441	428	431	471	436	492	410	436	426	428
2009	86	290	365	396	413	448	429	432	468	428	465	402	430	430

Source: Connecticut State Department of Education.

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* The original enrollment data between 1984 an 1994 recorded special education/need students as un-graded students. Therefore, HCPC allocated these ungraded students to each grade in proportion to the graded enrolllments. Accordingly, the 1984-1994 data are approximations. In contrast, the 1995-2009 enrollment data which were obtained from the Connecticut State Department of Education (CSDE) already included the *graded* special education and special need students. Note also the data obtained from the CSDE are slightly different from the data obtained from the Newtown Public Schools. HCPC decided to use the CSDE data in order to be consistent with the nonpublic school enrollment data, which are also obtained from the CSDE.

TABLE 4.1B
HISTORY OF NEWTOWN PUBLIC SCHOOLS ENROLLMENT BY GRADE LEVEL
1984-2009 (AS OF OCTOBER 1)

As of Oct. 1	K-4	5-6	7-8	9-12	K-12	PK-12
1984	1,220	504	702	1,311	3,737	3,737
1985	1,287	492	588	1,333	3,700	3,700
1986	1,343	499	532	1,280	3,654	3,678
1987	1,327	508	483	1,190	3,508	3,536
1988	1,376	511	483	1,123	3,493	3,522
1989	1,400	522	495	977	3,394	3,415
1990	1,457	558	517	973	3,505	3,524
1991	1,432	576	555	949	3,512	3,533
1992	1,508	571	554	951	3,584	3,617
1993	1,578	609	587	1,019	3,793	3,818
1994	1,647	615	694	1,035	3,991	4,008
1995	1,695	590	601	1,085	3,971	3,983
1996	1,743	626	616	1,074	4,059	4,073
1997	1,810	678	628	1,125	4,241	4,259
1998	1,882	747	673	1,194	4,496	4,513
1999	1,927	801	721	1,244	4,693	4,716
2000	2,010	814	768	1,332	4,924	4,941
2001	2,006	806	816	1,364	4,992	5,018
2002	2,060	840	850	1,427	5,177	5,202
2003	2,090	876	854	1,560	5,380	5,403
2004	2,095	874	862	1,622	5,453	5,493
2005	2,108	915	896	1,684	5,603	5,645
2006	2,094	911	890	1,710	5,605	5,665
2007	2,031	886	930	1,713	5,560	5,620
2008	1,983	902	928	1,700	5,513	5,596
2009	1,912	861	896	1,727	5,396	5,482

4.4 Enrollment Cycles: Peaks and Troughs

A review of the number of births in both Connecticut and Newtown reveals that births cycles **exist**. Connecticut's birth cycle is a 15-year half cycle* from its 1976 trough (35,607 births) to its 1990 peak (50,098 births). On the other hand, Newtown has a 20-year birth half cycle from a 1981 trough (192 births) to 1997 peak (372 births). The number of births clearly produced distinct patterns of enrollments in most towns in Connecticut. However, due to annual variations of the net in-migration of school age children into Newtown, the enrollment cycle may not be the same among the various grade levels. However, as shown in Table 4.2, all grade levels in Newtown have regular 20 to 21 year cycles.

_____
* A cycle or full cycle refers to a time period between one peak and the next peak, or a trough and the next trough. Thus, a half cycle refers to either a trough to a peak or a peak to a trough.

TABLE 4.2
ENROLLMENT CYCLES
NEWTOWN PUBLIC SCHOOLS, CONNECTICUT 1970-2009

Grade Level	Year of Trough	Trough Enrollment	Year of Peak	Peak Enrollment	Duration of Half Cycles
Births	1977	192	1997	372	20 year half cycle from trough to peak
K-4	1984	1,220	2005	2,108	21-year half cycle from trough to peak
5-6	1985	492	2005	915	20-year half cycle from trough to peak
7-8	1987	483	2007	930	20-year half cycle from trough to peak
9-12	1991	949	2012*	1,730**	20-year half cycle from trough to peak

Source: HCPC, Inc. See Table 5.8.   * Assuming a 20-year cycle following the pattern of lower grade level cycles. **This is the 2009 enrollment number. The projected peak enrollment can be found in Section 6 of this report. If 192 births in 2009 turn out to be the lowest births, Newtown has a trough-to-trough full birth cycle of 33 years.

As noted in Table 4.2 and illustrated in Figure 4-2, the peaks and valleys in the enrollments of different grade levels fall on different years because the pattern of the upper grades must inherently follow that of the lower grades. Therefore, there are time lags between grade level peaks and troughs. As shown in Table 4-1B (troughs are underlined and peaks are framed), there is a one-year lag between K-4 and grades 5-6 enrollment troughs but a lag of two years between Grades 5-6 and 7-8. On the other hand, the high school enrollment trough was recorded in 1991, four years after the middle school enrollment trough in 1987. The K-4 and grades 5-6 enrollment peaks occurred in 2005, and the peak for grades 7-8 occurred in 2007. Although Table 4.1 shows that the grades 9-12 enrollment was the highest in 2009, one cannot be sure that this is the peak enrollment for the high school because the high school enrollment may grow even further within the next few years following the pattern of 20-year half cycles of intermediate and middle school enrollments. However, it may well be that the Great Recession of the last three years might hasten the attainment of peak enrollment much earlier than expected.

FIG. 4-2
26-YEAR TRENDS OF GRADES K-4, 5-6, 7-8, AND 9-12 ENROLLMENTS
NEWTOWN PUBLIC SCHOOLS, 1984-2009
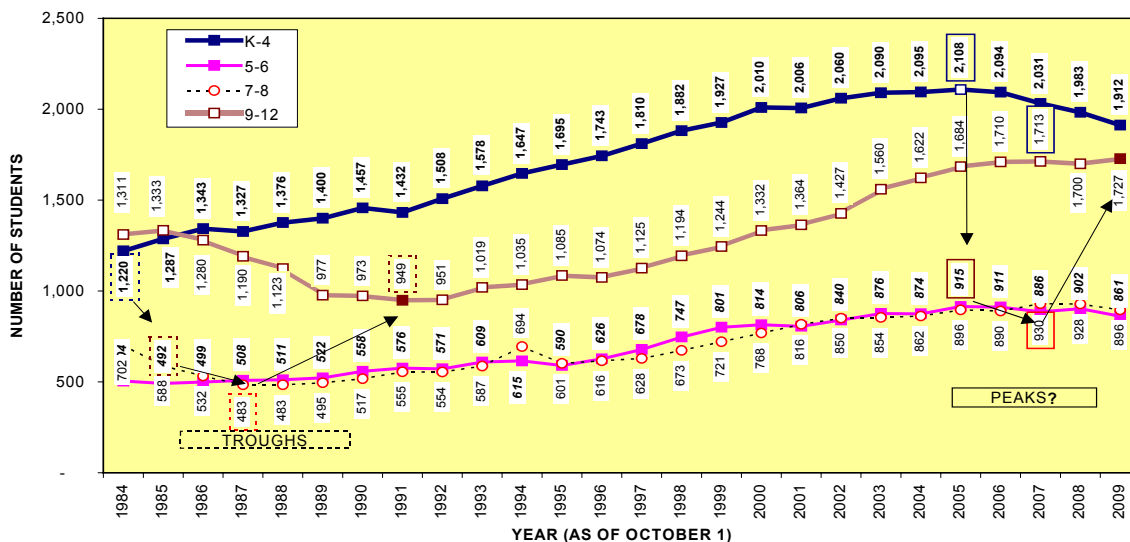
4.5 Grades K-4 Enrollment

There were 1,220 K-4 students in 1984 which grew to 2,108 students in 2005, increasing by 1,012 students (+83%) in 21 years, or an annual average rate of 48 students per year. But the K-4 enrollment reversed this trend and started to decline beginning **in** 2006 and reach**ing** 1,912 students in 2009, a decline of 196 students in four years, or -49 students per year. The recent decline of elementary school enrollments was a reflection of the decreasing number of births since the 1997 birth peak in Newtown because of a shrinking number of childbearing-age women as well as declining fertility rates caused by then recessionary economic conditions. The question is: will K-4 enrollments continue to decline, remain stable, or even increase over the next ten years?

The growth/decline pattern of K-4 enrollments during the past 21 years (1988-2009) is well captured by the following regression equation:

[4.3] $K4(T) = 1.9804 \, K(-1) + 1.5165 \, K(-2) + 0.8714 \, K(-3) + 1.1353 \, K(-4)$ [1988-2009]

             (5.99)   (3.74)   (2.20)   (3.20)

$R^2 = 0.977$ SEE = 39.08   D.W. = 1.80   MVD = 1811.09

where the dependent variable K4(T) represents the grades K-4 enrollments in the year T and independent variables K(-1), K(-2), K(-3) and K(-4) are the K enrollments in one, two, three and four years prior to T, respectively. From this equation, note that the growth pattern of Newtown's elementary school enrollments is positively affected by the number of K enrollments in the four prior years. The equation indicates that 97.7% (R^2=0.977) of the variations in K-4 enrollments can be explained by the independent variables included in the equation. The SEE (Standard Error of Estimates) of the regression shows that 95% of the time, annual variations in grades K-4 enrollment fall within a range of $\pm$ 78 students (39.08 x 2 = 78.16 or 2 SEE's) from the expected mean of grade K-5 enrollments. The SEE also implies that on average the margin of error is within $\pm$4.3% (78.16 ÷ 1811.09) at the 95% confidence level. In sum, Equation 4.3 is a reasonably accurate model that describes K-4 enrollment growth over the past 21 years between 1988 and 2009.

From this equation, it is clear that the continued decline of births will reduce kindergarten enrollments and thus K-4 enrollments in Newtown's public elementary schools.

4.6 Grades 5-6 Enrollment

As shown in Figure 4-2, intermediate school or grades 5-6 enrollment increased from 492 students in 1985 to 915 students in 2005, a gain of 423 students in 20 years, or an addition of on average 21.2 students per year. Middle school enrollments then decreased to 861 students in 2009, losing 54 students in four years at the rate of on average 13.5 students per year. Clearly the rate of decline has been slower than the growth rate previously experienced until 2005.

Equation 4.4 below describes grades 5-6 enrollment trends over the past eleven years, between 1995 and 2009:

[4.4]   G56(T) = 1.1225 K(-5) + 0.6274 K(-6) + 0.8512 K(-8) – 16.6515 UNT(T)   [1995-2009]

$$\qquad\qquad\quad \textbf{(5.52)}\qquad\textbf{(2.69)}\qquad\quad\textbf{(3.63)}\qquad\quad\textbf{(-3.90)}$$

$$\textbf{R}^2 \textbf{ = 0.969}\qquad\textbf{SEE =21.91}\qquad\textbf{D.W. = 1.05}\qquad\textbf{MDV =} \text{ 773.44}$$

According to the multiple regression equation 4.4 shown above, the intermediate school enrollment (grades 5 & 6) in a given year T was positively related to K(-5), K(-6) and K(-8), the kindergarten enrollments five, six and eight years prior to the year T, but negatively affected by UNT(T), the Newtown resident unemployment rate in the year T.

The variables included in the equation explained 96.9% of all variations in the intermediate school enrollment (R^2 = 0.969) between 1995 and 2009. The SEE also implies that on average the margin of error is within $\pm$6.4% (21.91 X 2 $\div$ 773.44) at the 95% confidence level. In sum, Equation 4.4 is a moderately accurate model to describe intermediate school enrollment growth over the past 14 years between 1995 and 2009.

4.7 Grades 7-8 Enrollment

Newtown's grades 7-8 enrollments increased from 483 students (the lowest enrollments) in 1987 to 930 students in 2007, adding 447 students or more than doubling in 20 years. Note the middle school enrollments peaked in 2007, two years after grades K-4 and 5-6 peaked in 2005, then declined to 896 students in 2009. It is likely that grades 7-8 enrollments will decline further in more or less the pattern of grades 5-6 enrollments. The past growth pattern is also captured by a regression equation shown below**:**

[4.5]   G78(T) = 1.3830 K(-7) + 1.2472K(-8) – 11.1658 UNT(T)   [1995-2009]

$$\qquad\qquad\qquad\textbf{(5.41)}\qquad\quad\textbf{(5.03)}\qquad\quad\textbf{(-2.21)}$$

$$\textbf{R}^2 \textbf{ = 0.951}\qquad\textbf{SEE = 26.27}\quad\textbf{D.W. = 1.52}\qquad\textbf{MVD = 795.27}$$

Equation 4.5 also shows that the grades 7 and 8 enrollments in the middle school are positively affected by K(-7) and K(-8), the K enrollments of seven and eight years prior to the year T**,** but that they are negatively impacted by UNT(T), the Newtown resident unemployment rate of the current year T during the past 14 years between 1995 and 2009. Note that the grade 7-8 enrollments are very sensitive to the variable UNT so that a 1% increase (or decrease) in Newtown resident unemployment had reduced (or increased) as many as 11.2 students in the Newtown Middle School. These three variables explained 95.1% of the variations in the middle school enrollments, and indicated that $\pm$6.6% of annual enrollments were outside of two standard deviations from the regression line.

4.8 Grades 9-12 Enrollments

With four grades in a high school, grades 9-12 enrollments are equal to roughly the combined enrollments of intermediate and middles schools. The high school enrollments were the last to reach its lowest level or trough with 949 students in 1991, seven years after the K-4's trough and four years after the grades 7-8's trough in 1987. Henceforth, high school enrollments steadily expanded reaching 1,727 students in 2009, an increase of 778 students or 82% in 18 years, adding on average nearly 43 students per year (or 10.7 students per grade per year). This average growth rate is almost similar to the 9.6 K-4 students per grade per year, the 10.6 grades 5-6 students per grade per year, and the 10.6 grades 7-8 students per grade per year. It is not clear at this time whether high school enrollments have already reached their peak in 2009 or whether a few more years will be needed to reach the peak. But K-4, 5-6 and 7-8 enrollments have shown that they reached their respective peaks 20 ~ 21 years after their respective troughs. Therefore, it is likely that the high school enrollments will also reach their peak sooner or later, if not already in 2009. But we will wait until the projections are made in later sections.

The past growth patterns of the Newtown High School enrollments are depicted by the following regression equation:

[4.6] $G912(T) = 0.5673\ G78(-1) + 0.2268\ HSALE(T) + 43.4366\ T - 22.3487\ UNT(-5)$ [1995-2009]
                    (2.65)   (3.17)   (6.41)   (-2.88)
          $R^2 = 0.981$ SEE = 34.01   D.W. = 1.35   MVD = 1437.40

The high school enrollments, G912(T), in the current year T is positively influenced by the variables G78(-1), grades 7-8 enrollment of a year prior to T; HSALE(T), the number of home sales in the year T; and the time variable T (1970 is set to be 0 and 1971=1), but they are negatively impacted by UNT(-5), the Newtown resident unemployment rate five years prior to T. The high school enrollments are very sensitive to the unemployment rates: the equation shows that a one percent increase (or decrease) of Newtown's unemployment rate will reduce (or increase) high school enrollments by 22.3 students. The equation also states that on average the sale of five homes yielded one high school student in Newtown in the past. With the given SEE value, the margin of error is calculated to be +/- 4.7% at a 95 confidence level.

4.9 Grades K-12 Enrollments

K-12 enrollments grew from a low level of 3,394 students in 1989 to 5,605 students in 2006, a gain of 2,211 students in 16 years, or an addition of 132 students per year, that is, on average 10 students per grade per year. However, after reaching their enrollment peak in 2006, K-12 enrollments dropped to 5,396 students in 2009, a loss of 209 students in three years at the

average rate of nearly -69 students per year. It is clear that in spite of dire economic conditions in recent years, K-12 enrollments registered a decline less than one half the growth rate registered prior to 2006. The K-12 enrollment growth and decline since 1995 is depicted by a regression equation shown below:

[4.5]   K12(T) = 2.7748 BNT(T) +1.5749 NETG(-9) + 1.1120 HSALE(T) - 44.2187 UCT(T) + 167.4212 T   [1998-2009]

$$\qquad (6.30) \qquad\qquad (3.67) \qquad\qquad (4.06) \qquad\qquad (-2.83) \qquad (30.63)$$

$$R^2 = 0.982 \quad SEE = 77.56 \qquad D.W. = 1.72 \qquad MDV = 5073.67$$

Equation 4.5 shown above indicates that K12(T), the K-12 enrollments in Newtown, is positively affected by three independent variables, NETG(-9), the annual housing gain nine years prior to T; HSALE(T), the home sales in year T; and the time variable T. At the same time, enrollments are negatively impacted by the UCT(T), the unemployment rate of Connecticut in year T. According to this equation, every housing net gain yielded on average 1.57 K-12 students in Newtown public schools, and every home sale produced 1.11 students. On average, every year K-12 enrollments increased by 167 students but the enrollment declined by 44 students per one percent of Connecticut's unemployment rate. The R bar squared statistics indicate that 98.2% of K-12 enrollment change in the previous decade could be explained by four variables included in the equation. SEE is 77.56 students, implying that on average the margin of error is within +3.1% at the 95% confidence level. In short, equation 4-5 is a very accurate model for the past K-12 enrollment trend.

4.10 Trends of Cohort-Survival Ratios

Practically all school districts use the Cohort-Survival Method (CSM) for making enrollment projections. This method traces annual changes in cohort-survival or retention ratios, which are derived by dividing the lower grade enrollment of a year ago into the current grade enrollment. The advantages of CSM are that it is simple to use and easy to understand. Over the years, the method has shown itself capable of producing fairly accurate projections as long as it can initially project the size of kindergarten classes accurately, and as long as the retention ratios are stable. However, CSM is limited because it relies on one variable to project enrollments, either births five years prior for projecting K enrollments or the previous year's enrollment for projecting enrollments for the ensuing grades 1 through 12, and the method assumes that retention ratios remain *constant* as shown by the equation below:*

[4.6]   G(T) = f G(-1)

[4.7]   G(T) = a + b G(-1)   where a=0 or G(T) = b G(-1)

_____

* Similarly, the kindergarten enrollments are projected by:

[4.8]   K(T) = f B(-5)

[4.9]   K(T) = a + b B(-5)   where a=0 or K(T) = b B(-5)

Where K(T) = kindergarten enrollments in the current year T; B(-5) = the number of births five years ago; a = constant; and b = coefficient of variable B(-5).

Equation 4.6 says that G(T), grade enrollment in current year T, is a function of G(-1), its enrollment in the previous year. When Equation 3.1 is expressed in a linear form, it is expressed as Equation 4.7 where b is the coefficient of independent variable G(-1). In short, CSM is a *pseudo* Simple (one variable) linear regression method where the independent variable coefficient b = the survival ratio, and a = 0. It is *similar* to a simple regression, but its coefficients are slightly different from the coefficient derived by the statistical method. Besides, CSM does not yield probability statistics whereas the simple regression offers probability statistics. The coefficient b is usually estimated by 3- or 5-year average survival ratios. Thus, CSM produces reasonably accurate projections for the short-term (5-years or less) but not for the long-term (5 or more years) unless the stability of survival ratios is well documented.

Table 4.2 on page 4-12 compares the 3-, 5-, and 10-year average survival ratios for Newtown as well as the b coefficient estimated by the Simple Regression Method. For each b, the R^2 is also shown. In addition, the maximum and minimum survival ratios experienced since 1999 are included. From this table and Figure 4-3 below, observe the following:

1) The 10-year average survival ratios for the eight grades are greater than the 3-year average survival ratios except for grades 1 and 12 , which show lower 10-year average survival ratios than the weighted 3-year ratios. Thus, the application of 10-year survival ratios yields high enrollment projections while the application of weighted 3-year ratios produces low enrollment projections. Weighted 3-year average survival ratios are much lower than the 10-year average ratios due to the fact that enrollments for each grade have been declining compared to previous years' enrollments in recent years, especially the last two years.

FIG. 4-3
W3-,W5-, AND 10-YEAR INTER-GRADE SURVIVAL RATIOS
NEWTOWN PUBLIC SCHOOLS, 2000-2009
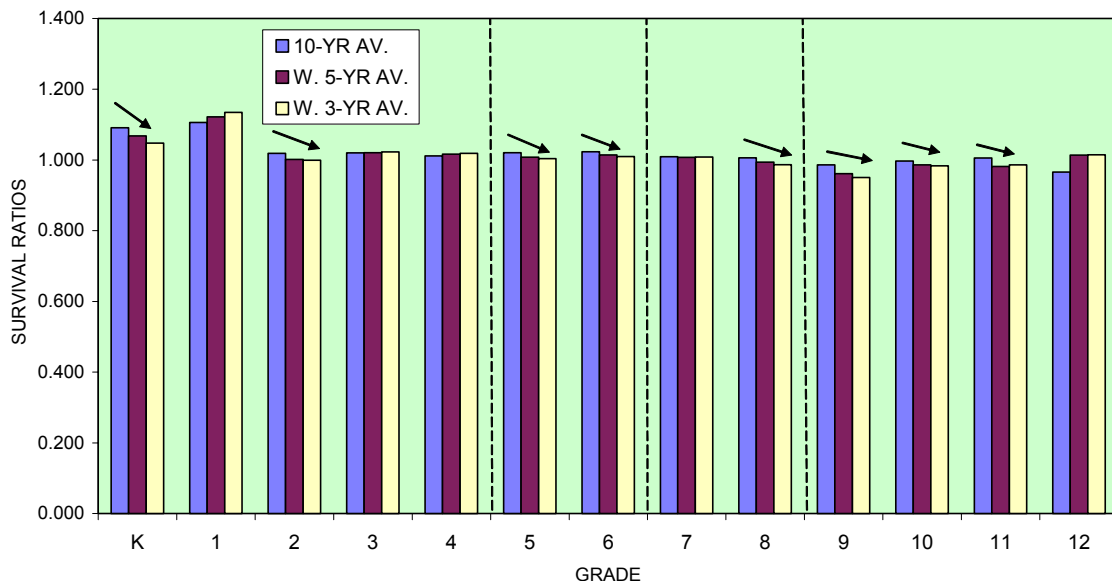
2) In general, the differences between the weighted 3- and 10-year average cohort survival ratios are not large with the weighted 5-year survival ratios occupying more or less the midpoints of the weighted 3- and 10-year survival ratios. Accordingly, the application of weighted 5-year average survival ratios yields more or less middle enrollment projections.

3) <u>Stability or Variability Index of Survival Ratios</u>: As noted earlier, the stability assumption of the b coefficient (the survival ratio) is crucial for being able to apply the constant survival ratios derived from past trends to project numbers for the next ten years. We have chosen the max-min range* (see Table 4.2) to assess the variability of survival ratios during the past 10 years. A broad max-min range indicates that survival ratios varied considerably from year to year, and a narrow max-min range indicates that survival ratios did not change much from year to year. Thus, a large max-min range indicates less stability than does a small max-min range. From Table 4.2 and also from Figure 4.4, it is clear that the max-min ranges by grade are the largest for Kindergarten followed by grades 12, 11, 1 and 7 in that order, indicating the difficulty of accurately forecasting these grade enrollments, especially the K enrollments.

FIG. 4-4
MINI-MAX RANGE OF INTER-GRADE SURVIVAL RATIOS
NEWTOWN PUBLIC SCHOOLS, 2000-2009
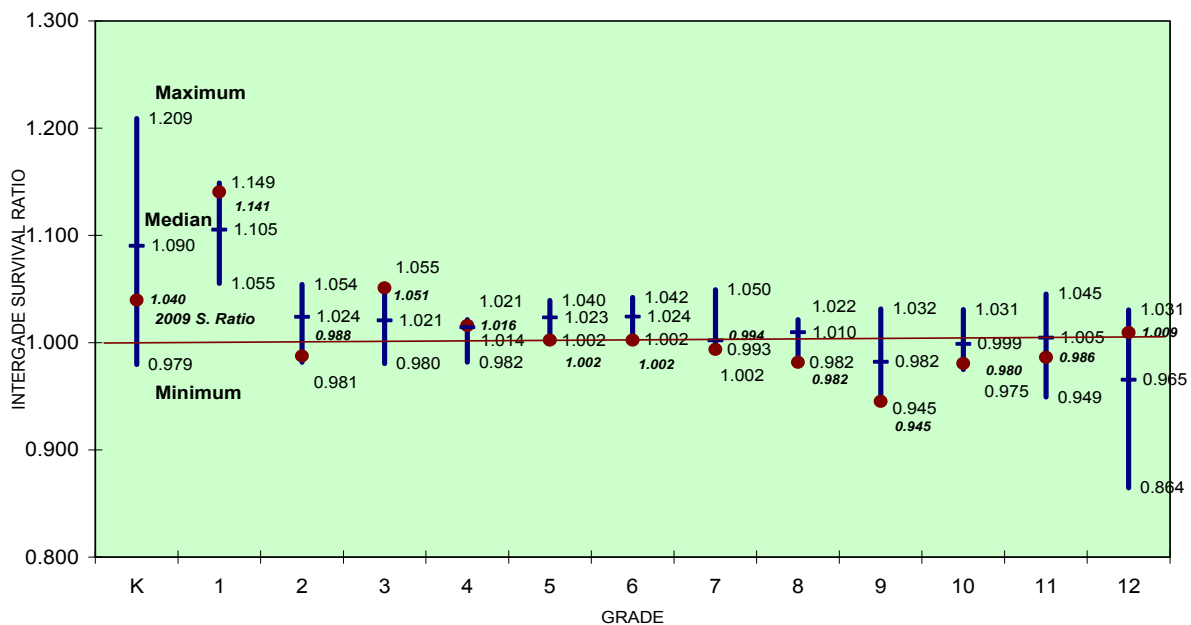
_____
* A better index for assessing the stability of survival ratios is the *standard deviation* of b. The standard deviation measures the extent of spread or dispersion of the b coefficient in various years from its mean. Thus, when survival ratios are very different from each other, the standard deviation is large, and when survival ratios are more or less the same, the standard deviation is small. In short, a large standard deviation signals that survival ratios are not stable (they are highly variable from year to year), while a small standard deviation indicates that survival ratios are temporally stable (do not change too much from year to year).

Table 4.2
GRADES K-12 COHORT-SURVIVAL RATIOS
NEWTOWN PUBLIC SCHOOLS, 2000-2009

BIRTH YEAR	SCHOOL YEAR	K	1	2	3	4	5	6	7	8	9	10	11	12
2005	2000	1.155	1.091	1.054	1.018	1.020	1.031	1.030	1.000	1.003	1.032	1.003	1.045	0.930
2006	2001	1.028	1.093	0.992	1.023	1.013	1.005	1.020	0.998	1.010	1.008	1.000	1.024	0.898
2007	2002	1.045	1.130	1.051	1.047	0.982	1.040	1.042	1.050	1.022	0.980	1.005	1.014	0.864
2008	2003	1.127	1.118	1.041	1.022	1.018	1.037	1.024	1.010	1.017	0.998	0.997	1.032	0.973
2009	2004	1.120	1.055	1.026	0.980	1.006	1.025	1.027	1.009	1.009	0.972	1.002	1.041	0.951
2010	2005	1.149	1.122	1.022	1.055	1.013	1.032	1.031	0.993	1.016	1.028	1.031	0.995	0.958
2011	2006	1.061	1.073	0.981	1.019	1.002	1.022	1.025	1.000	1.013	0.984	0.975	0.949	1.031
2012	2007	1.209	1.089	1.035	0.988	1.021	1.002	1.019	1.004	1.002	0.963	0.991	0.981	1.022
2013	2008	0.979	1.149	1.000	0.998	1.021	1.007	1.015	1.033	0.986	0.951	0.984	0.988	1.019
2014	2009	1.040	1.141	0.988	1.051	1.016	1.002	1.002	0.994	0.982	0.945	0.980	0.986	1.009
3-YR AV.		1.076	1.126	1.008	1.012	1.020	1.004	1.012	1.010	0.990	0.953	0.985	0.985	1.017
5-YR AV.		1.088	1.115	1.005	1.022	1.015	1.013	1.019	1.005	1.000	0.974	0.992	0.980	1.008
10-YR AV.		1.091	1.106	1.019	1.020	1.011	1.020	1.024	1.009	1.006	0.986	0.997	1.006	0.965
W. 3-YR AV.		1.048	1.135	1.000	1.023	1.019	1.004	1.009	1.009	0.987	0.950	0.983	0.986	1.015
W. 5-YR AV.		1.068	1.122	1.002	1.020	1.016	1.008	1.014	1.007	0.993	0.961	0.986	0.981	1.014
MIN.		0.979	1.055	0.981	0.980	0.982	1.002	1.002	0.993	0.982	0.945	0.975	0.949	0.864
MAX.		1.209	1.149	1.054	1.055	1.021	1.040	1.042	1.050	1.022	1.032	1.031	1.045	1.031
RANGE		0.230	0.094	0.073	0.074	0.040	0.037	0.040	0.056	0.040	0.086	0.056	0.096	0.166
MEDIAN		1.094	1.102	1.018	1.018	1.002	1.021	1.022	1.021	1.002	0.988	1.003	0.997	0.947
Regression Coeff. (2000-2009)		1.086	1.104	1.020	1.020	1.015	1.020	1.023	1.008	1.005	0.982	0.996	1.001	0.974
R BAR SQ		0.406	0.774	0.786	0.817	0.956	.0947	0.975	0.930	0.966	0.850	0.966	0.903	0.868
S.E.E.		27.2	11.12	11.09	10.70	5.26	6.36	4.46	7.67	5.89	12.58	6.68	12.01	20.78
MDV		361.1	405.9	417.8	425.8	428.3	430.4	438.1	438.1	430.9	416.3	401.4	393.2	373.0
Avg. Projection Deviations		±15.1%	±5.5%	±5.3%	±5.0%	±2.5%	±3.0%	±2.0%	±3.5%	±2.7%	±6.0%	±3.3%	±6.1%	±11.1%

Source: H. C. Planning Consultants, Inc.

4) The R^2 statistics of the Simple Regression Method show *very lo*w values for K (0.406) and also low values for grades 1 and 2. These small R square statistics coupled with relatively large SEEs indicate that it is probable that the K enrollment projections are prone to yield large projection errors (+/- 15.1%). Although many other Connecticut school districts also exhibit small R square values with large SEEs for K enrollments, Newtown has especially small R squares and large SEEs, indicating the difficulty of projecting K enrollments from births five years prior. *

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* However, it is not unique to Newtown that K grade enrollments have smaller R^2 with a large SEE. In general, whenever school children have to enter a lowest grade in a new school such as grade K in an elementary school, grade 6 in a middle school, and 9th grade in a high school, the inter-grade survival ratios change because more students may choose to enroll in nonpublic schools or vice versa.

4.11 Conclusions

In this section, we reviewed growth trends in enrollments of Newtown public schools and more importantly, we have discovered the way various factors have contributed to the changes in enrollments of various grade levels. It was found that indeed the number of births, new home construction, and unemployment rates were good indicators of growth and decline in Newtown's school enrollments. Thus, we have laid the foundations for projecting enrollment into the future.

It was also found that the Cohort-Survival Method of enrollment projections is a valid method for *short-term* forecasts as long as the inter-grade survival ratios are stable. Nonetheless, large variations in the survival ratios for grades K, 1, 9, 11 and 12 (see Fig. 4-4) tend to produce large projection errors, especially for long-term projections. Accordingly, in the next section, we will prepare the enrollment projections by three different methods to check the consistency of the projections.

5. ENROLLMENT PROJECTION ASSUMPTIONS

5.1 Introduction

In this section we discuss several assumptions that underlie a variety of K-12 enrollment projections to be presented in the next section. We could have presented only one set of assumptions if the future development/growth patterns of Newtown were reasonably certain. Unfortunately, that is not the case so that we need to present a range of possible scenarios, which represent optimistic, pessimistic, and moderate ways that the national, regional and local recessionary economies will recover.

5.2 Enrollment Projection Procedures and Assumptions

Figure 5-1 below describes the procedures for public school enrollment projections by a school district. In Step I, we establish underline area development assumptions in terms of unemployment rates, net housing gains, home sales, and percent of resident students in nonpublic schools. In Step II, we derive population growth assumptions on births and migration trends which are consistent with the Step I assumptions. In Step III, the assumed number of births and net migration of school-age population (expressed in terms of public school inter-grade survival ratios) are directly applied to the public school enrollments by grade in order to project first kindergarten enrollments and then subsequently the upper grade enrollments.

FIG. 5-1

PUBLIC SCHOOL ENROLMENT PROJECTION PROCEDURES AND ASSUMPTIONS
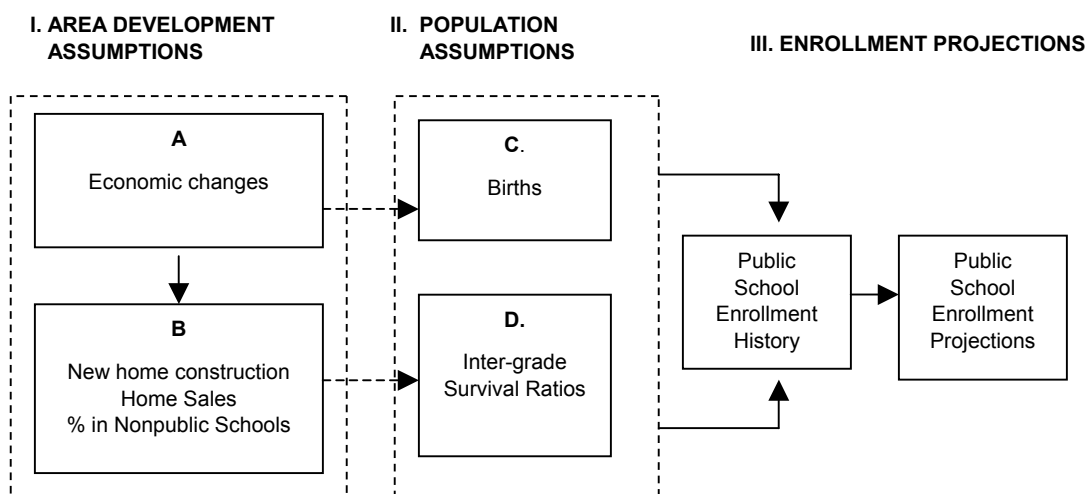
5.3 Alternate Sets of Assumptions

The word 'assumption' means that we are making the best guess as to the future. In addition, the word 'projection' implies that the past trends are extended or projected into the future to foresee future outcomes. There are two fundamental complications to following these procedures. First, when our assumptions are wrong**,** so are the projections. Second, since there are various pasts with different area development or growth patterns, enrollment projections are likely to differ depending on 'which' past we choose for enrollment projections.

In Sections 2 and 3 of this report, we studied the past trends of various factors that influence public school enrollments, and in Section 4, we analyzed Newtown's public elementary and middle school enrollment growth trends since 1988. Based on these studies, we have chosen five past trends**:** 3-year, 5-year, and 10-year, weighted 3-year and weighted 5-year trends. Relatively short past time spans are chosen because recent trends are considered more relevant to the near future. On the other hand, the 10-year trend may be more relevant to the projections for a longer time horizon.*

5.4 School District Development Assumptions

Table 5.1 delineates five sets of assumptions as to the future development patterns of Newtown in terms of employment rates, new housing, home sales**,** and percent of nonpublic school enrollments. These assumptions are derived by averaging each of the 3-, 5-, 10-, weighted 3- and weighted 5-year trends.

As of December 2009, the unemployment rate was 10.0% nationally, 8.9% in Connecticut**,** and 6.9% in Newtown. Although the national unemployment rate dropped to 9.7% in 2010, in this precarious economic environment, it is almost impossible to foresee unemployment rates for future years. Accordingly, for the purpose of school enrollment projections, we have chosen three scenarios described below:

- A low growth or pessimistic scenario in which the economy of Connecticut and Newtown would recover very slowly with relatively high unemployment rates persisting for many years. It is represented by 3- and weighted 3-year trends covering the years 2007, 2008, and 2009 in which the nation was thrust into a dire economic recession leading to high unemployment rates. The *average* unemployment rates for the weighted 3-year assumption were 5.0% for Newtown and 7.1% for Connecticut.

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*On the other hand, when we use multiple regression equations to project school enrollments, these equations are considered to produce the projection assumptions. For example, equation 4.3 shown on page 4-4 depicts the K-4 enrollment trend between 1998 and 2008, and we used this equation to project the K-4 enrollments in Section 6. In such a case, the equation itself constitutes a projection assumption.

- The high growth or optimistic scenario assumes that the recessionary economy of the Danbury-Bridgeport-Stamford Labor Market Area will revive quickly. The unemployment rates will be lowered within a year or two, and the very low unemployment rates which Newtown and Connecticut enjoyed in 2000 will return (i.e., 1.4% and 2.3%, respectively). This scenario is represented by the 10-year trend in which average unemployment rates were 3.4% for Newtown and 5.0% for Connecticut. This ten-year period covers 2000 to 2009: it started with the very low unemployment rate of 1.4% in 2000 in Newtown and 2.3% in Connecticut, but also includes the last three years of the Great Recession.

- The moderate growth scenario assumes the national and regional economy will recover from the recession within a few years and return to the unemployment rates which are more or less between the high and low growth scenarios. This scenario is represented by the weighted 5-year trend (covering a period from 2005 to 2009) in which the average unemployment rates were 4.4% for Newtown and 6.4% for Connecticut. This five-year assumption includes the low growth 3-year period but also uses two years of relatively low level of unemployment rates in 2006: 3.0% for Newtown and 3.6% for Connecticut.

TABLE 5.1
ASSUMPTIONS ON
THE FACTORS INFLUENCING NEWTOWN PUBLIC SCHOOL ENROLLMENTS

Year	Growth Scenario	Newtown Unemploy-ment Rate (1)	Connecticut Unemploymen t Rate (2)	Births (State Data) (3)	Housing Net Gain (4)	Home Sales (5)	% of K-8 in Nonpublic schools (6)
HISTORY:							
1999		1.9	3.2	344	203	670	9.9%
2000		1.4	2.3	346	**88**	528	9.6%
2001		2.5	3.4	349	157	493	9.7%
2002		3.2	4.4	278	186	614	9.5%
2003		3.7	5.5	337	149	541	9.7%
2004		3.5	4.9	276	133	554	9.9%
2005		3.6	4.9	275	84	481	9.6%
2006		3.0	4.9	238	31	363	10.3%
2007		3.2	4.6	239	31	382	**11.2%**
2008		4.1	5.7	201	9	271	11.6%
2009(est.)		6.2	8.9	192	4	237	11.4%
Averages:							
W. 3-yr.	**Low**	**5.0**	**7.1**	**203**	**10**	**273**	**11.4%**
3-yr. Avg.	Low	4.5	6.4	211	15	297	11.4%
W. 5-yr.	**Moderate**	**4.4**	**6.4**	**215**	**20**	**308**	**11.1%**
5-yr. Avg.	Moderate	4.0	5.8	229	32	347	10.8%
10-yr. Avg.	**High**	**3.4**	**5.0**	**273**	**87**	**446**	**10.2%**

Sources: Col. (1) and (2) - Connecticut Department of Labor. Column (3) - Connecticut Department of Public Health; Col. (4) - Connecticut Department of Economic and Community Development; Col. (5) **-** Warren Information Service; Col. (6) **-**Connecticut State Department of Education**.**

Figure 5-1 on the next page illustrates the growth patterns of Newtown's annual housing net gains, home sales, births**,** and unemployment rates during the past ten years. It also shows the averages of the 3-, 5-, 10, weighted 3- and weighted 5-year trends as well as the 'middle' assumptions which are derived by averaging the w. 3-year (the lowest) and the 10-year (high) trends.

FIG. 5-1
ALTERNATE FUTURE GROWTH ASSUMPTIONS
NEWTOWN, CONNECTICUT
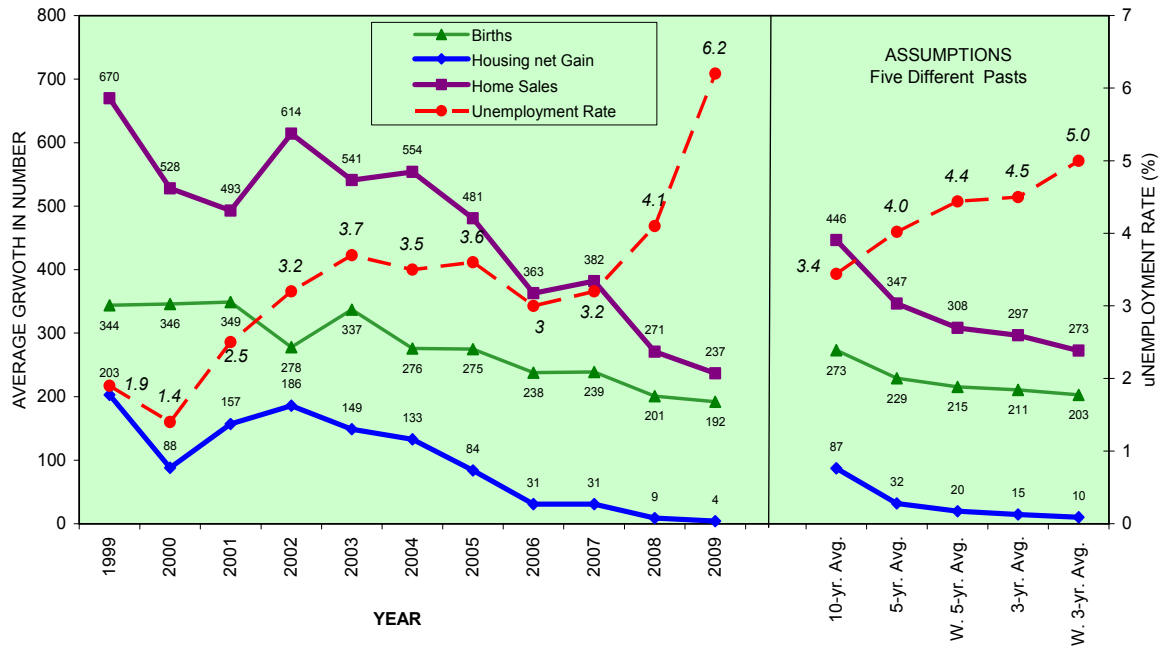
We can observe the following from Figure 5-1 shown above:

(a) Newtown's annual housing gains, home sales, and births trends were inversely correlated to the unemployment rates of Newtown's labor force. Thus, as the unemployment rates have risen in recent years (red broken line), the annual housing net gains, home sales, and births in Newtown all declined, except for the increasing percent of Newtown's resident K-12 students attending nonpublic schools (not shown in Figure 5-2 but so indicated in Table 5.1).

(b) The average unemployment rate for the weighted 3-year trend (5.0 %) was the highest while the 10-year trend produced the lowest average unemployment rates (3.4 %). The other trends were between these two high and low unemployment rates.

The weighted 3-year trend is a pessimistic scenario in which the recovery from the high unemployment is very slow, new home construction and home sales are stagnant, and inter-town population migration continues to be minimal. On the other hand, the 10-year trend is a relatively optimistic scenario in which the economy improves relatively fast and new home construction and home sales steadily improve.

5.5 Births Assumption and the Effects on Future Enrollment Projections

At the outset, it must be noted that the births over the next five years between 2010 and 2014 will affect only the grades K-4 enrollments projected over the second five years of the 10-year projection period **(**between 2014 and 2019**)**. That is, the projected births over the next five years will not affect the elementary (K-4) school enrollments over the next five years (2010 – 2014) nor will they affect grades 5-6, 7-8, and 9-12 enrollment projections over the next ten years (2010 - 2019). In other words, all of the K-12 students projected for the next ten years between 2010 and 2019 were already born as of 2009, except for the grade K-4 students projected for the years between 2015 and 2019. (See Appendix Table 5 on page 5-8**.)**

In addition to the area's development assumptions, we have to establish assumptions on the number of births over the next five years**,** between 2010 and 2014**,** in order to project kindergarten enrollments for the years 2015 through 2019. Table 5-2 shows the projected number of births applying various past trends including weighted 3-, weighted 5-, and 10-year average births trends adjusted by unemployment assumptions.

Table 5.2
PROJECTIONS OF BIRTHS IN NEWTOWN, 2010-2014
BASED ON PAST BIRTHS TRENDS

	Low Births (W. 3-Yr. Trend)	Middle Births (W. 5-Yr. Trend)	High Births (10-Yr. Trend)
2010	**197**	**205**	**213**
2011	**166**	**202**	**220**
2012	**168**	**204**	**224**
2013	**195**	**204**	**220**
2014	**205**	**207**	**238**

Observe that the weighted 3-year trend produced low births, the 10-year trend produced relatively high births, and the w. 5-year trend yielded birth levels between the high and low estimates. The differences among these projected births are moderate but the cumulative effects of these numbers from grades K through 4 would be considerable in enrollment projections. In light of the uncertainty surrounding the national and regional economic future, it is prudent to adopt the middle births (W. 5-year trend) for enrollment projection purposes.

The low and middle birth assumptions are consistent with the findings of our population projections which indicate that: the number of childbearing-age females aged 15 to 49 years old is projected to increase slightly between 2010 and 2015. *

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 * See page 2-6.

5.6 Assumptions on Inter-Grade Survival Ratios

Once the number of births is projected, we need applicable inter-grade survival ratios in order to convert the births into kindergarten enrollments and then subsequently into upper grade enrollments. The inter-grade survival ratios define in major part the net migration rates of school age children as they progress from the lower to upper grades.

Table 5.3 presents five sets of inter-grade survival ratios (also called progression or retention ratios). This is a reproduction of Table 4.2 but rearranged from low to high survival ratios. In order to calculate the K enrollment of a given year, B:K (B to K) ratios are multiplied to the adjusted number of births from five years prior. (This is fully discussed in Section 6). Once the kindergarten enrollments are forecast, we convert K enrollments into the 1st grade enrollments, followed by 2nd grade, 3rd grade and so forth up to the 8th grade by applying the corresponding inter-grade ratios.

Table 5.3
LOW AND HIGH INTER-GRADE SURVIVAL RATIOS
NEWTOWN PUBLIC SCOOLS, 2000 – 2009

Public School Inter-Grade Survival Ratios*

Trends	B:K	K:1	1:2	2:3	3:4	4:5	5:6	6:7	7:8	8:9	9:10	10:11	11:12
W. 3-YR AV. (Low)	**1.048**	**1.135**	**1.000**	**1.023**	**1.019**	**1.004**	**1.009**	**1.009**	**0.987**	**0.950**	**0.983**	**0.986**	**1.015**
3-YR AV.	1.076	1.126	1.008	1.012	1.020	1.004	1.012	1.010	0.990	0.953	0.985	0.985	1.017
W. 5-YR AV. (Mod)	**1.068**	**1.122**	**1.002**	**1.020**	**1.016**	**1.008**	**1.014**	**1.007**	**0.993**	**0.961**	**0.986**	**0.981**	**1.014**
5-YR AV.	1.088	1.115	1.005	1.022	1.015	1.013	1.019	1.005	1.000	0.974	0.992	0.980	1.008
10-YR AV. (High)	**1.091**	**1.106**	**1.019**	**1.020**	**1.011**	**1.020**	**1.024**	**1.009**	**1.006**	**0.986**	**0.997**	**1.006**	**0.965**

* Excludes nonpublic school enrollments.

FIG. 5-2
W3-,W5-, AND 10-YEAR INTER-GRADE SURVIVAL RATIOS
NEWTOWN PUBLIC SCHOOLS, 2000-2009
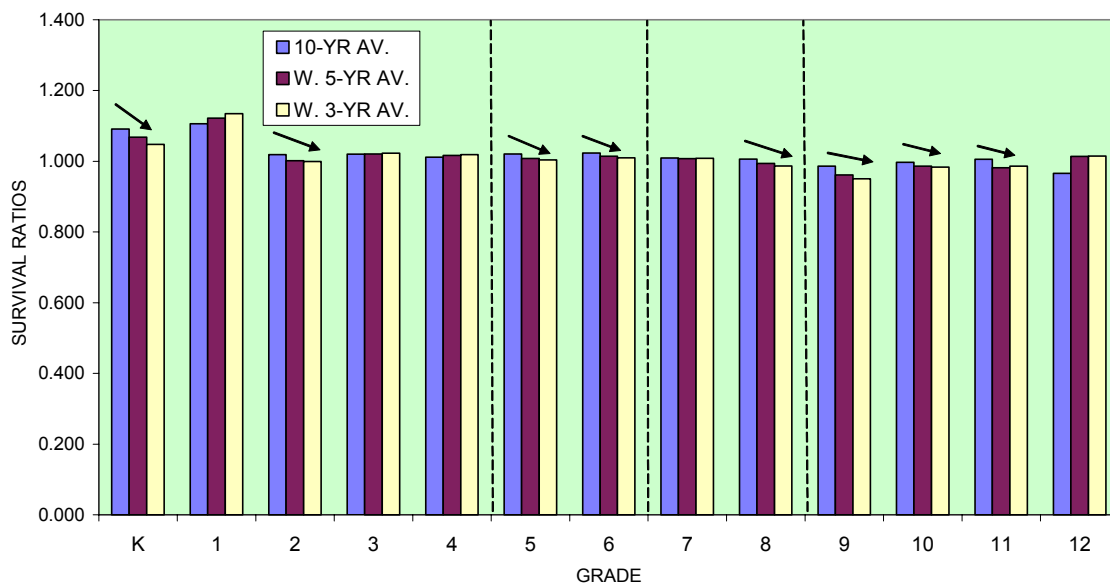
Figure 5-2 also illustrates that the inter-grade ratios for the W. 3-year trends are lower than those for the 10-year trends for eight out of 13 grades (K though 12). In contrast, the 1st and 9th grades show clearly the reverse trends while grades 3, 4 and 7 are almost even. Accordingly, the application of W. 3-year trend ratios is expected to produce low enrollment projections while the 10-year coefficients will result in high enrollment projections. Although inter-grade survival ratios are different among W. 3-, W-5 and 10-year trend averages, the effects on the enrollment projections are quite minimal because alternating large or small survival ratios from one grade to the other cancel each other out. For example, grade K survival ratios shows 10-year ratios that are larger than the W. 3-year ratios, but the first grade ratios are reversed, exhibiting a higher W. 3-year trend ratio over the 10 year ratio; although grade 2 shows that 10-year ratios are greater than W. 3-year ratios, grades 3 and 4 exhibit the reverse trend; and although grades 9, 10, and 11 show that 10-year ratios are greater than W. 3-year ratios, grade 12 shows the opposite trend.

5.7 Policy Assumptions

In addition, we assumed there would be no significant changes in education policies over the next ten years. That is, the Newtown public schools will continue to operate *half-day* kindergarten programs and there will be no significant changes in the K retention policy, pre-K enrollment programs, or charter/magnet schools. We also assume that there will be no closing of existing private/parochial schools or opening of new ones. It is also assumed that there will be no change in the school capacities. Another assumption is that the Town of Newtown will maintain its current land use policies, instituting no significant changes in zoning and subdivision regulations.

Finally, it is assumed that there will be no significant economic development in Newtown (e.g., Fairfield Hills) and in the commuting area, which will generate employment and attract residential development to Newtown.

5.8 Summary

All projections are based on the underlying assumptions discussed in this report, and these assumptions determine projection results to a large extent. Various alternative projections are presented in this report. These alternatives reveal the level of uncertainty involved in making projections, and they also exhibit the sensitivity of projections to the assumptions on which they are based. It is important that users of projections understand these assumptions to choose the best set of projections for their purposes from the many projections presented in this report.

APPENDIX TABLE 5-A
TABLE OF BIRTH-YEAR COHORTS

BIRTH YEAR	NEWTOWN BIRTHS	SCHOOL YEAR	K	1	2	3	4	5	6	7	8	9	10	11	12
1991	258	1996	1991	1990	1989	1988	1987	1986	1985	1984	1983	1982	1981	1980	1979
1992	245	1997	1992	1991	1990	1989	1988	1987	1986	1985	1984	1983	1982	1981	1980
1993	299	1998	1993	1992	1991	1990	1989	1988	1987	1986	1985	1984	1983	1982	1981
1994	284	1999	1994	1993	1992	1991	1990	1989	1988	1987	1986	1985	1984	1983	1982
1995	350	2000	1995	1994	1993	1992	1991	1990	1989	1988	1987	1986	1985	1984	1983
1996	332	2001	1996	1995	1994	1993	1992	1991	1990	1989	1988	1987	1986	1985	1984
1997	372	2002	1997	1996	1995	1994	1993	1992	1991	1990	1989	1988	1987	1986	1985
1998	335	2003	1998	1997	1996	1995	1994	1993	1992	1991	1990	1989	1988	1987	1986
1999	344	2004	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990	1989	1988	1987
2000	346	2005	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990	1989	1988
2001	349	2006	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990	1989
2002	278	2007	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
2003	337	2008	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991
2004	276	2009	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992
2005	275	2010	**2005**	2004	2003	2002	2001	**2000**	1999	**1998**	1997	**1996**	1995	1994	1993
2006	238	2011	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994
2007	239	2012	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995
2008	201	2013	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996
2009	192	2014	**2009**	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997
2010	205	2015	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998
2011	202	2016	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999
2012	204	2017	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
2013	204	2018	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001
2014	207	2019	2014	2013	2012	2011	2010	**2009**	2008	**2007**	2006	**2005**	2004	2003	2002
2015		2020		2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003
2016		2021			2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004
2017		2022				2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
2018		2023					2014	2013	2012	2011	2010	2009	2008	2007	2006

6. 10-YEAR ENROLLMENT PROJECTIONS NEWTOWN PUBLIC SCHOOLS

6.1 Newtown Public School Enrollment Projections

In this section, we finally present the 10-year enrollment projections for the Newtown public schools. Three methods were used in forecasting K-12 enrollments: (1) the Share Ratio Method; (2) the Cohort Survival Method; and (3) the Multiple-Regression Method.

Note that all projections are made as of October 1st for each school year. The cohort survival method and the share ratio method projections are made based on 3-, 5-, and 10-year trends of school enrollments by grade, whereas the multiple-regression method projections are made based on the enrollment trends of 10 or more years.

6.2 Importance of Kindergarten Enrollment

The enrollment projections for grades K through 12 are derived from forecasts of the size of entering kindergarten classes. In order to form an accurate forecast of kindergarten enrollments, information about the number of births that occurred five years ago is necessary. However, birth data alone are not sufficient because over a period of five years some of the preschool children born in Newtown will leave the town, and other preschool children born elsewhere will migrate into Newtown. The size of the net migration varies each year and is dependent on economic conditions in Newtown and in Connecticut. In addition, the number of children attending non-public kindergarten schools varies each year. Although projections of kindergarten enrollments are most important, they are also problematical to forecast as discussed in an earlier chapter.

6.3 Components of Kindergarten Enrollments

Annual kindergarten enrollment is a result of various components that make up K enrollment as shown below:

[6.1]   K enrollment = Adjusted births five years ago - kindergartners in nonpublic schools +

the number of kindergartners retained + the *net number* of preschool children

who moved in and out of a school district during the past five years

Table 6.1 below illustrates the components of annual kindergarten enrollments including the number of births five years ago, the number of kindergartners in nonpublic schools, and the

cumulative net in-migration of preschool and kindergarten-age children during the five years prior to their entry into kindergarten classes.

TABLE 6.1
COMPONENTS OF ANNUAL KINDERGARTEN ENROLLMENT
AS OF OCTOBER 1, 1999-2009
NEWTOWN PUBLIC SCHOOLS

School Year	Adj. Births 5 Years Ago* (1)	Non-Public K (2)	K Retention (3)	Estimated Net In-Migration (4)	Public K (5)	Annual K Enrollment Change (6)	Annual B -to-K Change (7)	K/B Ratio*** (8)
1999	293	55	2	113	353	-22	60	1.206
2000	345	61	2	112	398	45	53	1.155
2001	338	73	2	80	347	-51	9	1.028
2002	366	73	2	87	382	35	16	1.045
2003	338	79	2	120	381	-1	43	1.127
2004	344	80	2	119	385	4	41	1.120
2005	346	67	3	116	398	13	52	1.149
2006	340	78	3	96	361	-37	21	1.061
2007	289	95	2	153	349	-12	60	1.209
2008	327	88	2	79	320	-29	-7	0.979
2009	279	83	4	90	290	-30	11	1.040
2000-2009								
3-Yr. Average	298	89	3	108	320	-24	22	1.076
5-Yr. Average	316	82	3	107	344	-19	27	1.088
10-Yr. Average	331	78	2	105	361	-6	30	1.091
W. 3-Yr. Avg.	296	87	3	97	310	-27	13	1.048
W. 5-Yr. Avg.	**306**	**85**	**3**	**102**	**326**	**-24**	**20**	**1.068**
10-Yr. Maximum	279	61	2	79	290	-51	-7	0.979
10-Yr.Minimum	366	95	4	153	398	45	60	1.209
10-Yr, Range	87	34	2	74	108	96	67	0.230
Median	339	79	2	104	371	-7	31	1.090

*5% born six years ago, 83% born five years ago, and 12% four years ago ** Based on the data from the Newtown Public Schools.
K Enrollment (T) = Adjusted Births (T-5) – Nonpublic School K Enrollment + K pupils retained + Net Migration
*** These ratios may be off due to computer rounding. Actual calculations include numerical digits after the decimal point.

(a) <u>Adjustment to births 5 years prior</u> (Column 1); According to the data supplied by the Newtown Public Schools, on average 12% of kindergartners were four years old, 83% of kindergartners were five years old and 5% were six years old as of October 1st of each school year. Accordingly, when we forecast the kindergarten enrollments, we adjusted the number of births in accordance with these percentages.

(b) <u>Kindergartners in Nonpublic Schools</u> (Column 2): Kindergarten enrollment in each year is also affected by the number of kindergartners attending nonpublic schools. Figure 6-1 shows the number of kindergartners attending nonpublic schools since 1995. Observe that the *number* of kindergartners in nonpublic schools increased from 44 students (11.8%) in 1995 to 95 students (21.4%) in 2007, and then declined to 88 students in 2008 and 83 students in 2009 due to dire economic conditions at the time. Nonetheless the *percent* of students in nonpublic schools increased to 22.3% because the total K enrollments declined considerably. It is likely that a high

percent of Newtown kindergartners are attending nonpublic schools largely because Newtown does not offer a full-day kindergarten program.

FIG. 6-1
NEWTOWN RESIDENT KINDERGARTNERS ATTENDING
NONPUBLIC SCHOOLS, 1995-2009
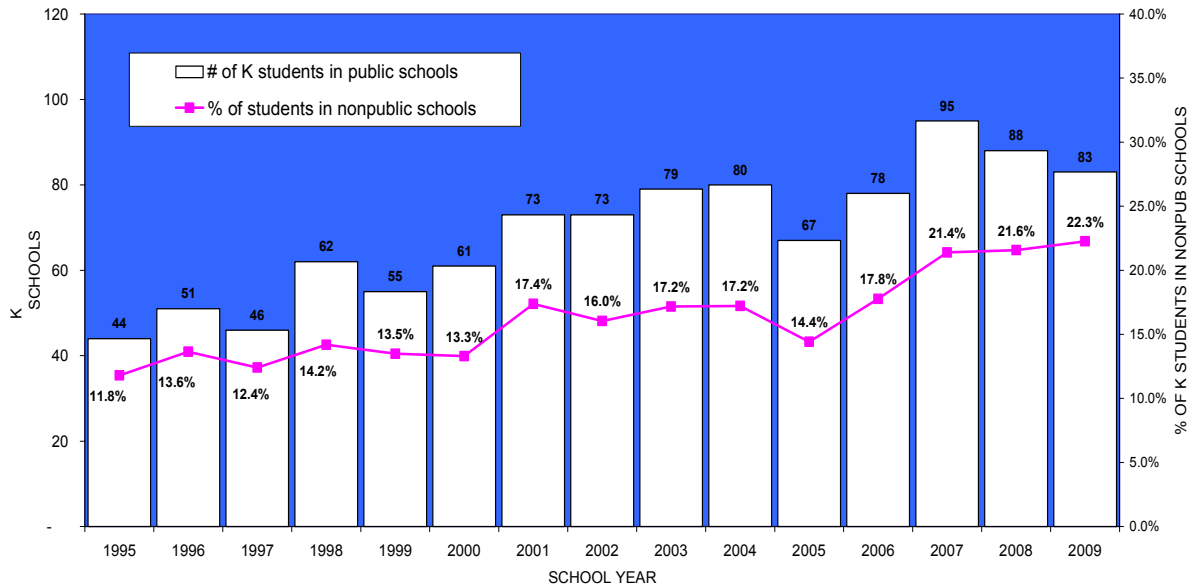
(c) <u>Net Migration of Preschool and Kindergarten-Age Children</u> (Colum**n** 4): Although the historical data for births and nonpublic school enrollments are available from various sources, there are no sources which supply the data on net migration of pre-K and kindergarten age children for each year. However, as shown in Table 6.1 (column 4), we can estimate the cumulative net in- or out-migration of pre-school children during the five years prior to their entry into kindergarten classes. Rearranging Equation 6.1, we can derive Formula 6.2:

[6.2]   Net Migration of K = Actual K enrollment - Adj. Births – K retention + Nonpublic K

During the past ten years between 2000 and 2009, there was always a net *in*-migration of kindergartners into Newtown in each school year. Nonetheless, as shown in Figure 6-2 below, the number that in-migrated (on net) severely fluctuated. There was a net in-migration of 113 K students who enrolled at Newtown public schools in 1999. But the net in-migration dropped to 80 students in 2001. Subsequently, the net in-migration of preschool children increased again from 80 students in 2001 to 153 students in 2007 and then dropped again to 79 students in 2008. Just as the number of births and net in-migration annually fluctuated a great deal, so did the number of annual K enrollments in Newtown. Accordingly, the ratio between the number of births and the kindergarten enrollments of a given year, or K/B ratios, also fluctuated (column 7). Note in Figure

6-2 that the K/B ratios increased from a low of 1.028 in 2001 to a high of 1.209 in 2007. But the ratio sharply dropped to 0.979 in the following year 2008 due to high unemployment rate.

FIG. 6-2
ESTIMATED NET IN-MIGRATION OF PRESCHOOL CHILDREN PRIOR
TO ENTERING INTO NEWTOWN PUBLIC SCHOOLS
AND K/B RATIOS
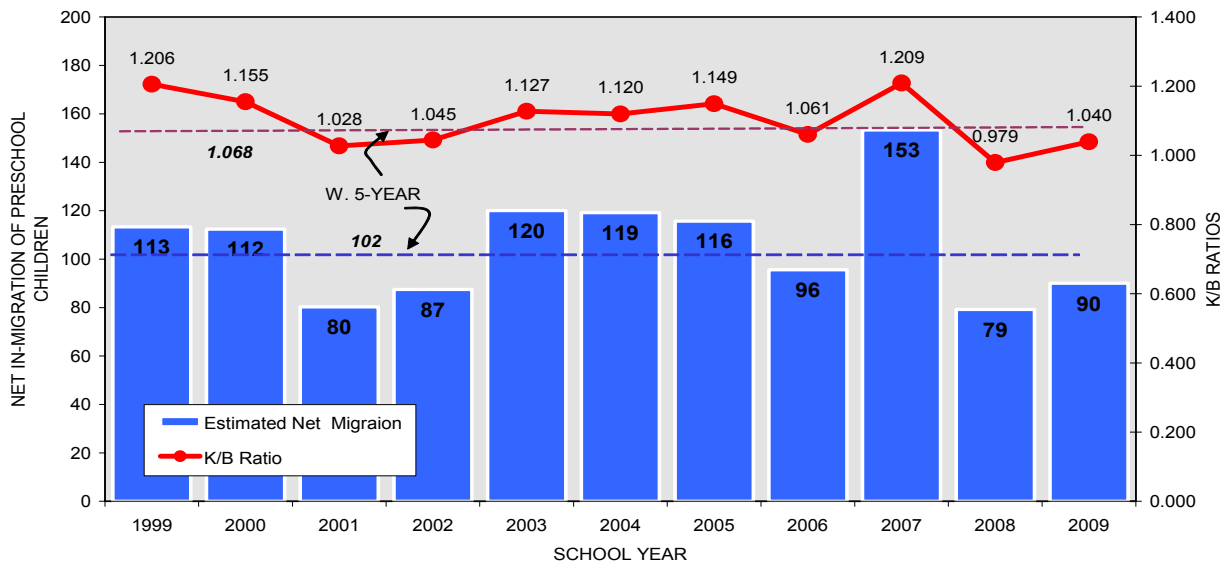
Clearly, the net in-migration of kindergartners into Newtown is an important factor influencing the size of kindergarten enrollments in Newtown. What then causes the movement of preschool children into Newtown and thus affects the K/B ratios? According to Equation 6.3, the K/B ratio in a given year T is positively correlated to HSALE(T), the number of home sales in the year T. The t-ratio (5.98) indicates a statistically significant relationship between K/B ratios and HSALE. The trend of K/B ratios between 2001 and 2007 gradually increased when home sales were on the rise but when home sales in Newtown dwindled during the past two years, so did the K/B ratios. If the weak economy persists, then home sales will suffer as will the K/B ratios. In contrast, if we assume the economy recovers soon, home sales will also surge, as will also the K/B ratios so that there will be more net in-migration of kindergarteners into Newtown. For projection purposes, a constant 1.068 K/B ratio (W. 5-year trend) and net in-migration of 102 kindergarteners per year since 1999 will be assumed.

[6.3] $\text{KBRATIO(T)} = 0.000735\ \text{HSALE(T)} + 0.030517\ \text{T}$ 2001-2009
$\qquad\qquad\qquad\quad (5.98)\qquad\qquad (13.73)$
$\qquad R^2 = 0.287 \qquad \text{SEE} = 0.0605 \qquad \text{D.W.} = 2.86 \qquad \text{MVD} = 1.084$

6.4 Annual K Enrollment Changes

In general, Kindergarten enrollment grows and declines annually as a result of variations in the number of births, nonpublic school enrollments, and the size of net migration. Since these factors vary a great deal annually, the actual kindergarten enrollments also vary considerably from year to year. Observe from Table 6.1 (column 6) that in the past ten years between 2000 and 2009, Newtown's K enrollments declined over six years losing 160 students, but increased over four years gaining 97 students, so that there was a net reduction of K enrollments by 63 students between 1999 and 2009.

6.5 Kindergarten Enrollment Projections

Recognizing the importance and difficulty of producing reliable kindergarten enrollment projections, we applied three methods of projecting kindergarten enrollments: (1) the K Enrollment Component Method; (2) the K/B Ratio Method; and (3) the multiple regression method. The K component method and the K/B ratio method are demonstrated in Table 6.2.

TABLE 6.2
ANNUAL KINDERGARTEN ENROLLMENT PROJECTIONS BY THE COMPONENT METHOD
AS OF OCTOBER 1, 2000-2019, NEWTOWN PUBLIC SCHOOLS

Assumptions: Flat births and constant weighted 5-year K/B Ratios, nonpublic K, and net migration.

	Adj. Birth 5-Yeara GO	Assumed Non-Public K	Assumed K Retention	Assumed Net Migration	Projected Public School K	Annual K Enrollment Change	Annual B -to-K Change	K/B Ratio	Projected K By K/B method
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
W. 5-Yr. Avg.	306	85	3	102	326	-24	20	1.068	1.068
PROJECTIONS:									
2010	271	85	3	102	**291**	1	20	1.074	*289*
2011	240	85	3	102	**260**	-31	20	1.083	*256*
2012	234	85	3	102	**254**	-6	20	1.085	*250*
2013	202	85	3	102	**222**	-32	20	1.099	*216*
2014	195	85	3	102	**215**	-7	20	1.103	*208*
2015	*204**	85	3	102	**224**	18	20	1.094	*218*
2016	*202**	85	3	102	**222**	7	20	1.091	*216*
2017	*204**	85	3	102	**224**	3	20	1.09	*218*
2018	*204**	85	3	102	**224**	-1	20	1.09	*218*
2019	*207**	85	3	102	**227**	15	20	1.084	*221*

\# Estimated births   * Middle (flat) births projected by equation 2.1.
 Total Resident K = (Public K + Nonpublic K) = (Adj. Births 5 Yrs prior + Net Mig. + Retention)

(a) <u>K Projections by the B-to-K Component Method</u>: Table 6.2 illustrates how the K enrollments over the next ten years are projected by the K enrollment component method. Note that column 5 presents the projected K enrollments. In column 1, we applied the 'flat' or middle-level births but

low and high births can be also used. Next, based on the weighted 5-year trend averages, we adopted the assumption that nonpublic school K enrollment will be constant at 85 students (Col. 2), that K retention will be constant at 3 students (Col. 3), and net in-migration of preschool children will be constant 102 students (Col. 4). Based on these assumptions, we derived the projected K enrollments over the next ten years between 2010 and 2019. The resulting calculation shows that K enrollments are projected to *decline* from 291 kindergartners in 2010 to 227 kindergartners in 2019.

(b) K Projections by the K/B Ratio Method: As shown in Table 6.1 (column 7), we can calculate the K/B ratio (K over B) for each year. Then, we can calculate 3-, 5-., 10, weighted 3-, and weighted 5-year average K/B ratios and apply these ratios for projecting future K enrollments. In Table 6.2 we applied the W. 5-year K/B ratio to the adjusted births 5-year prior to the projection school year. The results (col. 9) are that K enrollments will *decline* from 289 pupils in 2010 to 221 kindergartners in 2019, indicating somewhat smaller K enrollments than the projections made by the K enrollment component method.

(c) K Projections by Multiple Regression Equations: K enrollments were also projected applying the regression equations developed in this report (see Equation 4.1 in Section 4). Assuming that the past relationships among the variables in Equation 4.1 will remain the same over the next ten years and that assumptions for independent variables are valid, future enrollments were projected by applying the regression equation. *The MRM method does not necessarily produce more accurate projections, but it has the advantage of providing information on the probability statistics so it helps to tell how reliable the projections are, based on past trends.* Results of these K projections are shown on Table 6.3 on the next page. The result shows that K enrollments are projected to decline from 285 pupils in 2010 to 263 pupils in 2019, registering a smaller decline than the previous two methods. (*Note: Table 6.3 projections are based on* <u>high</u> *births*.)

6.6 District-Wide Enrollment Projections by Grade and Grade Level
We applied three different methods: (1) the Multiple Regression Method (MRM); (2) the Cohort-Survival Method (CSM); and (3) the Share-Ratio Method (SRM in projecting the Newtown school district-wide enrollment projections by grade.

(a) Enrollment Projections by the Multiple Regression Method: Table 6.4 below shows the two projections by the Multiple Regression Method (MRM). Panel A presents enrollment projections by grade level applying the regression equations in Section 4, and panel B projections were prepared by grade-by-grade regression equations. Note that the MRM projections are prepared by applying trends much longer than 10 years. Panel A and B projections are similar to the middle projections shown in Table 6.4.

TABLE 6.3
NEWTOWN PUBLIC SCHOOL ENROLLMENT PROJECTIONS
BY MULTIPLE REGRESSION METHOD, 2009-201

	(A) MRM Projections by Grade Level						(B) MRM Projections by Grade					
	K	K-4	5-6	7-8	9-12	K-12	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396	290	1912	861	896	1727	5396
2010	285	1774	610	940	1786	5110	285	1798	896	906	1704	5304
2011	262	1679	911	908	1798	5296	262	1690	893	881	1735	5199
2012	245	1567	886	831	1690	4974	245	1570	851	917	1759	5097
2013	217	1460	860	832	1643	4795	217	1444	817	912	1732	4905
2014	221	1353	784	878	1645	4660	221	1367	742	869	1777	4755
2015	237	1278	749	823	1398	4248	237	1310	687	834	1748	4579
2016	248	1272	704	749	1713	4438	248	1292	655	758	1741	4446
2017	244	1290	645	705	1629	4269	244	1292	606	703	1701	4302
2018	250	1317	607	669	1560	4153	250	1327	518	670	1584	4099
2019	263	1350	574	616	1451	3991	263	1373	526	584	1497	3980
2009-14	-69	-559	-77	-18	-82	-736	-69	-545	-119	-27	50	-641
2014-19	42	-3	-210	-262	-194	-669	42	6	-216	-285	-280	-775
2009-19	-27	-562	-287	-280	-276	-1405	-27	-539	-335	-312	-230	-1416
2009-14	-23.8%	-29.2%	-8.9%	-2.0%	-4.7%	-13.6%	-23.8%	-28.5%	-13.8%	-3.0%	2.9%	-11.9%
2014-19	19.0%	-0.2%	-26.8%	-29.8%	-11.8%	-14.4%	19.0%	0.4%	-29.1%	-32.8%	-15.8%	-16.3%
2009-19	-9.3%	-29.4%	-33.3%	-31.3%	-16.0%	-26.0%	-9.3%	-28.2%	-38.9%	-34.8%	-13.3%	-26.2%

(b) <u>Enrollment Projections by CSM</u>: Table 6.4 presents enrollment projections applying the Cohort Survival Method. In his table, the low projections are prepared applying the low births assumption and w. 3-year trend average survival ratios. The middle projections are based on the 'flat' births assumption and survival ratios that are averages of w. 3-year trend (low) and 10-year trend (high) ratios. The high projections were derived by the application of the relatively high births assumption and 10-year trend survival ratios.

(c) <u>Enrollment Projections by the Share Ratio Method</u>: School enrollment projections by grade were derived by applying the Share Ratio Method. Under the Share Ratio Method, Newtown's future enrollments were calculated by projecting Newtown's share of enrollments as a percent of the statewide enrollments for each grade, and then multiplying these percentages by the statewide enrollment projections by grade. The Share Ratio Method has the advantage of being capable of showing Newtown's enrollment changes relative to statewide enrollment changes. Appendix Table 6-H presents the 'middle births' based projections by the Share Ratio Method. We can easily compare the projections contained in Appendix Table 6-G (CSM projections) and Appendix Table 6-H (SRM projections), and find that the K-12 enrollment projections by SRM are 1.4% (55 students) higher than the projections by CSM. In short, the projections by both CSM and SRM are more or less the same.

TABLE 6.4
NEWTOWN PUBLIC SCHOOLS ENROLLMENT PROJECTIONS
BY *THE COHORT-SURVIVAL METHOD*, 2009-2019

Low Projections (Low Births/ Weighted 3-Yr. Trend)

	K	K-4	5-6	7-8	9-12*	K-12
2009	290	1912	861	896	1727	5396
2010	302	1,822	883	897	1,697	5,299
2011	268	1,725	876	867	1,692	5,160
2012	262	1,625	840	889	1,692	5,046
2013	225	1,519	800	882	1,637	4,837
2014	215	1,435	729	846	1,660	4,670
2015	215	1,335	706	804	1,624	4,469
2016	187	1,246	679	733	1,611	4,270
2017	191	1,164	631	710	1,566	4,071
2018	217	1,151	580	683	1,466	3,881
2019	229	1,164	525	635	1,407	3,731
Changes:						
2009-14	-75	-477	-132	-50	-67	-726
2014-19	13	-271	-204	-211	-253	-939
2009-19	-61	-748	-336	-261	-320	-1665
2009-14	-25.7%	-24.9%	-15.3%	-5.6%	-3.9%	-13.5%
2014-19	6.2%	-18.9%	-28.0%	-24.9%	-15.2%	-20.1%
2009-19	-21.1%	-39.1%	-39.0%	-29.1%	-18.5%	-30.9%

Middle Projections (Middle Births/Avg. of W3 & 10-Yr.)

	K	K-4	5-6	7-8	9-12*	K-12
2009	290	1912	861	896	1727	5396
2010	310	1827	889	902	1701	5319
2011	275	1737	885	874	1717	5213
2012	268	1644	847	903	1730	5124
2013	231	1541	809	898	1691	4938
2014	222	1465	737	859	1724	4786
2015	233	1375	717	821	1693	4607
2016	223	1316	700	748	1684	4448
2017	227	1267	650	729	1642	4287
2018	239	1274	598	710	1535	4117
2019	254	1308	542	660	1480	3990
Changes:						
2009-14	-68	-447	-124	-37	-3	-610
2014-19	32	-158	-194	-200	-244	-796
2009-19	-36	-604	-319	-236	-247	-1406
2009-14	-23.4%	-23.4%	-14.4%	-4.1%	-0.1%	-11.3%
2014-19	14.2%	-10.8%	-26.4%	-23.2%	-14.2%	-16.6%
2009-19	-12.5%	-31.6%	-37.0%	-26.3%	-14.3%	-26.1%

High Projections (High Births/10-Year Trend)

	K	K-4	5-6	7-8	9-12*	K-12
2009	290	1912	861	896	1727	5396
2010	318	1832	896	907	1705	5340
2011	282	1748	894	882	1742	5265
2012	275	1663	853	918	1769	5202
2013	237	1562	818	915	1745	5040
2014	229	1496	745	873	1789	4903
2015	250	1415	729	837	1763	4744
2016	259	1386	721	762	1757	4626
2017	262	1369	669	747	1718	4503
2018	261	1397	616	737	1603	4353
2019	279	1452	560	685	1553	4249
Changes:						
2009-14	-61	-416	-116	-23	62	-493
2014-19	50	-44	-185	-188	-236	-653
2009-19	-11	-460	-301	-211	-174	-1147
2009-14	-21.0%	-21.8%	-13.5%	-2.5%	3.6%	-9.1%
2014-19	21.7%	-2.9%	-24.8%	-21.6%	-13.2%	-13.3%
2009-19	-3.8%	-24.1%	-35.0%	-23.6%	-10.1%	-21.2%

*Peak enrollments for grades 9-12 are underlined.

(d) K Enrollment Projections: As illustrated by Figure 6-4, it is clear that the historical K enrollments since 1984 are roughly parallel to the number of births five years earlier. Observe that Newtown's K enrollments sharply declined from 398 students in 2000 to 347 students in 2001, but regained the level of 398 students in 2005. However, K enrollment plummeted once again and reached 290 students in 2009. Under the *middle* births scenario, K enrollments are projected to resume their descent to 222 students in 2014 consistent with the births that already declined five years ago; however, they will grow slightly to 247 students in 2019. In contrast, under the low births scenario, K enrollments will drop more sharply and reach a trough in 2016 with an enrollment of 187 kindergartners only to reverse the trend and reach 229 students in 2019. On the other hand, under the high births scenario, K enrollment is projected to reach a trough in 2014 with 229 students but gradually grow back to 279 students in 2019.

Note that the second five-year K enrollment projections are based on projected births, and they are less reliable than the K enrollment projections for the first five years that were prepared based on actual births.

FIG. 6-4
KINDERGARTEN ENROLLMENT PROJECTIONS
NEWTOWN PUBLIC SCHOOLS, 2010-2019
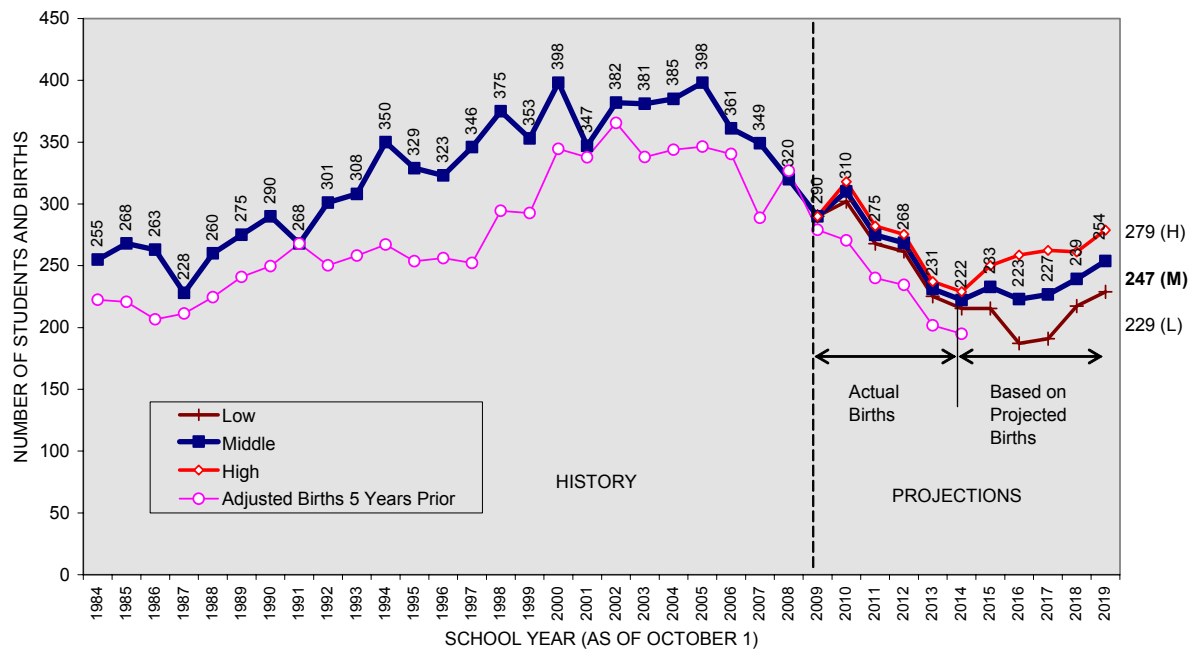
(e) K-4 Enrollment Projections: grades K-4 enrollment projections are shown on Appendix Table C and also in Figure 4. Observe that:

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▪ K-4 enrollments in Newtown public schools declined from 2,108 students in 2005 to 1,912 students in 2009, registering a decline of 196 students (-9.3%) in four years or a decline of on average 49 students per year.

▪ The <u>middle</u> projections show that K-4 enrollment will continue to decline and reach 1,308 students in 2019, resulting in a reduction of 604 K-4 students (-31.6%) in ten years. In comparison, the low projections show that K-4 enrollments will decline to 1,164 students in 2017 and stay at that level until 2019, recording a reduction of 748 students (-39.1%) in ten years. According to the high projections, K-4 enrollments will decline to 1,369 students in 2017 but increase again to 1,452 students in 2019, a reduction of 460 students (-24.1%) in ten years.

▪ *In sum, Newtown's K-4 enrollments grew at the rate of adding 37 students per year during the past 21 years, and declined by on average 49 students per year between 2005 and 2009. These enrollments are projected to decline at an accelerated rate of 60 students per year over the next ten years according to the middle projections. These declines reflect the adverse impact of the on-going economic malaise on K-4 enrollments in terms of severely declining births and net migration into Newtown.*

FIG. 6-5
GRADES K-4 ENROLLMENT HISTORY (1984-2009) AND PROJECTIONS (2010-2019)
NEWTOWN PUBLIC SCHOOLS
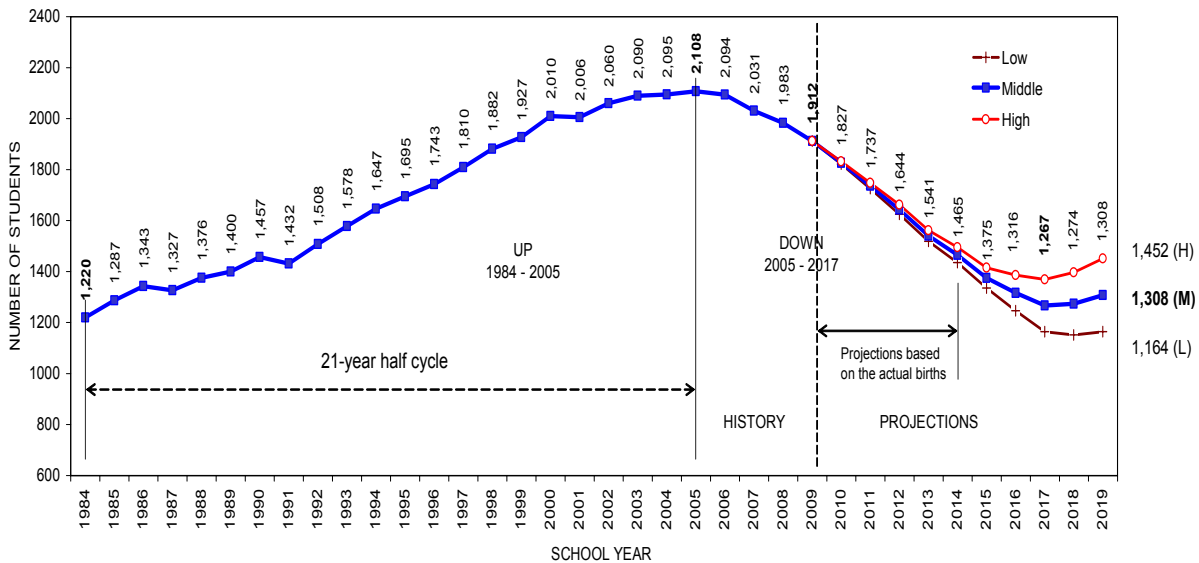
(f) <u>Grades 5-6 Enrollments</u>: The grades 5 and 6 enrollments steadily grew from 492 students in 1985 to 915 students in 2005, and then declined to 891 students in 2019. This decline is expected because K enrollments have been declining since 2000.

There is no significant difference between the low and high enrollment projections because all 5th and 6th graders in Newtown Intermediate School between 2010 and 2019 were already born between 2000 and 2009 (see Appendix Table 5-A on page 5-8). The *low* (W. 3-year trend) projections show a decline to 525 students in 2019 while the *high* (10-year trend) projections show a decline to 560 students in 2019, indicating a difference of only 35 students between the high and low projections.

The *middle* projections show a decline of 319 students (-37.0%) in ten years from 861 students in 2009 to 542 students in 2019. It is forecast that the intermediate school enrollments will lose 124 students (-14.4%) over the next five years**,** between 2009 and 2014, but will lose as many as 194 students (-26.4%) over the second five years**,** between 2014 and 2019.

FIG. 6-6
GRADES 5-6 ENROLLMENT HISTORY (1984-2009)AND PROJECTIONS (2010-2019)
NEWTOWN PUBLIC SCHOOLS
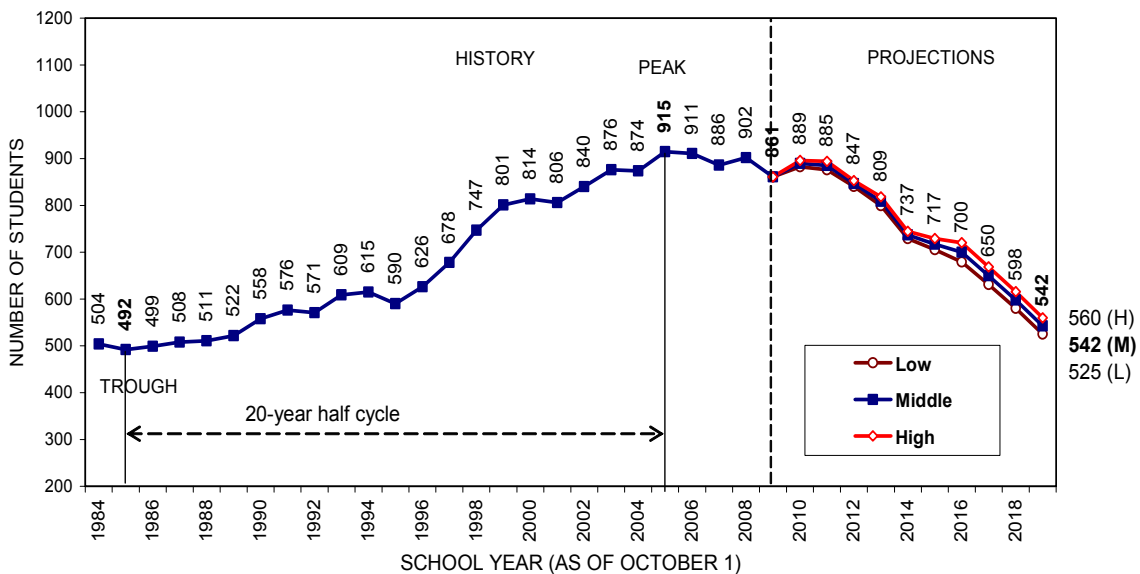
(g) Grades 7-8 Enrollments: Middle school enrollments almost doubled in size during the past twenty years growing from 483 students in 1987 to 930 students in 2007, adding 447 students in 20 years at the average rate of 22+ students per year. Then enrollments dropped to 896 students in 2009, losing 34 students in two years.

According to our middle projections, grades 7-8 enrollments in Newtown will decline slowly to 859 students in 2014, losing 37 students over the next five years, but will decline sharply to 660 students over the second five years in 2019, losing as many as 200 students. Altogether, middle

school enrollment will be reduced from 896 students in 2009 to 660 students in 2019, a loss of 236 students (-26.3%).

There is no significant difference between the low and high enrollment projections because all 7th and 8th graders in Newtown middle school between 2010 and 2019 were already born between 1998 and 2007. The low (W. 3-year trend) projections show a decline to 635 students in 2019 while the high(10-year trend) projections show a decline to 685 students in 2019, indicating a difference of only 50 students between the high and low projections.

FIG. 6-7
GRADES 7-8 ENROLLMENT HISTORY (1984-2009) AND PROJECTIONS (2010-2019)
NEWTOWN PUBLIC SCHOOLS
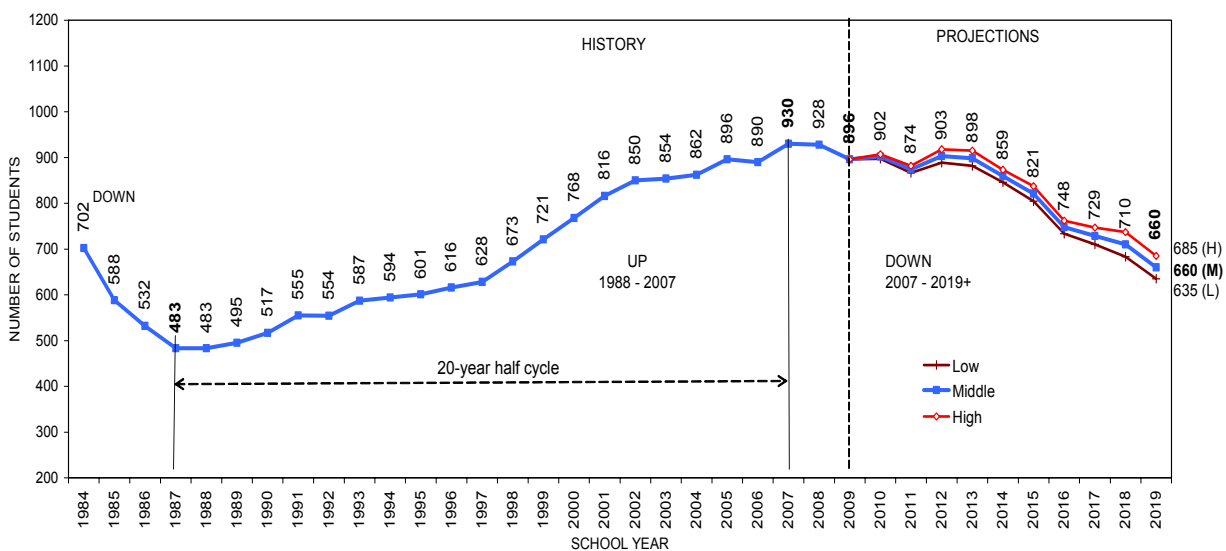
(h) <u>Grades 9-12 Enrollments</u>: High school enrollments have increased from 949 students in 1991 to 1,710 students in 2006; then, they were more or less flat for three years but reached 1,727 students in 2009. The increase represented an addition of 778 students (+82%) during the past 18 years (on average 43 students per year). It is not clear from the past enrollment trend whether the grades 9-12 enrollments have reached a peak in 2009 or not. However, according to our forecast, high school enrollments are expected to reach their peak enrollment of 1,730 students in 2012, exactly 21 years after the 1991 trough, repeating the 21-year cycle of K-4 enrollments and 20-year cycles of grades 5-6, and 7-8.* Nonetheless, the enrollment level will continue to be flat until 2014 at the level of more or less 1,700 students because all of these students were born between 1996 and 2000 when the birth levels were still very high. Then, high school enrollments will begin to decline over the second five years reaching 1,480 students in 2019 because the students belong to cohorts born between 2001 and 2005 when births were fast declining in Newtown.**

_____
*See next page for footnotes.

Unlike lower grade levels, the low and high grades 9-12 enrollments are +/- 259 students (6.5%) higher or lower than the middle enrollment projections. This is due to greater variability of inter-grade survival ratios.

FIG. 6-8
GRADES 9-12 ENROLLMENT HISTORY (1984-2009) AND PROJECTIONS (2010-2019)
NEWTOWN PUBLIC SCHOOLS
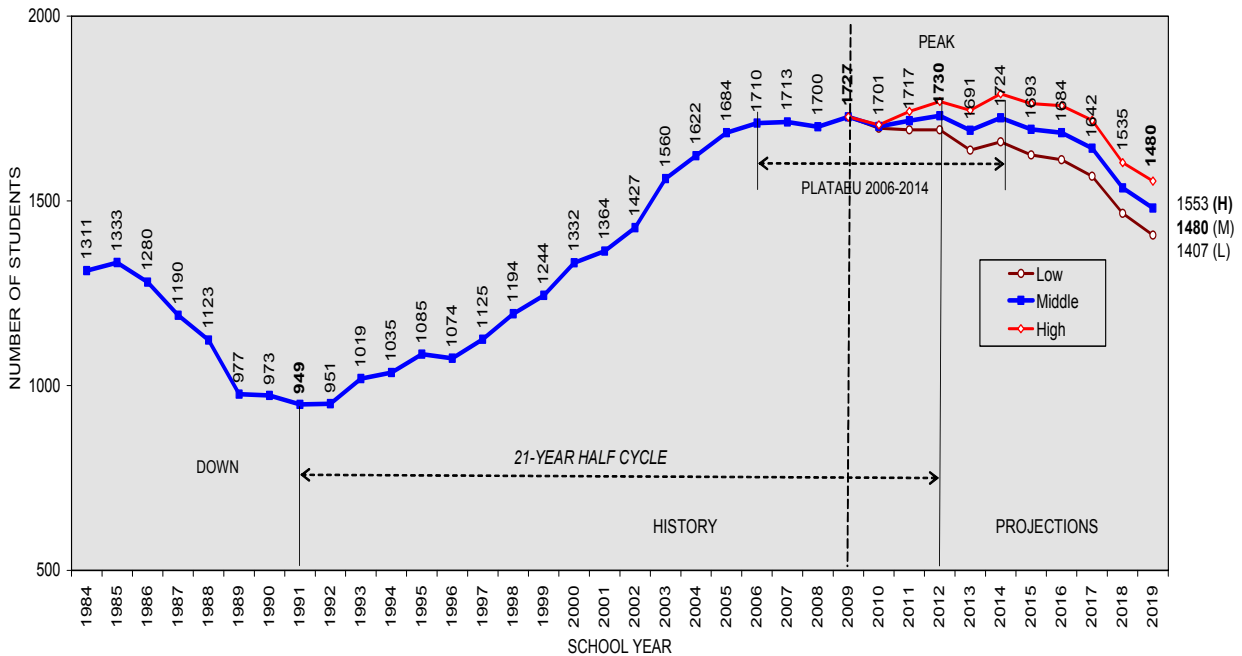
_____
*From Table 6.4, observe also that the years of peak enrollment for low, middle, and high projections for grades 9-12 enrollments are different: the low projection's peak enrollment year was 2009, the middle projections would produce the peak K enrollment in 2012, and the high projection's peak enrollment is projected to be in 2014. However, only the middle projections have a 21-year half cycle consistent with enrollment cycles found in the lower grade levels.

** We have also extended our grades 9-12 enrollment projections for four more years to year 2023. This extended projection was possible because a would-be high school student between 2020 and 2023 was already born between 2006 and 2009 (refer to Appendix Table 5-A). This was the period in which the births in Newtown declined considerably. Thus, it is projected that the Newtown High School enrollment will continue to follow the downward spiral reaching +/-1,057 students in 2025 according to the middle births scenario and 1,175 students in 2025 according to the high births scenario. A drop from 1,480 grades 9-12 students in 2019 to 1,057 students in 2025 represents a 29% decline in six years, a considerable decline which reflects the sharp birth decline experienced between 2006 and 2009. However, *it is possible that the decline will be mitigated by a growth in the net in-migration of high school students if economic conditions substantially improve in future years.*

(i) <u>Grades K-12 Enrollments</u>: As shown in Figure 6-9 below, K-12 enrollment steadily expanded from 3,394 students in 1989 to 5,605 students in 2006, adding 2,211 students (+65.1%) in 17 years at the average rate of 130 students per year. After reaching its peak enrollment in 2006, K-12 enrollment began to diminish and dropped to 5,396 students in 2009. According to the middle projections, K-12 enrollment will resume its descent and reach 3,990 students in 2019, resulting in a loss of 1,406 students over the next ten years at the rate of 141 students per year. *Clearly, the annual rate of projected decline is faster than the growth experienced during the past growth period.*

In comparison, according to the low projections, K-12 enrollments will decline to 3,731 students, 259 students less than the middle projections; and the high projections indicate K-12 enrollments will decline to 4,249 students in 2019, 259 students more than the middle projections.

FIG. 6-9
K-12 ENROLLMENT HISTORY (1984-2009) AND PROJECTIONS (2010-2019)
NEWTOWN PUBLIC SCHOOLS
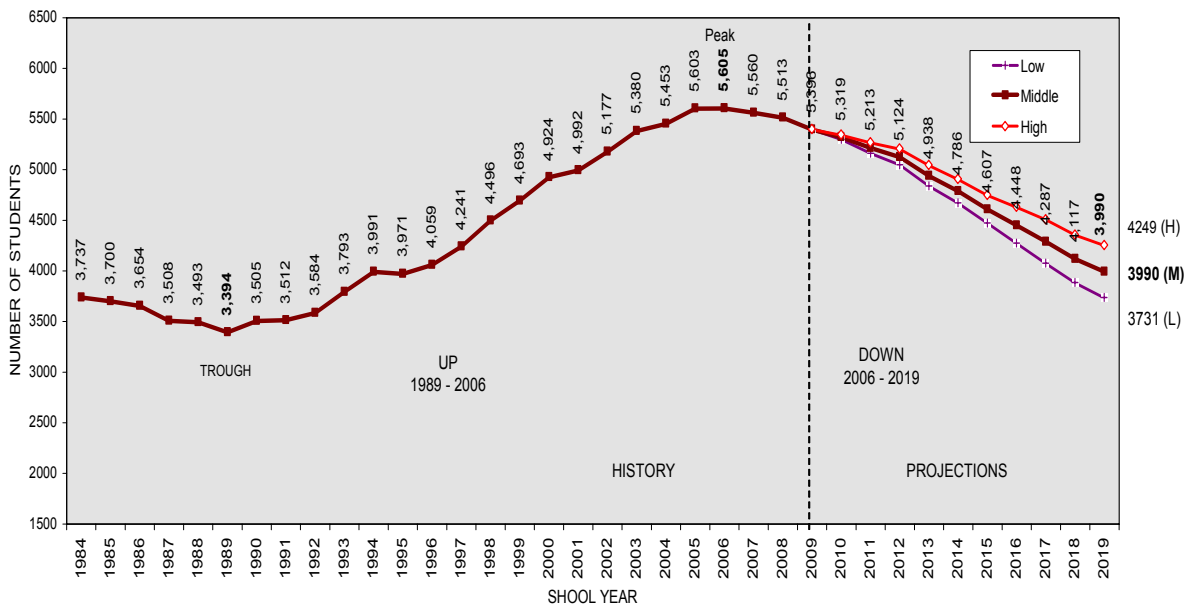
6.7 Newtown's Share of Connecticut's Enrollments

Table 6.5 summarizes Newtown's shares of Connecticut's enrollments by grade level (in percentages). Note that Newtown's K-12 enrollment represented 0.984 percent of the state's total K-12 enrollment in 2009. In comparison, Newtown's population is estimated to be 0.764% of the state's total population in 2008 (26,737 ÷ 3,501,252) according to the Connecticut State Department of Public Health (see page 2-3).

TABLE 6.5
NEWTOWN'S ENROLLMENT AS A PERCENT OF
CONNECTICUT'S ENROLLMENT BY GRADE LEVEL, 1999 – 2019
Middle Projections by SRM

	K-4	5-6	7-8	9-12	K-12
HISTORY:					
1999	0.875%	0.918%	0.867%	0.834%	0.869%
2000	0.920%	0.910%	0.895%	0.865%	0.899%
2001	0.921%	0.895%	0.923%	0.856%	0.899%
2002	0.952%	0.935%	0.938%	0.872%	0.924%
2003	0.971%	0.979%	0.937%	0.927%	0.954%
2004	0.982%	0.991%	0.956%	0.941%	0.967%
2005	0.993%	1.058%	1.001%	0.964%	0.995%
2006	0.996%	1.062%	1.008%	0.972%	1.001%
2007	0.973%	1.041%	1.073%	0.977%	1.000%
2008	0.959%	1.067%	1.078%	0.972%	0.998%
2009	0.934%	1.022%	1.050%	0.993%	0.984%
PROJECTIONS:					
2010	0.900%	1.068%	1.063%	0.989%	0.980%
2011	0.861%	1.072%	1.035%	1.014%	0.969%
.2012	0.816%	1.045%	1.082%	1.029%	0.959%
2013	0.774%	1.001%	1.085%	1.013%	0.932%
2014	0.742%	0.914%	1.058%	1.042%	0.912%
2015	0.700%	0.901%	1.013%	1.030%	0.883%
2016	0.673%	0.879%	0.925%	1.040%	0.859%
2017	0.651%	0.817%	0.913%	1.019%	0.832%
2018	0.654%	0.765%	0.890%	0.963%	0.804%
2019	0.670%	0.707%	0.828%	0.935%	0.783%
2019/2009 Ratios	**0.717**	**0.692**	**0.788**	**0.942**	**0.795**

Table 6.5 (last row) also shows in bold figures the ratio of Newtown's shares of Connecticut enrollments for the year 2019 divided by those of 2009 for each grade level. When Newtown's enrollment growth is the same as that of Connecticut, Newtown's 2019/2009 share ratios are expected to be one (1.00). Observe from Table 6.5 that the 2019/2009 share ratios for all grade levels were less than one indicating that Newtown school enrollments are projected to decline faster than the state as a whole. Note also that the 2019/2009 ratio for K enrollments in 2019 is very small (0.717) indicating a much faster decline than Connecticut's projected K enrollments. In contrast, Newtown's high school enrollment results in a 2019/2009 ratio of 0.942, indicating a decline rate closer to the state's high school enrollment decline rate. Newtown's faster than the statewide enrollment decline is mainly due to the fact that Newtown's births were declining much faster than the birth trend for Connecticut.*

See Fig. 2-2 on page 2-4 and Table 2.3 on page 2-5 for a comparison of decline rates of births in Newtown and Connecticut. For example, Newtown's births as a % of Connecticut's births fell from 0.864 in 1997 to 0.479% in 2009.

6.8 Application of Enrollment Projections for School Facilities Planning

We have prepared various enrollment projections combining different methods and various assumptions. However, we have so far narrowed down the projections for low, middle and high projections by applying the Cohort-Survival method with different assumptions on projected births and inter-grade survival ratios. We found the share-ratio and multiple regression methods provided enrollment projections quite similar to the CSM projections. But given these three (low, middle and high) projections, which one should the school authority use for school facilities planning purposes? We prefer the Middle Projections for the following reasons.

(a) <u>Accuracy of Projections</u>: The most important criterion is the accuracy of projections. Everyone may ask which projection is most accurate or most probable. However, it is impossible to know the accuracy of projections ahead of time. The projections are not predictions. When all three alternative scenarios are equally plausible,* we offer a strategy for choosing the enrollment projection which has the better chance of yielding the least errors or avoiding a 'big mistake'.

   1)   The Middle Projections will produce the least errors (approximately $\pm 6.5\%$) even if either the low (w. 3-year trend) or high (10-year trend) projections turn out to be true. In comparison, if we choose low projections but the actual K-12 enrollments turn out to be the high projections, then the projection error would be $\pm$ 13.0%.

   2)   The W. 3-year trend (low) projections may be more plausible for the short-term future but not the long-term future, and the 10-year trend (high) projections may be appropriate for the distant future but not the near future.

   3)   Our experience shows that the enrollment projections prepared at the time the enrollments are rapidly declining are very often proven to be too low in hindsight because the projections are basically linear (straight-line) projections and likely to miss the inflection (turning) points such as enrollment peaks and valleys in the future (this is called a 'recency' bias).

   4)   The middle projections prepared by CSM and SRM methods are almost the same as the MRM projections. Accordingly, we can quote the statistics produced by the MRM projections and use them for the projections prepared by CSM and SRM. According to Equation 4.5 on page 4-5, on average the margin of error for K-12 enrollment projections made by this equation is within $\pm 3.1\%$ (+/- 155 students) at the 95% confidence level, indicating it is a fairly accurate model for the past K-12 enrollment trend (see page 4-9).

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* If one of the three scenarios is considered most probable, we should choose the most probable scenario. On the other hand, if one of the scenarios is the most improbable, it should be dropped from further consideration. It must be noted that the very reason we offered three alternatives is that we were uncertain as to the future course of our nation's economy.

5) In addition, the SRM projections show that the Middle Projection's shares of Connecticut's future enrollments appear to closely follow the patterns established during the past decade as shown in Table 6.6.

It is important to emphasize that the future outcome will be greatly dependent on the future economic conditions of the nation and Connecticut as well as Newtown's status relative to the statewide economic conditions. Therefore we have to closely monitor changing economic realities and re-examine the projection assumptions stated in Section 5. We tend to discount the lowest projections on the grounds that the last three years contained the unprecedented economic recession, the largest since the Great Depression of the 1930s. On the other hand, we may also discount the highest projections due to economic uncertainty and malaise in the national and regional economies. Thus, the middle projections may be more likely to produce the least projection errors in the long run.

(b) Risk Taking: The choice of which projection to use for the purpose of school facilities planning is dependent not only on the perceived accuracy of the projections, but also on the school authority's attitude toward risk-taking. If one assumes that the low and high projections presented in this report are equally plausible, one may choose the low projections if the school system prefers to err on the side of "under-planning". If the school system "under-plans," the short-term costs will be lower and there remains the option of adding more facilities when needed. However, under-planning or an incremental approach risks that educational quality may suffer due to temporary overcrowding and that overall school construction costs may escalate. This escalation will be due to the rising price of construction over the years and the increase in cost and time when expansion is negotiated as a series of jobs rather than as a single construction job.

On the other hand, the school system may choose the "high" projections if it prefers the risk of "over-planning" or building more facilities than needed. Over-planning will build more facilities than required in the short-run, but this strategy foresees that in *a growing community*, schools can always grow into the excess capacity and escalating higher standards of educational space utilization. Though the short-term costs will be higher, educational quality will not be compromised and long-term overall costs may be lower.

(c) Surprises due to Random Factors; Enrollment projections presented in this report may be called 'surprise-free' projections, meaning that we were not able to take random factors into consideration. By definition we cannot possibly foresee the nature, extent and timing of events such as unexpected economic/social disasters, wars, natural calamities, and endemic diseases. Thus, it is always possible that the future reality may turn out to be *unexpectedly* and *significantly* different from the projections presented in this report. Accordingly, the Newtown Public Schools should be ready to update their long-term enrollment projections if future economic conditions substantially differ from the assumptions adopted in this report.

(d) <u>Uncertainty of Enrollment Projections and Flexibility in School Facilities Planning</u>: As stated earlier, enrollment projections are not predictions, and they are susceptible to errors. Accordingly, school facilities must be planned with considerable flexibility in design. Flexibility means the ability to build additions, to convert existing spaces for different uses, to change the size of rooms from small to large spaces or vice versa, and the ability to keep up with changing technology and pedagogical requirements. An obvious fact should be noted: small facilities lose flexibility to meet unexpected situations.

For these reasons we recommend the adoption of the middle projections for school facilities planning purposes. *However, it is up to the school authority to determine which projections are most consistent with their risk-taking and educational philosophy and the assessment of projection assumptions.*

6.9 Hybrid Enrollment Projections Application

It is possible that the school authority may use parts of all three (low, middle and high) projections depending on the time horizons for which the enrollment projections are needed and the application purposes. For example, the weighted 3-year trend projections (the most recent past) may be used for the next two years, and the 5-year or weighted 5-year trend projections may be suitable for the mid-term period (3rd to 5th year), and the 10-year trend projections may be appropriate for the long-term period (6th to 10th year).

6.10 Enrollment Growth over the Next Twenty Years

What will be the trend in enrollment growth *beyond* the ten-year projections included in this study? For example, when a new school is built it is going to last for decades and this is a very pertinent question for the school facilities policy makers. They have to manage the excess or shortage of school facilities to maintain desirable educational standards at the same time achieving financial efficiency. For these reasons, it is quite desirable to have a very long-term glimpse (if not a projection) of future enrollment levels.

Although we wish to have 20-year enrollment projections, in order to achieve this objective, we have to project future births for fifteen years from 2010 to 2024. Clearly this is an adventurous task. However, there are some hints that will help to accomplish this goal in a rudimentary way. It is reasonable to believe that the births cycle of Newtown is *at least* 32 years from the first trough in 1977 to the second trough in 2009 as shown in Table 6.6. There were 192 births recorded in both years, and as long as the births will not decline further below 192 births after 2009, then the 32-year birth cycle is a fact. Therefore, the enrollment cycles of K-4, 5-8, and 9-12 will follow the birth cycle with several time lags one after the other and they will also have a more or less 32 years cycle. Such enrollment cycles are shown in Figure 6-10 on the next page. According to this diagram, the K-4 enrollments' second trough will occur in 2017 with a projected enrollment of +/-

1,267 students; the grades 5-8 enrollments' second trough will occur in 2021 with a projected enrollment of +/- 1,095 students; and the grades 9-12 enrollments second trough will be take place in 2025 with an estimated enrollment of 1,057 students. Of course, these numerical values should be considered as rough approximations, which undoubtedly will be modified due to many future events. Although these estimates may not provide clear views, they may still provide somewhat helpful views of the future we want to see.

TABLE 6.6
ENROLLMENT CYCLES
NEWTOWN PUBLIC SCHOOLS, CONNECTICUT 1970-2029

Grade Level	Year of Earlier Trough	Actual Trough Values	Year of Peak	Year of Later Trough	Estimated Values	Trough-to-Trough Cycle
Births	1977	192 births	1997	2009*	192 births	32 year trough to trough cycle
K-4	1984**	1,220	2005	2017	+/- 1,267	33 year trough to trough cycle**
5-8	1987	975	2008	2021	+/- 1,095	34 year trough to trough cycle
9-12	1991	949	2012*	2025	+/- 1,057	34 year trough to trough cycle

 * If the number of births in Newtown declines even after 2009, then the births cycle will be longer than 32 years.
** The Newtown enrollment data prior to 1984 are not at the moment available and we cannot ascertain that 1983 had lower numbers than 1984 K-4 enrollments. If it did, the K-4 trough-to-trough cycle was 34 years instead of 33 years.

FIG. 6-10
NEWTOWN SCHOOL ENROLLMENT CYCLES
HISTORY (1984-2009) AND PROJECTIONS(2010-2029)
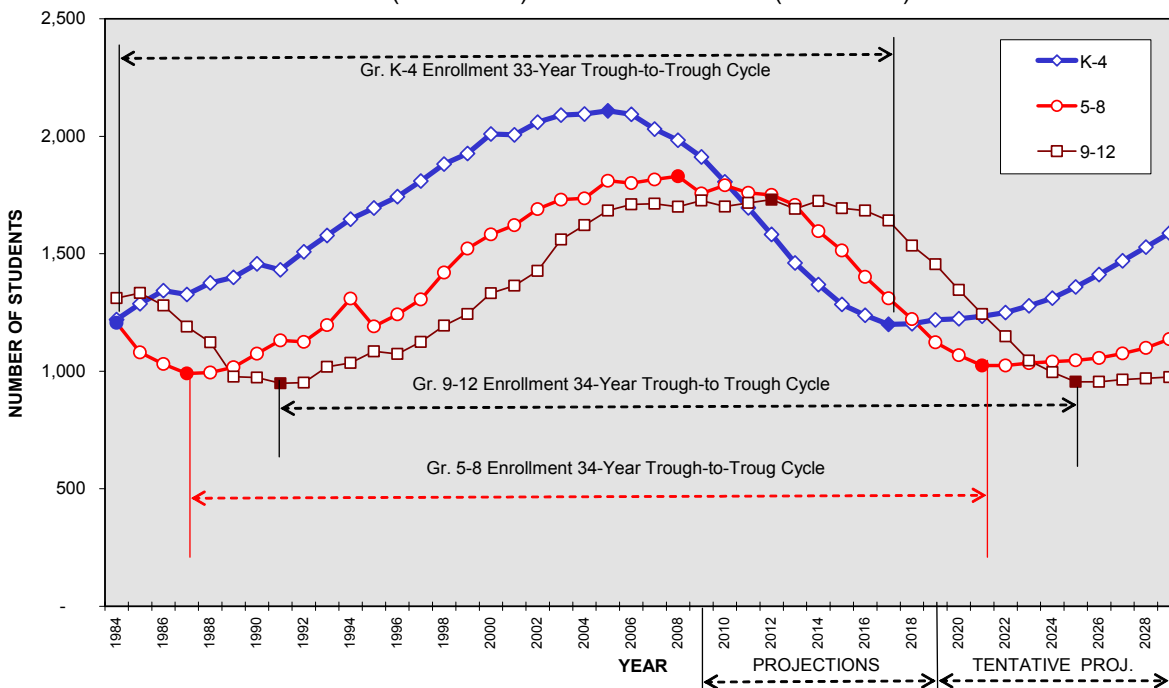
6.11 Annual Updating of School Enrollment Projections

The cyclical variations in enrollment can be easily captured by the annual updating of school enrollment projections. The annual updating will confirm the validity of assumptions adopted in this report and should be able to fine-tune the projections, based on the additional data available each year.

6.12 Summary and Conclusions

1) The number of annual births is the primary factor that determines the future school-age population and school enrollments. Two other important factors are the net migration of school children and the number of children attending nonpublic schools; these factors are reflected in the inter-grade survival or retention rates.

2) We need ten-year *births* data in order to make 10-year enrollment projections for the grads K-4 enrollments. The first five years (2005-2009) are already known, but the next five years (2010-2014) must be projected or estimated. We assumed three levels of births: low (declining), middle (flat), and high (increasing) births.

3) Based on the three alternative births scenarios, we prepared various enrollment projections applying three methods (CSM, SRM and MRM)**,** and projecting different pasts such as 3-, 5-, 10-, weighted 3-, and weighted 5-year past trends. We found the projections prepared by CSM, SRM and MRM to be more or less the same and chose the Cohort Survival Method projections in presenting our findings in the report.

4) Given various projections, we chose three alternative projections: weighted 3-year trend projections based on low births as the Low Projections; 10-year trend projections based on the high births scenario was selected as the High Projections; and the average of the low and high projections based on the application of a middle births scenario was chosen as the Middle Projections. Thus, the low projections assume a pessimistic economic outlook or slow economic recovery; the high projections assume an optimistic economic outlook or fast economic recovery; and the middle projections assume an economic recovery at a moderate pace.

5) Of the three alternative projections, the middle projection is preferred on the ground that it is likely to produce the least projection errors when all three scenarios are considered to be equally plausible. At the same time, faced with considerable uncertainty, the middle projection is also a cost-efficient strategy that avoids costly over-planning or under-planning approaches to long-term school facility development.

6) Enrollment projections presented in this report are long-term <u>trend-line</u> (surprise free) projections that ignore the potentially severe fluctuations resulting from random events. Thus, actual enrollments may be significantly above or below the trend-line projections.

7) . Although the Middle Projections (average of low and high projection**)** are preferred in this report on the grounds that in the long run it will minimize the margin of possible projection errors, the school authority may choose one of the low, middle, and high projections presented in this report in accordance with its own risk-taking philosophy to maximize the educational goals in the most cost-effective manner. They may also pursue the hybrid enrollment projections combining all three projections depending on the time horizons of projection applications.

8) The updating of enrollment projections is strongly recommended when the school authority detects that the validity of enrollment projection assumptions are violated. Remember too that a small cost of updating the enrollment projections saves a large sum of tax resources, which could be wasted when expensive school facilities capital improvement projects are effectuated without updating demographic studies.

APPENDIX TABLES

DISTRICT-WIDE ENROLLMENT PROJECTIONS BY GRADE

(LOW, MIDDLE AND HIGH PROJECTIONS)

APPENDIX TABLE 6-A
NEWTOWN PUBLIC SCHOOL ENROLLMENT HISTORY AND PROJECTIONS BY GRADE
1984-2019

(Middle Projections)

YEAR	PK	K	1	2	3	4	5	6	7	8	9	10	11	12	K-4	5-6	7-8	9-12	K-12	PK-12
HISTORY:																				
1984	0	255	241	238	253	233	247	257	317	385	309	355	357	290	1,220	504	702	1,311	3,737	3,737
1985	0	268	270	255	234	260	235	257	276	312	354	314	372	293	1,287	492	588	1,333	3,700	3,700
1986	24	263	282	278	259	261	258	241	256	276	276	354	325	325	1,343	499	532	1,280	3,654	3,678
1987	28	228	294	293	258	254	250	258	231	252	256	275	374	285	1,327	508	483	1,190	3,508	3,536
1988	29	260	264	297	290	265	263	248	257	226	251	249	288	335	1,376	511	483	1,123	3,493	3,522
1989	21	275	276	265	300	284	259	263	243	252	200	243	269	265	1,400	522	495	977	3,394	3,415
1990	19	290	295	305	272	295	292	266	272	245	256	210	263	244	1,457	558	517	973	3,505	3,524
1991	21	268	299	294	305	266	296	280	277	278	231	265	204	249	1,432	576	555	949	3,512	3,533
1992	33	301	314	295	294	304	273	298	280	274	264	232	261	194	1,508	571	554	951	3,584	3,617
1993	25	308	340	333	302	295	322	287	309	278	282	264	248	225	1,578	609	587	1,019	3,793	3,818
1994	17	350	333	340	324	300	300	315	288	306	275	278	256	226	1,647	615	694	1,035	3,991	4,008
1995	12	329	371	340	336	319	296	294	322	279	297	272	281	235	1,695	590	601	1,085	3,971	3,983
1996	14	323	349	371	347	353	314	312	295	321	274	272	277	251	1,743	626	616	1,074	4,059	4,073
1997	18	346	365	356	380	363	355	323	322	306	327	267	280	251	1,810	678	628	1,125	4,241	4,259
1998	17	375	374	377	360	396	376	371	346	327	318	331	279	266	1,882	747	673	1,194	4,496	4,513
1999	23	353	405	393	392	384	406	395	372	349	330	308	343	263	1,927	801	721	1,244	4,693	4,716
2000	17	398	385	427	400	400	396	418	395	373	360	331	322	319	2,010	814	768	1,332	4,924	4,941
2001	26	347	435	382	437	405	402	404	417	399	376	360	339	289	2,006	806	816	1,364	4,992	5,018
2002	25	382	392	457	400	429	421	419	424	426	391	378	365	293	2,060	840	850	1,427	5,177	5,202
2003	23	381	427	408	467	407	445	431	423	431	425	390	390	355	2,090	876	854	1,560	5,380	5,403
2004	40	385	402	438	400	470	417	457	435	427	419	426	406	371	2,095	874	862	1,622	5,453	5,493
2005	42	398	432	411	462	405	485	430	454	442	439	432	424	389	2,108	915	896	1,684	5,603	5,645
2006	60	361	427	424	419	463	414	497	430	460	435	428	410	437	2,094	911	890	1,710	5,605	5,665
2007	60	349	393	442	419	428	464	422	499	431	443	431	420	419	2,031	886	930	1,713	5,560	5,620
2008	83	320	401	393	441	428	431	471	436	492	410	436	426	428	1,983	902	928	1,700	5,513	5,596
2009	86	290	365	396	413	448	429	432	468	428	465	402	430	430	1,912	861	896	1,727	5,396	5,482
MIDDLE PROJECTIONS:																				
2010	*71*	310	325	368	404	419	453	436	436	466	414	460	400	426	1,827	889	902	1,701	5,319	5,391
2011	*69*	275	347	328	376	411	424	461	440	434	451	410	459	396	1,737	885	874	1,717	5,213	5,283
2012	*68*	268	308	350	335	382	415	431	465	438	420	447	409	454	1,644	847	903	1,730	5,124	5,192
2013	*65*	231	301	311	358	340	387	422	435	463	424	416	445	404	1,541	809	898	1,691	4,938	5,005
2014	*63*	222	259	304	317	363	344	393	426	433	449	420	415	441	1,465	737	859	1,724	4,786	4,851
2015	*60*	233	249	261	310	322	368	350	396	424	420	444	419	410	1,375	717	821	1,693	4,607	4,669
2016	*58*	223	260	251	267	315	326	374	353	395	411	416	443	414	1,316	700	748	1,684	4,448	4,508
2017	*56*	227	249	263	257	271	319	332	377	351	383	407	414	438	1,267	650	729	1,642	4,287	4,345
2018	*53*	239	253	252	269	260	274	324	334	376	340	379	406	410	1,274	598	710	1,535	4,117	4,172
2019	*51*	254	268	256	257	273	264	279	327	333	364	337	378	401	1,308	542	660	1,480	3,990	4,044

Source: H. C. Planning Consultants, Inc.   Estimate and projections are shown in italics.

APPENDIX TABLE 6-A (Continued)

PANEL A: LOW PROJECTIONS (Low Births and W. 3-Year Trend Projections)

YEAR	K	1	2	3	4	5	6	7	8	9	10	11	12	K-4	5-6	7-8	9-12	K-12
2009	290	365	396	413	448	429	432	468	428	465	402	430	430	1912	861	896	1727	5396
2010	302	329	365	405	421	450	433	436	462	407	457	396	436	1822	883	897	1697	5299
2011	268	343	329	373	413	422	454	437	430	439	400	451	402	1725	876	867	1692	5160
2012	262	304	343	336	380	414	426	458	431	408	431	394	458	1625	840	889	1692	5046
2013	225	297	304	350	343	382	418	430	452	409	402	425	400	1519	800	882	1637	4837
2014	215	256	297	311	357	344	385	422	424	429	403	396	432	1435	729	846	1660	4670
2015	215	244	255	303	316	358	347	388	416	403	422	397	402	1335	706	804	1624	4469
2016	187	244	244	261	309	318	362	350	383	395	396	416	403	1246	679	733	1611	4270
2017	191	212	244	250	266	310	321	365	346	364	389	391	422	1164	631	710	1566	4071
2018	217	217	212	250	255	267	313	323	360	328	358	383	397	1151	580	683	1466	3881
2019	229	247	217	217	255	256	270	316	319	342	323	353	389	1164	525	635	1407	3731
2009-19 Change	-61	-118	-179	-196	-193	-173	-162	-152	-109	-123	-79	-77	-41	-748	-336	-261	-320	-1665

PANEL B: MIDDLE PROJECTIONS (Middle Births and AVG. OF 10- AND W. 3-Year Trend Projections)

YEAR	K	1	2	3	4	5	6	7	8	9	10	11	12	K-4	5-6	7-8	9-12	K-12
2009	290	365	396	413	448	429	432	468	428	465	402	430	430	1912	861	896	1727	5396
2010	310	325	368	404	419	453	436	436	466	414	460	400	426	1827	889	902	1701	5319
2011	275	347	328	376	411	424	461	440	434	451	410	459	396	1737	885	874	1717	5213
2012	268	308	350	335	382	415	431	465	438	420	447	409	454	1644	847	903	1730	5124
2013	231	301	311	358	340	387	422	435	463	424	416	445	404	1541	809	898	1691	4938
2014	222	259	304	317	363	344	393	426	433	449	420	415	441	1465	737	859	1724	4786
2015	233	249	261	310	322	368	350	396	424	420	444	419	410	1375	717	821	1693	4607
2016	223	260	251	267	315	326	374	353	395	411	416	443	414	1316	700	748	1684	4448
2017	227	249	263	257	271	319	332	377	351	383	407	414	438	1267	650	729	1642	4287
2018	239	253	252	269	260	274	324	334	376	340	379	406	410	1274	598	710	1535	4117
2019	254	268	256	257	273	264	279	327	333	364	337	378	401	1308	542	660	1480	3990
2009-19 Change	-36	-97	-140	-156	-175	-165	-153	-141	-95	-101	-65	-52	-29	-604	-319	-236	-247	-1406

PANEL C: HIGH PROJECTIONS (High Births and 10-Year Trend Projections)

YEAR	K	1	2	3	4	5	6	7	8	9	10	11	12	K-4	5-6	7-8	9-12	K-12
2009	290	365	396	413	448	429	432	468	428	465	402	430	430	1912	861	896	1727	5396
2010	318	321	372	404	418	457	439	436	471	422	464	404	415	1832	896	907	1705	5340
2011	282	352	327	379	409	426	468	443	438	464	421	466	390	1748	894	882	1742	5265
2012	275	312	358	333	384	417	436	472	446	432	463	423	450	1663	853	918	1769	5202
2013	237	305	318	366	337	391	427	440	475	440	431	465	409	1562	818	915	1745	5040
2014	229	262	310	324	370	344	401	430	443	468	438	434	449	1496	745	873	1789	4903
2015	250	253	267	317	328	377	352	404	433	437	467	441	419	1415	729	837	1763	4744
2016	259	277	258	273	320	334	386	355	407	427	435	470	425	1386	721	762	1757	4626
2017	262	286	282	263	276	327	342	390	357	401	426	438	453	1369	669	747	1718	4503
2018	261	290	291	287	266	281	334	345	392	352	400	428	423	1397	616	737	1603	4353
2019	279	289	296	297	291	272	288	337	347	386	351	402	413	1452	560	685	1553	4249
2009-19 Change	-11	-76	-100	-116	-157	-157	-144	-131	-81	-79	-51	-28	-17	-460	-301	-211	-174	-1147

APPENDIX TABLE 6-B
NEWTOWN SHARE (%) OF CONNECTICUT'S ENROLLMENTS
BY GRADE LEVEL, 2010-2019

A. Low Projections

SCHOOL YEAR	K-4	5-6	7-8	9-12	K-12	K-4	5-6	7-8	9-12	K-12
	Newtown Public School Enrollments					Newtown Share (%) of Connecticut's Grade Enrollments				
2009	1912	861	896	1727	5396	0.934%	1.022%	1.050%	0.993%	0.984%
2010	1822	883	897	1697	5299	0.898%	1.060%	1.058%	0.987%	0.976%
2011	1725	876	867	1692	5160	0.855%	1.061%	1.026%	0.999%	0.959%
2012	1625	840	889	1692	5046	0.807%	1.037%	1.064%	1.007%	0.945%
2013	1519	800	882	1637	4837	0.763%	0.989%	1.065%	0.981%	0.913%
2014	1435	729	846	1660	4670	0.727%	0.904%	1.041%	1.003%	0.890%
2015	1335	706	804	1624	4469	0.679%	0.886%	0.993%	0.988%	0.857%
2016	1246	679	733	1611	4270	0.638%	0.853%	0.907%	0.995%	0.824%
2017	1164	631	710	1566	4071	0.598%	0.793%	0.890%	0.972%	0.791%
2018	1151	580	683	1466	3881	0.591%	0.742%	0.856%	0.920%	0.758%
2019	1164	525	635	1407	3731	0.596%	0.685%	0.796%	0.889%	0.732%

B. Middle Projections

SCHOOL YEAR	K-4	5-6	7-8	9-12	K-12	K-4	5-6	7-8	9-12	K-12
	Newtown Public School Enrollments					Newtown Share (%) of Connecticut's Grade Enrollments				
2009	1912	861	896	1727	5396	0.934%	1.022%	1.050%	0.993%	0.984%
2010	1827	889	902	1701	5319	0.900%	1.068%	1.063%	0.989%	0.980%
2011	1737	885	874	1717	5213	0.861%	1.072%	1.035%	1.014%	0.969%
2012	1644	847	903	1730	5124	0.816%	1.045%	1.082%	1.029%	0.959%
2013	1541	809	898	1691	4938	0.774%	1.001%	1.085%	1.013%	0.932%
2014	1465	737	859	1724	4786	0.742%	0.914%	1.058%	1.042%	0.912%
2015	1375	717	821	1693	4607	0.700%	0.901%	1.013%	1.030%	0.883%
2016	1316	700	748	1684	4448	0.673%	0.879%	0.925%	1.040%	0.859%
2017	1267	650	729	1642	4287	0.651%	0.817%	0.913%	1.019%	0.832%
2018	1274	598	710	1535	4117	0.654%	0.765%	0.890%	0.963%	0.804%
2019	1308	542	660	1480	3990	0.670%	0.707%	0.828%	0.935%	0.783%

C. High Projections

SCHOOL YEAR	K-4	5-6	7-8	9-12	K-12	K-4	5-6	7-8	9-12	K-12
	Newtown Public School Enrollments					Newtown Share (%) of Connecticut's Grade Enrollments				
2009	1912	861	896	1727	5396	0.934%	1.022%	1.050%	0.993%	0.984%
2010	1832	896	907	1705	5340	0.903%	1.076%	1.069%	0.992%	0.983%
2011	1748	894	882	1742	5265	0.867%	1.083%	1.044%	1.028%	0.978%
2012	1663	853	918	1769	5202	0.826%	1.052%	1.099%	1.052%	0.974%
2013	1562	818	915	1745	5040	0.785%	1.012%	1.105%	1.045%	0.952%
2014	1496	745	873	1789	4903	0.758%	0.923%	1.075%	1.081%	0.934%
2015	1415	729	837	1763	4744	0.720%	0.916%	1.033%	1.072%	0.910%
2016	1386	721	762	1757	4626	0.709%	0.905%	0.942%	1.085%	0.893%
2017	1369	669	747	1718	4503	0.704%	0.841%	0.936%	1.066%	0.874%
2018	1397	616	737	1603	4353	0.717%	0.787%	0.923%	1.006%	0.850%
2019	1452	560	685	1553	4249	0.743%	0.730%	0.859%	0.982%	0.833%

APPENDIX TABLE 6-C
PUBLIC SCHOOL ENROLLMENT PER HOUSING UNIT
NEWTOWN, CONNECTICUT, 2010-2019

	Total HU	K-4	5-6	7-8	9-12	K-12	K-4	5-6	7-8	9-12	K-12
		HISTORY									
1995	8,049	1,695	590	601	1,085	3,971	0.211	0.073	0.075	0.135	0.493
1996	8,246	1,743	626	616	1,074	4,059	0.211	0.076	0.075	0.130	0.492
1997	8,431	1,810	678	628	1,125	4,241	0.215	0.080	0.074	0.133	0.503
1998	8,661	1,882	747	673	1,194	4,496	0.217	0.086	0.078	0.138	0.519
1999	8,864	1,927	801	721	1,244	4,693	0.217	0.090	0.081	0.140	0.529
2000	8,952	2,010	814	768	1,332	4,924	0.225	0.091	0.086	0.149	0.550
2001	8,758	2,006	806	816	1,364	4,992	0.229	0.092	0.093	0.156	0.570
2002	8,944	2,060	840	850	1,427	5,177	0.230	0.094	0.095	0.160	0.579
2003	9,093	2,090	876	854	1,560	5,380	0.230	0.096	0.094	0.172	0.592
2004	9,226	2,095	874	862	1,622	5,453	0.227	0.095	0.093	0.176	0.591
2005	9,310	2,108	915	896	1,684	5,603	0.226	0.098	0.096	0.181	0.602
2006	9,394	2,094	911	890	1,710	5,605	0.223	0.097	0.095	0.182	0.597
2007	9,425	2,031	886	930	1,713	5,560	0.215	0.094	0.099	0.182	0.590
2008	9,456	1,983	902	928	1,700	5,513	0.210	0.095	0.098	0.180	0.583
2009	9,465	1,912	861	896	1,727	5,396	0.202	0.091	0.095	0.182	0.570
		LOW									
2010	9,545*	1,822	883	897	1697	5299	0.191	0.093	0.094	0.178	0.555
2011	9,625	1,725	876	867	1692	5160	0.179	0.091	0.090	0.176	0.536
2012	9,705	1,625	840	889	1692	5046	0.167	0.087	0.092	0.174	0.520
2013	9,785	1,519	800	882	1637	4837	0.155	0.082	0.090	0.167	0.494
2014	9,865	1,435	729	846	1660	4670	0.145	0.074	0.086	0.168	0.473
2015	9,945	1,335	706	804	1624	4469	0.134	0.071	0.081	0.163	0.449
2016	10,025	1,246	679	733	1611	4270	0.124	0.068	0.073	0.161	0.426
2017	10,105	1,164	631	710	1566	4071	0.115	0.062	0.070	0.155	0.403
2018	10,185	1,151	580	683	1466	3881	0.113	0.057	0.067	0.144	0.381
2019	10,265	1,164	525	635	1407	3731	0.113	0.051	0.062	0.137	0.363
		MIDDLE									
2010	9,545	1827	889	902	1701	5319	0.191	0.093	0.095	0.178	0.557
2011	9,625	1737	885	874	1717	5213	0.180	0.092	0.091	0.178	0.542
2012	9,705	1644	847	903	1730	5124	0.169	0.087	0.093	0.178	0.528
2013	9,785	1541	809	898	1691	4938	0.157	0.083	0.092	0.173	0.505
2014	9,865	1465	737	859	1724	4786	0.149	0.075	0.087	0.175	0.485
2015	9,945	1375	717	821	1693	4607	0.138	0.072	0.083	0.170	0.463
2016	10,025	1316	700	748	1684	4448	0.131	0.070	0.075	0.168	0.444
2017	10,105	1267	650	729	1642	4287	0.125	0.064	0.072	0.162	0.424
2018	10,185	1274	598	710	1535	4117	0.125	0.059	0.070	0.151	0.404
2019	10,265	1308	542	660	1480	3990	0.127	0.053	0.064	0.144	0.389
		HIGH									
2010	9,545	1832	896	907	1705	5340	0.192	0.094	0.095	0.179	0.559
2011	9,625	1748	894	882	1742	5265	0.182	0.093	0.092	0.181	0.547
2012	9,705	1663	853	918	1769	5202	0.171	0.088	0.095	0.182	0.536
2013	9,785	1562	818	915	1745	5040	0.160	0.084	0.094	0.178	0.515
2014	9,865	1496	745	873	1789	4903	0.152	0.076	0.088	0.181	0.497
2015	9,945	1415	729	837	1763	4744	0.142	0.073	0.084	0.177	0.477
2016	10,025	1386	721	762	1757	4626	0.138	0.072	0.076	0.175	0.461
2017	10,105	1369	669	747	1718	4503	0.135	0.066	0.074	0.170	0.446
2018	10,185	1397	616	737	1603	4353	0.137	0.060	0.072	0.157	0.427
2019	10,265	1452	560	685	1553	4249	0.141	0.055	0.067	0.151	0.414

* Assumed annual housing net gain of 80 units.

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APPENDIX TABLE 6-D
INTER-GRADE ENROLLMENT CHANGES* BY GRADE AND GRADE LEVEL
NEWTOWN PUBLIC SCHOOLS
*Enrollment changes when students in a grade advance to the next grade.

SCHOOL YEAR	K	1	2	3	4	5	6	7	8	9	10	11	12	K-4	5-6	7-8	9-12	K-12
2000	53	32	22	7	8	12	12	0	1	11	1	14	-24	122	24	1	2	149
2001	9	37	-3	10	5	2	8	-1	4	3	0	8	-33	58	10	3	-22	49
2002	16	45	22	18	-8	16	17	20	9	-8	2	5	-46	93	33	29	-47	108
2003	43	45	16	10	7	16	10	4	7	-1	-1	12	-10	121	26	11	0	158
2004	41	21	11	-8	3	10	12	4	4	-12	1	16	-19	68	22	8	-14	84
2005	52	47	9	24	5	15	13	-3	7	12	13	-2	-17	137	28	4	6	175
2006	21	29	-8	8	1	9	12	0	6	-7	-11	-22	13	51	21	6	-27	51
2007	60	32	15	-5	9	1	8	2	1	-17	-4	-8	9	111	9	3	-20	103
2008	-7	52	0	-1	9	3	7	14	-7	-21	-7	-5	8	53	10	7	-25	45
2009	11	45	-5	20	7	1	1	-3	-8	-27	-8	-6	4	78	2	-11	-37	32
3-Yr. Avg.	22	43	3	5	8	2	5	4	-5	-22	-6	-6	7	83	5	-27	60	22
5-Yr. Avg.	27	41	2	9	6	6	8	2	0	-12	-3	-9	3	92	10	-21	81	27
10-Yr. Avg.	30	39	8	8	5	9	10	4	2	-7	-1	1	-12	98	16	-18	96	30
W 3-Yr. Avg.	13	45	0	9	8	2	4	4	-6	-23	-7	-6	6	77	2	-30	48	13
W 5-Yr. Avg.	20	42	1	8	7	4	6	3	-3	-18	-6	-8	6	82	6	-26	62	20
MINIMUM	-7	21	-8	-8	-8	1	1	-3	-8	-27	-11	-22	-46	56	-10	-47	32	-7
MAXIMUM	60	52	22	24	9	16	17	20	9	12	13	16	13	152	46	6	175	60
RANGE	67	31	30	32	17	15	16	23	17	39	24	38	59	95	56	53	143	67
MIDDLE	27	37	7	8	1	9	9	9	1	-8	1	-3	-17	104	18	-21	103	27
MEDIAN	31	41	10	9	6	10	11	1	4	-8	-1	2	-14	94	16	-21	94	31

LOW PROJECTIONS: (w. 3--Year Trend)

SCHOOL YEAR	K	1	2	3	4	5	6	7	8	9	10	11	12	K-4	5-6	7-8	9-12	K-12
2010	31	39	0	9	8	2	4	4	-6	-21	-8	-6	6	87	6	-3	-28	62
2011	28	41	0	8	8	2	4	4	-6	-23	-7	-6	6	84	6	-2	-30	58
2012	27	36	0	7	7	2	4	4	-6	-21	-7	-6	7	78	6	-2	-28	54
2013	23	35	0	8	6	1	4	4	-6	-21	-7	-6	6	73	5	-3	-28	47
2014	22	30	0	7	7	1	4	4	-6	-23	-7	-6	6	66	5	-2	-29	40
2015	22	29	0	7	6	1	3	3	-6	-21	-7	-6	6	64	5	-2	-28	38
2016	19	29	0	6	6	1	3	3	-5	-21	-7	-6	6	60	5	-2	-27	35
2017	20	25	0	6	5	1	3	3	-5	-19	-7	-5	6	55	4	-2	-25	33
2018	23	26	0	6	5	1	3	3	-5	-17	-6	-5	6	58	4	-2	-23	37
2019	24	29	0	5	5	1	3	3	-4	-18	-5	-5	6	63	3	-2	-23	42

MIDDLE PROJECTIONS: (Average of 10-Year and W. 3--Year Trend)

SCHOOL YEAR	K	1	2	3	4	5	6	7	8	9	10	11	12	K-4	5-6	7-8	9-12	K-12
2010	30	35	3	8	6	5	7	4	-2	-14	-5	-2	-4	83	12	2	-24	74
2011	27	36	3	8	6	5	7	4	-2	-15	-4	-2	-4	80	13	2	-25	70
2012	26	32	3	7	6	5	7	4	-2	-14	-4	-2	-5	74	12	2	-24	64
2013	23	31	3	7	5	5	7	4	-2	-14	-4	-2	-4	69	11	2	-24	58
2014	22	27	3	6	5	4	6	4	-2	-15	-4	-2	-5	63	10	2	-25	50
2015	22	26	2	6	5	4	6	3	-2	-14	-4	-2	-5	61	10	2	-24	49
2016	15	27	2	5	4	4	6	3	-1	-13	-4	-2	-5	54	10	2	-24	42
2017	17	26	3	5	4	4	5	3	-1	-12	-4	-2	-5	54	9	2	-23	42
2018	28	26	3	5	4	3	5	3	-1	-11	-4	-1	-5	66	9	2	-21	55
2019	40	28	3	5	4	3	4	3	-1	-11	-3	-1	-5	79	8	2	-20	68

HIGH PROJECTIONS: (10--Year Trend)

SCHOOL YEAR	K	1	2	3	4	5	6	7	8	9	10	11	12	K-4	5-6	7-8	9-12	K-12
2010	47	31	7	8	5	9	10	4	3	-6	-1	2	-15	98	19	7	-20	104
2011	42	34	6	8	5	8	11	4	3	-7	-1	3	-14	94	19	7	-19	100
2012	41	30	7	7	4	8	10	4	3	-6	-1	2	-16	88	18	7	-21	92
2013	35	29	6	7	4	8	10	4	3	-6	-1	3	-15	81	18	7	-19	86
2014	34	25	6	6	4	7	9	4	3	-7	-1	2	-16	76	16	6	-22	77
2015	37	24	5	6	4	8	8	4	3	-6	-1	2	-15	76	16	6	-20	78
2016	39	26	5	5	4	7	9	3	2	-6	-1	3	-15	79	16	6	-20	80
2017	39	27	5	5	3	7	8	3	2	-6	-1	2	-16	80	14	6	-21	79
2018	39	28	5	6	3	6	8	3	2	-5	-1	2	-15	81	13	5	-19	81
2019	42	28	6	6	3	5	7	3	2	-5	-1	2	-15	84	12	5	-19	82

APPENDIX TABLE 6-E
NEWTOWN PUBLIC SCHOOLS ENROLLMENT PROJECTIONS
BY *THE COHORT-SURVIVAL METHOD*, 2009-2019

LOW BIRTHS

3-Year Trend

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	291	1807	884	900	1699	5291
2011	258	1696	878	871	1698	5142
2012	252	1586	838	894	1702	5020
2013	217	1468	796	888	1651	4803
2014	208	1376	727	848	1677	4628
2015	208	1280	687	805	1644	4416
2016	181	1195	650	734	1628	4207
2017	184	1116	604	695	1582	3997
2018	210	1104	555	657	1478	3794
2019	221	1116	503	610	1402	3631
Changes:						
2009-14	-82	-536	-134	-48	-50	-768
2014-19	13	-260	-224	-237	-275	-996
2009-19	-69	-796	-358	-286	-325	-1765
2009-14	-28.4%	-28.0%	-15.6%	-5.4%	-2.9%	-14.2%
2014-19	6.2%	-18.9%	-30.8%	-28.0%	-16.4%	-21.5%
2009-19	-23.9%	-41.6%	-41.6%	-31.9%	-18.8%	-32.7%

Weighted 3-Year Trend (Low Projections)

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	302	1822	883	897	1697	5299
2011	268	1725	876	867	1692	5160
2012	262	1625	840	889	1692	5046
2013	225	1519	800	882	1637	4837
2014	215	1435	729	846	1660	4670
2015	215	1335	706	804	1624	4469
2016	187	1246	679	733	1611	4270
2017	191	1164	631	710	1566	4071
2018	217	1151	580	683	1466	3881
2019	229	1164	525	635	1407	3731
Changes:						
2009-14	-75	-477	-132	-50	-67	-726
2014-19	13	-271	-204	-211	-253	-939
2009-19	-61	-748	-336	-261	-320	-1665
2009-14	-25.7%	-24.9%	-15.3%	-5.6%	-3.9%	-13.5%
2014-19	6.2%	-18.9%	-28.0%	-24.9%	-15.2%	-20.1%
2009-19	-21.1%	-39.1%	-39.0%	-29.1%	-18.5%	-30.9%

5-Year Trend

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	298	1812	891	902	1706	5310
2011	264	1707	887	873	1719	5186
2012	258	1598	849	904	1737	5087
2013	222	1483	809	899	1699	4891
2014	212	1397	734	860	1735	4727
2015	212	1300	698	820	1703	4522
2016	185	1213	668	744	1694	4319
2017	188	1133	620	708	1651	4113
2018	214	1121	571	677	1540	3909
2019	226	1134	516	629	1468	3747
Changes:						
2009-14	-78	-515	-127	-36	8	-669
2014-19	13	-263	-218	-232	-267	-980
2009-19	-64	-778	-345	-267	-259	-1649
2009-14	-26.8%	-26.9%	-14.7%	-4.0%	0.5%	-12.4%
2014-19	6.2%	-18.9%	-29.7%	-26.9%	-15.4%	-20.7%
2009-19	-22.2%	-40.7%	-40.0%	-29.8%	-15.0%	-30.6%

Weighted 5-Year Trend

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	289	1804	887	900	1700	5291
2011	256	1690	881	870	1703	5144
2012	250	1574	843	896	1711	5025
2013	215	1454	802	890	1664	4811
2014	206	1360	729	852	1693	4634
2015	206	1265	685	810	1659	4421
2016	179	1181	646	736	1647	4210
2017	183	1103	600	693	1602	3998
2018	208	1091	552	652	1496	3791
2019	219	1104	499	606	1416	3625
Changes:						
2009-14	-84	-552	-132	-44	-34	-762
2014-19	13	-256	-229	-246	-278	-1010
2009-19	-71	-808	-362	-290	-311	-1771
2009-14	-28.9%	-28.9%	-15.4%	-4.9%	-1.9%	-14.1%
2014-19	6.2%	-18.9%	-31.5%	-28.9%	-16.4%	-21.8%
2009-19	-24.5%	-42.3%	-42.0%	-32.4%	-18.0%	-32.8%

10-Year Trend Projections (High)

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	318	1832	896	907	1705	5340
2011	282	1748	894	882	1742	5265
2012	275	1663	853	918	1769	5202
2013	237	1562	818	915	1745	5040
2014	227	1493	745	873	1789	4901
2015	227	1389	729	837	1763	4719
2016	197	1296	721	762	1757	4536
2017	201	1211	669	747	1718	4345
2018	229	1198	616	737	1603	4154
2019	241	1211	557	685	1553	4006
Changes:						
2009-14	-63	-419	-116	-23	62	-495
2014-19	14	-282	-188	-188	-236	-894
2009-19	-49	-701	-304	-211	-174	-1390
2009-14	-21.8%	-21.9%	-13.5%	-2.5%	3.6%	-9.2%
2014-19	6.2%	-18.9%	-25.2%	-21.6%	-13.2%	-18.2%
2009-19	-16.9%	-36.7%	-35.3%	-23.6%	-10.1%	-25.8%

Middle Projections (Avg. of High and Low)

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	310	1827	889	902	1701	5319
2011	275	1737	885	874	1717	5213
2012	268	1644	847	903	1730	5124
2013	231	1541	809	898	1691	4938
2014	221	1464	737	859	1724	4785
2015	221	1362	717	821	1693	4594
2016	192	1271	700	748	1684	4403
2017	196	1188	650	729	1642	4208
2018	223	1175	598	710	1535	4018
2019	235	1188	541	660	1480	3869
Changes:						
2009-14	-69	-448	-124	-37	-3	-611
2014-19	14	-277	-196	-200	-244	-916
2009-19	-55	-724	-320	-236	-247	-1527
2009-14	-23.7%	-23.4%	-14.4%	-4.1%	-0.1%	-11.3%
2014-19	6.2%	-18.9%	-26.6%	-23.2%	-14.2%	-19.2%
2009-19	-19.0%	-37.9%	-37.1%	-26.3%	-14.3%	-28.3%

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TABLE 6-F
NEWTOWN PUBLIC SCHOOLS ENROLLMENT PROJECTIONS
BY *THE COHORT-SURVIVAL METHOD*, 2009-2019

3-Year Trend

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	291	1807	884	900	1699	5291
2011	258	1696	878	871	1698	5142
2012	252	1586	838	894	1702	5020
2013	217	1468	796	888	1651	4803
2014	209	1377	727	848	1677	4629
2015	219	1293	687	805	1644	4429
2016	218	1247	650	734	1628	4259
2017	219	1208	604	695	1582	4089
2018	220	1211	555	657	1478	3901
2019	223	1227	504	610	1402	3743
Changes:						
2009-14	-81	-535	-134	-48	-50	-767
2014-19	14	-150	-223	-237	-275	-886
2009-19	-67	-685	-357	-286	-325	-1653
2009-14	-28.0%	-28.0%	-15.6%	-5.4%	-2.9%	-14.2%
2014-19	6.8%	-10.9%	-30.7%	-28.0%	-16.4%	-19.1%
2009-19	-23.1%	-35.8%	-41.5%	-31.9%	-18.8%	-30.6%

Weighted 3-Year Trend (Low)

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	284	1803	883	897	1697	5280
2011	251	1688	876	867	1692	5123
2012	246	1569	840	889	1692	4990
2013	212	1447	800	882	1637	4765
2014	203	1349	729	846	1660	4583
2015	214	1267	684	804	1624	4379
2016	212	1221	638	733	1611	4203
2017	214	1183	593	688	1566	4029
2018	214	1186	545	642	1466	3839
2019	217	1201	494	596	1386	3678
Changes:						
2009-14	-87	-563	-132	-50	-67	-813
2014-19	14	-148	-235	-249	-274	-905
2009-19	-73	-711	-367	-300	-341	-1718
2009-14	-29.9%	-29.5%	-15.3%	-5.6%	-3.9%	-15.1%
2014-19	6.8%	-10.9%	-32.2%	-29.5%	-16.5%	-19.8%
2009-19	-25.1%	-37.2%	-42.6%	-33.4%	-19.7%	-31.8%

5-Year Trend

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	298	1812	891	902	1706	5310
2011	264	1707	887	873	1719	5186
2012	258	1598	849	904	1737	5087
2013	222	1483	809	899	1699	4891
2014	213	1398	734	860	1735	4728
2015	224	1313	698	820	1703	4535
2016	223	1266	668	744	1694	4372
2017	224	1226	620	708	1651	4206
2018	225	1229	571	677	1540	4017
2019	228	1246	518	629	1468	3860
Changes:						
2009-14	-77	-514	-127	-36	8	-668
2014-19	15	-152	-217	-232	-267	-868
2009-19	-62	-666	-343	-267	-259	-1536
2009-14	-26.4%	-26.9%	-14.7%	-4.0%	0.5%	-12.4%
2014-19	6.8%	-10.9%	-29.5%	-26.9%	-15.4%	-18.4%
.2009-19	-21.4%	-34.9%	-39.9%	-29.8%	-15.0%	-28.5%

Weighted 5-Year Trend (Moderate)

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	297	1812	887	900	1700	5299
2011	263	1706	881	870	1703	5160
2012	257	1598	843	896	1711	5048
2013	221	1485	802	890	1664	4841
2014	213	1398	729	852	1693	4673
2015	224	1313	695	810	1659	4478
2016	222	1266	663	736	1647	4313
2017	224	1227	616	702	1602	4147
2018	224	1230	567	670	1496	3962
2019	227	1246	514	623	1425	3808
Changes:						
2009-14	-77	-514	-132	-44	-34	-723
2014-19	14	-152	-215	-230	-268	-865
2009-19	-63	-666	-347	-273	-302	-1588
2009-14	-26.6%	-26.9%	-15.4%	-4.9%	-1.9%	-13.4%
2014-19	6.8%	-10.9%	-29.4%	-26.9%	-15.9%	-18.5%
2009-19	-21.6%	-34.8%	-40.3%	-30.5%	-17.5%	-29.4%

10-Year Trend Projections (High)

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	318	1832	896	907	1705	5340
2011	282	1748	894	882	1742	5265
2012	275	1663	853	918	1769	5202
2013	237	1562	818	915	1745	5040
2014	228	1494	745	873	1789	4902
2015	240	1404	729	837	1763	4733
2016	238	1353	721	762	1757	4592
2017	240	1310	669	747	1718	4444
2018	240	1314	616	737	1603	4270
2019	243	1331	558	685	1553	4128
Changes:						
2009-14	-62	-418	-116	-23	62	-494
2014-19	16	-163	-186	-188	-236	-774
2009-19	-47	-581	-303	-211	-174	-1268
2009-14	-21.4%	-21.8%	-13.5%	-2.5%	3.6%	-9.2%
2014-19	6.8%	-10.9%	-25.0%	-21.6%	-13.2%	-15.8%
2009-19	-16.0%	-30.4%	-35.2%	-23.6%	-10.1%	-23.5%

Middle Projections (Avg. of High and Low)

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	301	1818	889	902	1701	5310
2011	267	1718	885	874	1717	5194
2012	261	1616	847	903	1730	5096
2013	224	1505	809	898	1691	4903
2014	216	1422	737	859	1724	4743
2015	227	1335	706	821	1693	4556
2016	225	1287	679	748	1684	4398
2017	227	1247	631	717	1642	4237
2018	227	1250	580	689	1535	4054
2019	230	1266	526	641	1470	3903
Changes:						
2009-14	-74	-490	-124	-37	-3	-653
2014-19	15	-155	-211	-219	-255	-840
2009-19	-60	-646	-335	-255	-257	-1493
2009-14	-25.6%	-25.6%	-14.4%	-4.1%	-0.1%	-12.1%
2014-19	6.8%	-10.9%	-28.6%	-25.5%	-14.8%	-17.7%
2009-19	-20.6%	-33.8%	-38.9%	-28.5%	-14.9%	-27.7%

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TABLE 6-G
NEWTOWN PUBLIC SCHOOLS ENROLLMENT PROJECTIONS
BY *THE COHORT-SURVIVAL METHOD*, 2009-2019

HIGH BIRTHS

3-Year Trend

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	318	1834	884	900	1699	5317
2011	258	1726	878	871	1698	5173
2012	252	1616	838	894	1702	5051
2013	217	1499	796	888	1651	4834
2014	210	1409	727	848	1677	4661
2015	229	1304	719	805	1644	4471
2016	237	1277	682	734	1628	4321
2017	240	1262	604	727	1582	4175
2018	239	1287	555	689	1478	4010
2019	255	1338	505	610	1432	3886
Changes:						
2009-14	-80	-503	-134	-48	-50	-735
2014-19	46	-72	-222	-237	-245	-775
2009-19	-35	-574	-356	-286	-295	-1510
2009-14	-27.7%	-26.3%	-15.6%	-5.4%	-2.9%	-13.6%
2014-19	21.7%	-5.1%	-30.5%	-28.0%	-14.6%	-16.6%
2009-19	-11.9%	-30.0%	-41.3%	-31.9%	-17.1%	-28.0%

Weighted 3-Year Trend (Low)

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	284	1803	883	897	1697	5280
2011	251	1688	876	867	1692	5123
2012	246	1569	840	889	1692	4990
2013	212	1447	800	882	1637	4765
2014	204	1350	729	846	1660	4584
2015	223	1277	684	804	1624	4389
2016	231	1251	638	733	1611	4233
2017	234	1236	593	688	1566	4082
2018	233	1260	545	642	1466	3913
2019	249	1310	496	596	1386	3788
Changes:						
2009-14	-86	-562	-132	-50	-67	-812
2014-19	44	-40	-234	-249	-274	-797
2009-19	-41	-602	-365	-300	-341	-1608
2009-14	-29.5%	-29.4%	-15.3%	-5.6%	-3.9%	-15.0%
2014-19	21.7%	-3.0%	-32.0%	-29.5%	-16.5%	-17.4%
2009-19	-14.2%	-31.5%	-42.4%	-33.4%	-19.7%	-29.8%

5-Year Trend

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	298	1812	891	902	1706	5310
2011	264	1707	887	873	1719	5186
2012	258	1598	849	904	1737	5087
2013	222	1483	809	899	1699	4891
2014	214	1399	734	860	1735	4729
2015	234	1324	698	820	1703	4546
2016	242	1297	668	744	1694	4404
2017	246	1282	620	708	1651	4261
2018	245	1307	571	677	1540	4095
2019	261	1358	519	629	1468	3974
Changes:						
2009-14	-76	-513	-127	-36	8	-667
2014-19	47	-41	-215	-232	-267	-755
2009-19	-29	-554	-342	-267	-259	-1422
2009-14	-26.0%	-26.8%	-14.7%	-4.0%	0.5%	-12.4%
2014-19	21.7%	-2.9%	-29.3%	-26.9%	-15.4%	-16.0%
2009-19	-10.0%	-29.0%	-39.7%	-29.8%	-15.0%	-26.4%

Weighted 5-Year Trend

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	289	1804	887	900	1700	5291
2011	256	1690	881	870	1703	5144
2012	250	1574	843	896	1711	5025
2013	215	1454	802	890	1664	4811
2014	208	1362	729	852	1693	4636
2015	227	1289	685	810	1659	4444
2016	235	1263	646	736	1647	4292
2017	238	1248	600	693	1602	4142
2018	237	1272	552	652	1496	3972
2019	253	1322	502	606	1416	3846
Changes:						
2009-14	-82	-550	-132	-44	-34	-760
2014-19	45	-40	-227	-246	-278	-791
2009-19	-37	-590	-359	-290	-311	-1550
2009-14	-28.2%	-28.8%	-15.4%	-4.9%	-1.9%	-14.1%
2014-19	21.7%	-2.9%	-31.2%	-28.9%	-16.4%	-17.1%
2009-19	-12.6%	-30.8%	-41.8%	-32.4%	-18.0%	-28.7%

10-Year Trend Projections (High)

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	318	1832	896	907	1705	5340
2011	282	1748	894	882	1742	5265
2012	275	1663	853	918	1769	5202
2013	237	1562	818	915	1745	5040
2014	229	1496	745	873	1789	4903
2015	250	1415	729	837	1763	4744
2016	259	1386	721	762	1757	4626
2017	262	1369	669	747	1718	4503
2018	261	1397	616	737	1603	4353
2019	279	1452	560	685	1553	4249
Changes:						
2009-14	-61	-416	-116	-23	62	-493
2014-19	50	-44	-185	-188	-236	-653
2009-19	-11	-460	-301	-211	-174	-1147
2009-14	-21.0%	-21.8%	-13.5%	-2.5%	3.6%	-9.1%
2014-19	21.7%	-2.9%	-24.8%	-21.6%	-13.2%	-13.3%
2009-19	-3.8%	-24.1%	-35.0%	-23.6%	-10.1%	-21.2%

Middle Projections (Avg. of High and Low)

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	301	1818	889	902	1701	5310
2011	267	1718	885	874	1717	5194
2012	261	1616	847	903	1730	5096
2013	224	1505	809	898	1691	4903
2014	217	1423	737	859	1724	4744
2015	237	1346	706	821	1693	4567
2016	245	1319	679	748	1684	4430
2017	248	1303	631	717	1642	4293
2018	247	1329	580	689	1535	4133
2019	264	1381	528	641	1470	4019
Changes:						
2009-14	-73	-489	-124	-37	-3	-652
2014-19	47	-42	-209	-219	-255	-725
2009-19	-26	-531	-333	-255	-257	-1377
2009-14	-25.3%	-25.6%	-14.4%	-4.1%	-0.1%	-12.1%
2014-19	21.7%	-3.0%	-28.4%	-25.5%	-14.8%	-15.3%
2009-19	-9.0%	-27.8%	-38.7%	-28.5%	-14.9%	-25.5%

APPENDIX TABLE 6-H
NEWTOWN PUBLIC SCHOOLS ENROLLMENT PROJECTIONS
BY *THE SHARE-RATIO METHOD*, 2010-2019

HIGH BIRTHS

3-Year Trend

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	295	1817	900	912	1700	5329
2011	255	1685	891	885	1723	5185
2012	258	1564	852	920	1747	5082
2013	222	1453	792	911	1732	4888
2014	208	1350	717	871	1772	4711
2015	224	1269	683	810	1739	4501
2016	237	1248	630	733	1731	4342
2017	241	1228	586	698	1660	4172
2018	236	1244	549	644	1545	3982
2019	255	1295	492	599	1453	3838
Changes:						
2009-14	-82	-562	-144	-25	45	-685
2014-19	47	-56	-226	-272	-319	-872
2009-19	-35	-617	-369	-297	-274	-1558
2009-14	-28.4%	-29.4%	-16.7%	-2.8%	2.6%	-12.7%
2014-19	22.8%	-4.1%	-31.5%	-31.2%	-18.0%	-18.5%
2009-19	-12.0%	-32.3%	-42.9%	-33.1%	-15.9%	-28.9%

Weighted 3-Year Trend (Low)

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	291	1818	898	912	1683	5310
2011	251	1685	889	887	1711	5171
2012	254	1564	850	920	1740	5073
2013	219	1452	790	911	1732	4886
2014	205	1345	720	871	1769	4706
2015	221	1264	685	809	1740	4498
2016	233	1242	627	738	1728	4336
2017	237	1223	583	702	1655	4163
2018	233	1239	546	642	1546	3973
2019	252	1289	489	598	1451	3828
Changes:						
2009-14	-85	-567	-141	-25	42	-690
2014-19	47	-56	-231	-273	-318	-878
2009-19	-38	-623	-372	-298	-276	-1568
2009-14	-29.4%	-29.6%	-16.3%	-2.8%	2.4%	-12.8%
2014-19	22.8%	-4.2%	-32.1%	-31.3%	-18.0%	-18.7%
2009-19	-13.3%	-32.6%	-43.2%	-33.3%	-16.0%	-29.1%

5-Year Trend

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	301	1826	904	912	1723	5365
2011	259	1703	898	885	1767	5253
2012	262	1587	861	925	1795	5168
2013	226	1479	806	919	1779	4983
2014	211	1380	732	880	1825	4817
2015	228	1297	701	825	1793	4616
2016	241	1275	652	748	1794	4469
2017	245	1254	607	717	1729	4307
2018	240	1271	568	667	1615	4121
2019	260	1323	509	621	1528	3980
Changes:						
2009-14	-79	-532	-129	-16	98	-579
2014-19	48	-58	-223	-260	-297	-837
2009-19	-30	-589	-352	-275	-199	-1416
2009-14	-27.1%	-27.8%	-15.0%	-1.8%	5.7%	-10.7%
2014-19	22.8%	-4.2%	-30.4%	-29.5%	-16.3%	-17.4%
.2009-19	-10.5%	-30.8%	-40.9%	-30.7%	-11.5%	-26.2%

Weighted 5-Year Trend (Moderate)

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	297	1824	901	912	1705	5342
2011	256	1698	894	885	1741	5218
2012	259	1580	857	922	1770	5129
2013	223	1471	801	915	1758	4944
2014	209	1369	728	877	1800	4773
2015	225	1286	696	819	1769	4570
2016	238	1264	644	745	1765	4417
2017	242	1244	599	712	1697	4252
2018	237	1260	561	658	1586	4065
2019	256	1311	502	613	1497	3923
Changes:						
2009-14	-81	-543	-133	-19	73	-623
2014-19	48	-57	-226	-264	-303	-850
2009-19	-34	-601	-359	-283	-230	-1473
2009-14	-28.1%	-28.4%	-15.4%	-2.2%	4.2%	-11.5%
2014-19	22.8%	-4.2%	-31.0%	-30.1%	-16.8%	-17.8%
2009-19	-11.6%	-31.4%	-41.7%	-31.6%	-13.3%	-27.3%

10-Year Trend Projections (High)

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	306	1836	907	913	1731	5387
2011	264	1722	903	886	1791	5302
2012	267	1613	869	929	1815	5226
2013	230	1505	821	924	1799	5049
2014	215	1410	747	890	1847	4894
2015	232	1325	718	841	1817	4702
2016	245	1302	674	765	1825	4567
2017	249	1280	627	736	1770	4413
2018	244	1297	588	690	1659	4234
2019	264	1350	526	643	1580	4099
Changes:						
2009-14	-75	-502	-114	-6	120	-502
2014-19	49	-60	-221	-247	-267	-795
2009-19	-26	-562	-335	-253	-147	-1297
2009-14	-25.9%	-26.2%	-13.2%	-0.7%	6.9%	-9.3%
2014-19	22.8%	-4.3%	-29.6%	-27.8%	-14.4%	-16.2%
2009-19	-8.9%	-29.4%	-38.9%	-28.3%	-8.5%	-24.0%

Middle Projections (Avg. of High and Low)…..

	K	K-4	5-6	7-8	9-12	K-12
2009	290	1912	861	896	1727	5396
2010	298	1827	902	912	1707	5349
2011	258	1703	896	886	1751	5237
2012	260	1588	859	924	1777	5149
2013	224	1478	806	918	1766	4967
2014	210	1378	734	880	1808	4800
2015	227	1295	702	825	1779	4600
2016	239	1272	651	752	1777	4451
2017	243	1252	605	719	1712	4288
2018	239	1268	567	666	1603	4104
2019	258	1320	508	620	1516	3964
Changes:						
2009-14	-80	-534	-127	-16	81	-596
2014-19	48	-58	-226	-260	-292	-836
2009-19	-32	-592	-353	-276	-211	-1432
2009-14	-27.6%	-27.9%	-14.8%	-1.8%	4.7%	-11.0%
2014-19	22.8%	-4.2%	-30.8%	-29.5%	-16.2%	-17.4%
2009-19	-11.1%	-31.0%	-41.0%	-30.8%	-12.2%	-26.5%

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7. SCHOOL-BY-SCHOOL ENROLLMENT PROJECTIONS

7.1 Introduction

In this section, we present the enrollments for each of the four elementary schools: Hawley, Sandy Hook, Middle Gate, and Head O'Meadow schools. We also present the projected enrollments of Reed intermediate School, Newtown Middle School, and Newtown High School although their grade-by-grade enrollments were already presented as part of the district-wide enrollment projections.

7.2 Limitations of Projections

In general, enrollment projections for individual schools are likely to be inaccurate for several reasons. <u>First,</u> projections of small numbers are inherently more likely to be subject to large percentage errors than are projections of large numbers; <u>second,</u> although the enrollment projections are made based on the known annual births in an area, we normally do not have birth data for each elementary school zone or district; <u>third</u>, practices of grade retention among schools may vary from year to year; <u>fourth</u>, the past redistricting or redrawing of the boundaries of elementary school districts makes it difficult to prepare accurate historical statistics for individual school enrollment projections, and the future redistricting make the current enrollment projections invalid; and <u>fifth</u>, not all students in a school district attend their designated neighborhood schools for various reasons.

7.3 School-by-School Enrollment Projection Assumptions

In light of the various limitations to the school-by-school projections, it is necessary to adopt additional assumptions for projecting enrollments for individual schools in addition to the assumptions, which were adopted for the district-wide enrollment projections. They are:

1. There will be no redistricting during the projection period.
2. School capacities will not be significantly altered.
3. There will be no significant changes in school programs.
4. The pattern for the inter-zone exchange of students will not be significant. That is, the propensity of students to attend out-of-zone schools will not significantly change in the future.
5. In the future, the total number of births in the district will be distributed among the four elementary school zones or districts in a similar way to their allocation among the schools in the recent past.

This list consists of a rather stringent set of assumptions. Therefore, whenever any one of these assumptions is significantly violated in the future, the projections should be readjusted or updated.

7.4 Enrollment Projections for Each Elementary School

Table 7.1 and Figure 7-1 present the results of ten-year enrollment projections for each elementary school in Newtown. Note the following from Table 7.1:

■ Past Five Years: During the five-year period between 2004 and 2009, the K-4 enrollment declined by 183 students or by 8.7%. Head O'Meadow School lost the most students: its enrollment declined by as much as 22.2% or by -107 students. Next, the enrollments of Hawley School declined by 30 students (-6.7%), Sandy Hook School lost 34 students (-5.2%), and Middle Gate School lost only10 students or by -2.0%.

TABLE 7.1
10-YEAR ENROLLMENT PROJECTIONS OF EACH K-4 ELEMENTARY SCHOOL
NEWTOWN, CONNECTICUT, 2010-2019

|	Hawley	Sandy Hook	Middle Gate	Head O'Meadow	K-4 Total
(Middle Projections)					
HISTORY:					
2004	450	658	504	482	2,095
2005	440	666	510	492	2,108
2006	433	670	516	479	2,098
2007	418	639	531	443	2,031
2008	404	635	516	430	1,985
2009	420	624	494	375	1,912
PROJECTIONS:					
2010	408	586	479	354	1,827
2011	388	545	462	342	1,737
2012	369	512	446	316	1,644
2013	345	482	423	290	1,541
2014	324	448	403	291	1,465
2015	305	429	374	267	1,375
2016	292	411	358	255	1,316
2017	280	396	345	246	1,267 **
2018	282	398	347	247	1,274
2019	289	408	356	254	1,308
Changes:					
Past 5 years (2004-09)					
Number	-30	-34	-10	-107	-183
Percent	-6.7%	-5.2%	-2.0%	-22.2%	-8.7%
Fist 5 Years (2009-14)					
Number	-96	-176	-91	-84	-447
Percent	-22.9%	-28.2%	-18.5%	-22.5%	-23.4%
Second 5 Years.					
Number	-35	-40	-46	-37	-157
Percent	-10.7%	-8.9%	-11.5%	-12.7%	-10.8%
10 Years (2009-2019)					
Number	-131	-216	-138	-121	-604
Percent	-31.1%	-34.5%	-27.9%	-32.3%	-31.6%

 * Totals may be one or two off due to rounding. ** K-4 enrollment trough.

■ First Five Forecast Years: Since the K-4 enrollments are projected to decline from their peak level in 2005, it is projected that the enrollments of all four elementary schools will decline over

the next five years by as many as 447 students or by -23.4%. This drastic projected decline is due to a sharp decline of births in the midst of a dire economic recession during the past three years. In terms of percentage, Sandy Hook is projected to continue to decline by the most, 28.2% (-176 students), followed by Hawley by 22.9% (-96 students), Head O'Meadow by -22.5% (-84 students), and Middle Gate by -18.5% (-91 students) over the next five years.

▪ The Second Five Forecast Years: The declining enrollment trends of the past five years are projected to slow down during the second five years of the projection period given that the assumed numbers of births prove to be accurate. It is projected that Newtown's K-4 enrollments will decline much more slowly than they did in the first 5 years; they will decline by 158 students or by 10.8% over the second five years. In the process, K-4 enrollments reach a trough at the level of 1,267 students in 2017 and then show a slight increase because the projected births are shown to increase slightly. This pattern is repeated by each school losing on average 39.5 students or 10.8% in a span of five years.

FIG. 7-1
GRADE K-4 ENROLLMENT PROJECTIONS BY SCHOOL
NEWTOWN PUBLIC SCHOOLS, 2010-2019
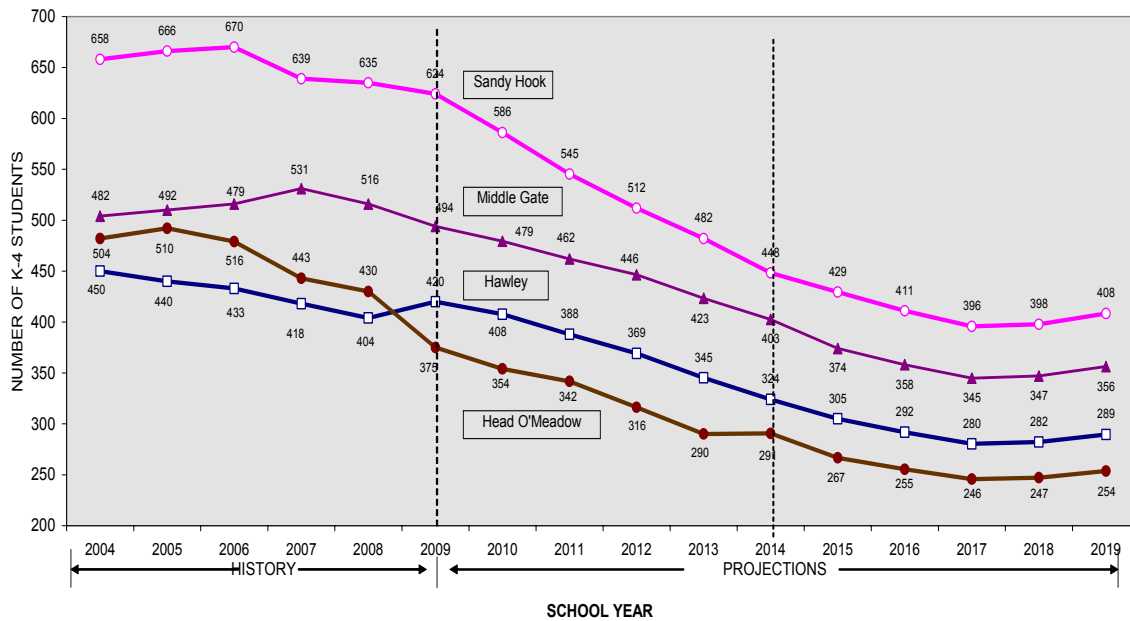
▪ Altogether, Newtown elementary schools are projected to lose 31.6% of their enrollments (604 students) over the next ten years according to the middle projections over the next ten years.

7.5 Intermediate, Middle and High School Enrollment Projections

Table7.2 presents 10-year enrollment projections for intermediate, middle, and high schools in Newtown.

▪   Reed Intermediate School: Reed Intermediate School lost only 13 students (-1.5%) during the past five years, but is projected to lose as many as 124 students (-14.4%) over the next five years, and even more students over the subsequent five years, losing a total of 195 students (-26.5%). Altogether, grades 5-6 enrollments in Newtown are projected to decline by 319 students or by 37.0%. This enrollment plunge is due to the fact that 5th and 6th graders over the next decade are the cohorts of those who were born between 2000 and 2009, the period during which the births in Newtown dived from 346 births in 2000 to 192 births in 2009, a reduction of births by 44.5% in ten years.

TABLE 7.2
10-YEAR ENROLLMENT PROJECTIONS FOR
INTERMEDIATE, MIDDLE AND HIGH SCHOOLS
NEWTOWN, CONNECTICUT, 2010-2019

	Reed Intermediate Grades 5-6	Newtown Middle School Grades 7-8	Newtown High School Grades 9-12
HISTORY:			
2004	874	862	1,622
2005	915	896	1,684
2006	911	890	1,710
2007	886	930	1,713
2008	902	928	1,700
2009	861	896	1,727
PROJECTIONS:			
2010	889	902	1,701
2011	885	874	1,717
2012	847	903	1,730
2013	809	898	1,691
2014	737	859	1,724
2015	717	821	1,693
2016	700	748	1,684
2017	650	729	1,642
2018	598	710	1,535
2019	542	660	1,480
Changes:			
Past 5 years (2004-09)			
Number	-13	34	105
Percent	-1.5%	3.9%	6.5%
Fist 5 Years (2009-14)			
Number	-124	-37	-3
Percent	-14.4%	-4.1%	-0.2%
Second 5 Years. (2014-19)			
Number	-195	-199	-244
Percent	-26.5%	-23.2%	-14.2%
10 Years (2009-2019)			
Number	-319	-236	-247
Percent	-37.0%	-26.3%	-14.3%

* Totals may be one or two off due to rounding.

■   Newtown Middle School Enrollment Projections: Newtown Middle School lost 34 students (-3.9%) during the past five years, and is projected to lose almost the same number of students (-37 students) over the first five years of the ten-year projection period. The 7th and 8th graders during this period are the students who were born between 1998 and 2002, the period during which the births in Newtown were still high. However, enrollment is projected to decline by 199 students or by 23.2% over the second five-year period because the 7th and 8th graders in this period were born when births were sharply declining, between 2003 and 2007. Altogether, Newtown Middle School enrollments are projected to decrease by 236 students or by 26.3% according to the middle projections.

■   Newtown High School Enrollment Projections: Newtown High School enrollments have been steadily growing during the past 17 years, reaching a level of 1,727 students in 2009. During the past five years alone, the enrollments expanded by 105 students or by 6.5%. According to the middle enrollment projections, high school enrollment will decline slightly for two years but attain a peak level of 1,730 students in 2012, thus completing a 21-year half cycle from a trough in 1991 to a peak in 2012. This high number was achieved because the high school students over the next five years are the cohorts born between 1996 and 2000, a period in which the peak births occurred in 1997 when the birth levels were very high. Thus, the high school is projected to lose only 3 students over the next five years. But the high school students in Newtown over the second five years are the ones who were born between 2001 and 2005, a period when the births in Newtown began to fall. Accordingly, grades 9-12 enrollments are forecast to decline by 244 students or by 14.2% over the second five-year period.

7.6 Conclusion and Caveat

This report offers a forewarning that public schools in Newtown are entering into a long period of declining school enrollments. These enrollment forecasts are prepared based on the assumptions stipulated in Section 5 of this report. Accordingly, as the future unfolds, if it reveals that the emerging reality differs significantly from the assumptions, the updating of the enrollment projections are warranted. It is especially important to keep track of annual birth data. If the births in Newtown differ significantly from the projected births, and the national, state and regional economy turns out to be significantly different from the assumed unemployment rates, the updating of the enrollment projections is required. In short, annual updating is a must in a period of significant change.

APPENDIX TABLE 7-A
NEWTOWN PUBLIC SCHOOL ENROLLMENT PROJECTIONS BY SCHOOL & BY GRADE
Middle Projections

HAWLEY SCHOOL

		PK	K	1	2	3	4	K-4
Actual	2009	--	66	83	83	94	94	420
Projections	2010	--	65	77	81	90	95	408
	2011	--	59	76	75	87	91	388
	2012		57	69	74	81	88	369
	2013		49	67	67	80	81	345
	2014		47	58	65	72	81	324
	2015		50	56	56	71	73	305
	2016		48	58	54	61	71	292
	2017		48	56	56	58	61	280
	2018		51	57	54	61	59	282
	2019		54	60	55	59	62	289

SANDY HOOK SCHOOL

		PK	K	1	2	3	4	K-4
Actual	2009	--	100	111	129	140	145	625
Projections	2010	--	89	111	114	130	143	586
	2011	--	86	99	114	115	132	545
	2012	--	84	96	101	114	117	512
	2013	--	72	93	98	102	116	482
	2014	--	69	80	96	99	104	448
	2015	--	73	77	82	96	101	429
	2016	--	70	81	79	83	98	411
	2017	--	71	77	83	80	85	396
	2018	--	75	79	80	84	81	398
	2019	--	79	83	81	80	85	408

MIDDLE GATE SCHOOL

		PK	K	1	2	3	4	K-4
Actual	2009	-	83	94	98	104	116	495
Projections	2010	-	92	88	95	99	105	479
	2011	-	78	98	90	96	100	462
	2012	-	76	83	99	90	97	446
	2013	-	65	82	85	101	91	423
	2014	-	63	70	83	85	102	403
	2015	-	66	67	71	83	86	374
	2016	-	63	71	68	72	84	358
	2017	-	64	68	72	69	73	345
	2018	-	68	69	69	72	70	347
	2019	-	72	73	70	69	73	356

HEAD O'MEADOW SCHOOL

		PK	K	1	2	3	4	K-4
Actual	2009	-	43	77	86	75	94	375
Projections	2010	-	64	49	79	85	77	354
	2011	-	52	74	50	78	87	342
	2012	-	51	60	75	50	80	316
	2013	-	44	59	62	75	51	290
	2014	-	42	51	60	61	76	291
	2015	-	44	49	52	60	62	267
	2016	-	43	51	50	51	61	255
	2017	-	43	49	52	49	52	246
	2018	-	46	50	50	52	50	247
	2019	-	48	52	51	49	53	254

Totals may be one or two off due to rounding.

REED INTERMEDIATE SCHOOL

		5	6	5-6
Actual	2004	417	457	874
	2005	485	430	915
	2006	414	497	911
	2007	464	422	886
	2008	431	471	902
	2009	429	432	861
Projections:	2010	453	436	889
	2011	424	461	885
	2012	415	431	847
	2013	387	422	809
	2014	344	393	737
	2015	368	350	717
	2016	326	374	700
	2017	319	332	650
	2018	274	324	598
	2019	264	279	542

NEWTOWN MIDDLE SCHOOL

		7	8	7-8
Actual	2004	435	427	862
	2005	454	442	896
	2006	430	460	890
	2007	499	431	930
	2008	436	492	928
	2009	468	428	896
Projections:	2010	436	466	902
	2011	440	434	874
	2012	465	438	903
	2013	435	463	898
	2014	426	433	859
	2015	396	424	821
	2016	353	395	748
	2017	377	351	729
	2018	334	376	710
	2019	327	333	660

NEWTOWN HIGH SCHOOL

		9	10	11	12	9-12
Actual	2004	419	426	406	371	1622
	2005	439	432	424	389	1684
	2006	435	428	410	437	1710
	2007	443	431	420	419	1713
	2008	410	436	426	428	1700
	2009	465	402	430	430	1727
Projection	2010	414	460	400	426	1701
	2011	451	410	459	396	1717
	2012	420	447	409	454	1730
	2013	424	416	445	404	1691
	2014	449	420	415	441	1724
	2015	420	444	419	410	1693
	2016	411	416	443	414	1684
	2017	383	407	414	438	1642
	2018	340	379	406	410	1535
	2019	364	337	378	401	1480

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