THE ECONOMIC IMPACT OF SCHOOL-AGE POPULATION LOSS ON RHODE ISLAND'S ECONOMY

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EXECUTIVE SUMMARY

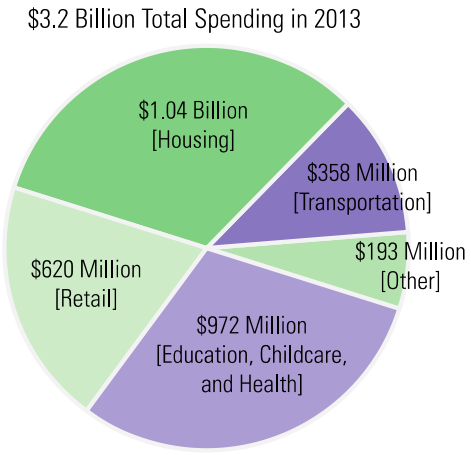
This report provides an empirical analysis of the economic impacts of spending among households with school-age children on economic activity and shows that spending among these households has a significant impact on economic activity and generates significant tax revenues for cities and towns in Rhode Island. The report also examines how the decline in the student population during the 2000s affected the cost-structure of K-12 public education services and economic activity in Rhode Island. Along with virtually non-existent population growth since 2000, Rhode Island has also seen a marked decrease in its school-age population (0-17 years). This loss of population resulted in decreased economic activity statewide and contributed to a significant increase in average spending per student enrolled in K-12 public schools locally.

Key Findings:

Economic Impact of Family Spending

This study uses industry accounts or *Input-Output Matrix* analysis to determine the economic impact that households with children have on the economy of Rhode Island. In Rhode Island, households spending related to child rearing is estimated to be $3.2 billion in 2013. This $3.2 billion in direct child rearing spending:

- Creates $4.2 billion in output across Rhode Island's economy, representing about 8 percent of the state's Gross Domestic Product.
- Supports 45,793 full-time equivalent (FTE) jobs in Rhode Island.
- Generates $1.7 billion in income for households.
- Creates $179.9 million in commercial and industrial taxes and $40 million in household taxes and fees for local and state governments.
- Accrues tax revenue about evenly between the state government and local cities and towns.



The school-age population in Rhode Island decreased by 35,417 from 2000-2013. This reduction negatively affects economic activity because it reduces households spending on local businesses and services. Our analysis shows that the loss of 14.3 percent of Rhode Island's school-age population meant a **reduction** in:

- GDP by $646 million, earnings by $262 million, and employment by 7,045 FTE jobs
- Child-rearing spending by $490 million
- Commercial and industrial tax revenues by $27.7 million and personal income and property taxes by $6.2 million. These figures include tax revenues for the local and state governments.

Spending on K-12 Education

The size of the school-age population is linked to overall population trends in a state. Rhode Island's population has seen a sharp decline since 2003 and a simultaneous decrease in K-12 enrollment throughout the state. The fixed costs associated with maintaining school infrastructure coupled with decreased student population has meant greater costs per pupil for municipalities.

- In Rhode Island, from 2003 to 2013, 26 out of 39 cities and towns lost population. From 2003 to 2011, K-12 enrollment declined in 34 out of 36 regular and regional school districts in Rhode Island. Lincoln and Barrington school districts were the exception and experienced increases in the number of students enrolled in the public system.
- The overall reduction in student population has meant excess capacity in school districts across the state. In 2011-12, districts reported a combined building capacity of 165,761 seats: 31,240 more than the state's current enrollment of 134,521. This suggests that the current stock of public educational facilities can accommodate up to an 18.8 percent increase in enrollment across the state.
- In Rhode Island, the average inflation-adjusted expenditure per student enrolled in K-12 public schools increased from $11,762 in 2001 to $14,948 in 2011, a 27 percent increase. Average expenditure per pupil varies greatly across school districts in Rhode Island. As of 2011, expenditure per pupil was $12,037 in Cumberland and $13,926 in Barrington compared to $19,467 in Central Falls and $22,059 in Newport.
- Socioeconomic conditions play a role in explaining the cost of K-12 public education in Rhode Island. However, staff composition, compensation scheme and school size explain most of the variations in expenditure per pupil across school districts in Rhode Island.

By examining the average cost function for Rhode Island's public schools over time and across school districts, this study finds strong evidence of economies of scale in public schools in Rhode Island. This means that the size of Rhode Island's school districts are currently economically inefficient and that increasing the size of the student population would reduce per pupil costs of K-12 educational services.

- Regardless of socio-economic factors, the per pupil cost of K-12 public education in Rhode Island is higher in small school districts than in larger school districts.
- Compensation to both instructional and non-instructional staff is the single most important driver of the per pupil cost of K-12 education in the state.
- The relatively higher cost per pupil experienced in the three largest school districts in Rhode Island (Cranston, Warwick, and Providence) are not caused by their large size, but rather it is associated with socio-economic factors and differences in compensation to both instructional and non-instructional staff in those districts.
- The share of non-instructional staff per pupil is positively related with average cost of K-12 education. This finding supports the view that small school districts with a larger ratio of non-instructional staff per student will experience higher cost to provide K-12 public education in Rhode Island.

- Student's socioeconomic conditions affect the per pupil cost of K-12 public education in Rhode Island. The percentage of students eligible for free/reduced-price lunch -- a proxy for economic hardship -- is positively associated with increasing cost of education. However, simulations conducted by the authors show that factoring out state school aid, local cities and towns do not face additional costs to educate children of disadvantaged socio-economic background compared to the costs of educating children from middle and upper classes.

Discussion and Implications

This report shows that spending among household with child rearing has a significant impact on economic activity in Rhode Island. Attracting and retaining families with children contribute to the economy via increased spending on local business and services and generate significant tax revenue for the state government (e.g. sales taxes, income taxes, and corporate taxes) and for local cities and towns (e.g. property taxes and fees). In addition, attracting families with children would increase the student population and contribute to reduce average cost per pupil via efficiency gains from economies of scale in educational services.

This study, however, also identifies that the costs and benefits of attracting and retaining families with children are split unevenly between the state government and local cities and towns. More precisely, the burden of K-12 education falls mostly on cities and towns, while the state government accrues just over 50 percent of the tax revenue generated by child-rearing related spending. This suggests that the cost and benefits of educating children are disproportionally biased in favor of the state government and against local cities and towns.

These findings suggest that the strength of the state and local economies depend on a multi-track approach to optimize education spending and promote economic development:

- **Statewide**: focus on economies of scale
    - Local and state governments might engage in efforts to align the size of school districts to levels that take advantage of economies of scale. Local and state policy makers should consider optimizing K-12 enrollment through the development of higher density housing, local education consortiums, and consolidation when feasible.
        - Housing development aimed at attracting families with children would increase the student population and contribute to reduced average costs per pupil via efficiency gains from economies of scale in educational services.
        - Families generate significant tax revenue for the state government (e.g. sales taxes, income taxes, and corporate taxes) and for local cities and towns (e.g. property taxes and fees).

- **Locally**: recognize that state aid mitigates costs of educating children, particularly students with disadvantaged socio-economic backgrounds.
    - Cities and towns are compensated --via school aid transfers – when they educate low-to-moderate income families with children. The June 2010 school funding formula allocates more school aid from the state government to districts with limited ability to generate revenues and with a higher density of students living in poverty.

- This study shows that factoring out state school aid, local cities and towns do not face additional costs to educate children of disadvantaged socio-economic background compared to the costs of educating children from middle and upper classes.

- **Consider additional support mechanism to reduce city and town burden**
  - Because attracting and retaining families with children is important to foster economic activity across the state, additional financial support for K-12 education is still required to help cities and towns in Rhode Island to provide quality education to their K-12 students. This could be accomplished by increasing aid through the existing funding formula or through the creation of financial and quality incentives for school districts that choose to increase their size (e.g. additional state funds to school districts that add an X number of students during a period).

THE ECONOMIC IMPACT OF SCHOOL-AGE POPULATION LOSS ON RHODE ISLAND'S ECONOMY

I. INTRODUCTION

Cities and towns across the country face an increased demand to provide a large array of public services including education, public safety, and sanitation. K-12 education has traditionally required substantial financial resources from local governments because of the scale of service demand and steady increases in cost to provide public educational services. In addition, expenditures per student enrolled in K-12 public schools have steadily increased over the years, resulting in some communities wanting to avoid growth in their school age population.

As demographic changes and migration flows affect the size of the school-age population across cities and towns in the U.S., the demand for educational services have also changed. These changes may affect school districts in different ways. For instance, places losing school-age population may experience an increase in the per-pupil cost of education because fixed costs like building maintenance and equipment must be incurred regardless of the number of students in a school or a school district. On the other hand, an over-crowded school district may experience rising educational costs due to the misallocation of resources to secondary or non-essential activities required to manage a larger student body.

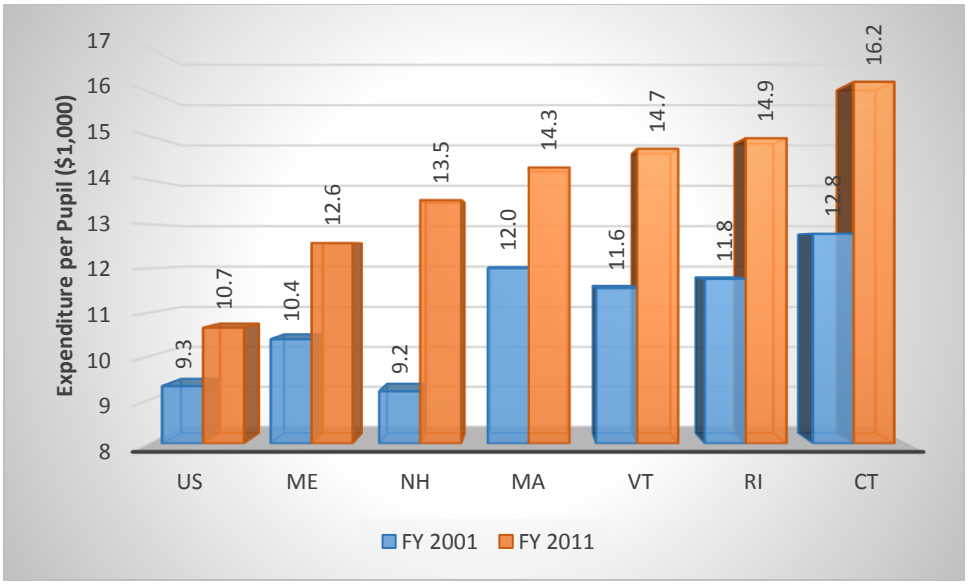
In Rhode Island, the number of students enrolled in public elementary and secondary schools dropped from 159,375 in 2003 to 142,300 in 2011, a decrease of 10.7 percent. The aggregate reduction in demand for educational services was followed by a significant increase in average current expenditures per student enrolled in K-12 public schools in the state. From 2001 to 2011, the inflation-adjusted average current expenditures per student enrolled in K-12 public schools in Rhode Island increased from $11,762 to $14,948, a 27 percent increase. This increase has placed additional budgetary concerns on local communities.

This study provides an empirical analysis of economic implications of changes in the school-age population across cities and towns in Rhode Island. The report is organized in six major sections. Section II investigates how changes in the school-age population as well as total population affect: i) construction activity (state level); ii) income tax revenues (state level), and iii) local property taxes across Rhode Island school districts. Section III examines changes in population and provides a detailed assessment of the cost to provide K-12 education across time and school districts in Rhode Island. Section IV reviews the literature examining economies of scale and the cost-structure of providing educational services. Section V develops an econometric model to examine the relationship between the size of the school-age population and the average cost of schooling per pupil across Rhode Island schools districts. This model allows determining if increases in school enrollment across Rhode Island cities and towns lead to increasing or decreasing average cost per pupil. This model also allows answering the following questions: Is it better to have a small or large school district? Are Rhode Island school districts too small or too big? Section VI summarizes the empirical results, discusses the implications of findings, and provides policy recommendations.

II. THE COST-STRUCTURE OF EDUCATIONAL SERVICES IN RHODE ISLAND

According to the Center for National Education Statistics (NCES, 2014), from 2001 to 2011, inflation-adjusted current expenditures per student enrolled in K-12 public schools in Rhode Island increased from $9,319 to $10,658, a 14 percent increase. It is worth noting that the 2011 expenditure was lower than 2010 level ($10,835). From 2001 to 2011, the average current expenditures per student enrolled in K-12 public schools increased from $11,762 to $14,948, a 27 percent increase. Figure 1 shows that in Rhode Island, the average expenditure per pupil is higher than the national average as well as higher than the average expenditure per pupil in Massachusetts ($14,285), Maine ($12,576), New Hampshire ($13,458), and Vermont ($14,707), but lower than that in Connecticut ($16,224). The high cost of education in Rhode Island requires administrators to seek innovative ways to improve the efficiency and reduce costs to deliver educational services in the state.

FIGURE 1: INFLATION-ADJUSTED CURRENT EXPENDITURES PER PUPIL FOR K-12 EDUCATION

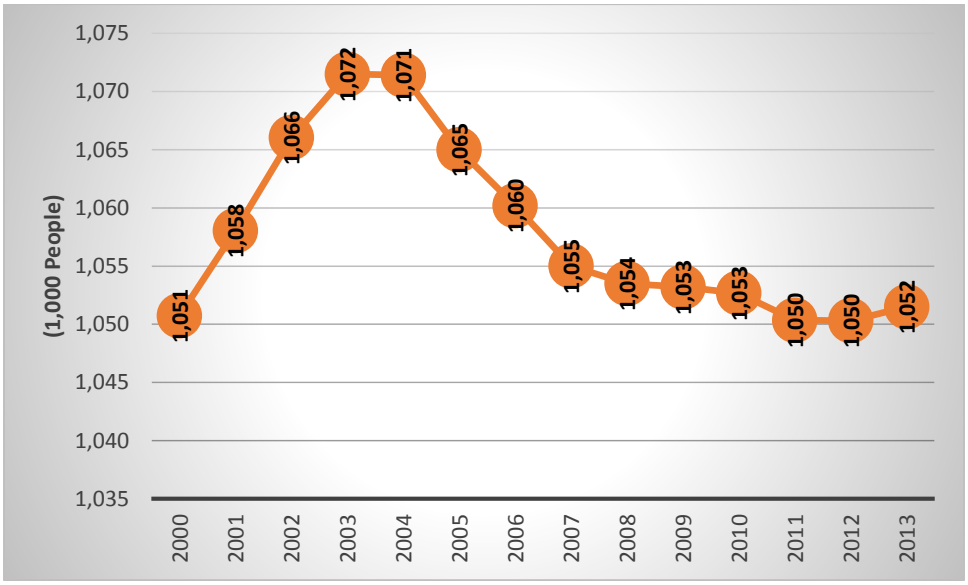


Source: Center for National Education Statistics.
The figures above have been adjusted to fiscal year 2011 dollars using the Consumer Price Index (CPI).

Providing educational services requires significant investments in school buildings and other infrastructures and costs of hiring teaching and administrative staffs. A certain amount of these costs, similar to fixed costs in accounting terms, will be incurred regardless of the number of students enrolled. Under this context, if the school-age population declines, the per-pupil cost of education may rise due to the fixed cost-structure. Likewise, if the school-age population increases to a certain degree, the per-pupil cost of education may decline as fixed costs are distributed across a larger number of students so that average fixed cost, or the fixed cost per student, decreases.

The size of the school-age population is linked to overall population trends in a state. According to the U.S. Census, Rhode Island population peaked in 2003 at 1.071 million and then returned to the level of early 2000s. The state population was 1.051 million in 2000 and 1.052 million in 2013.

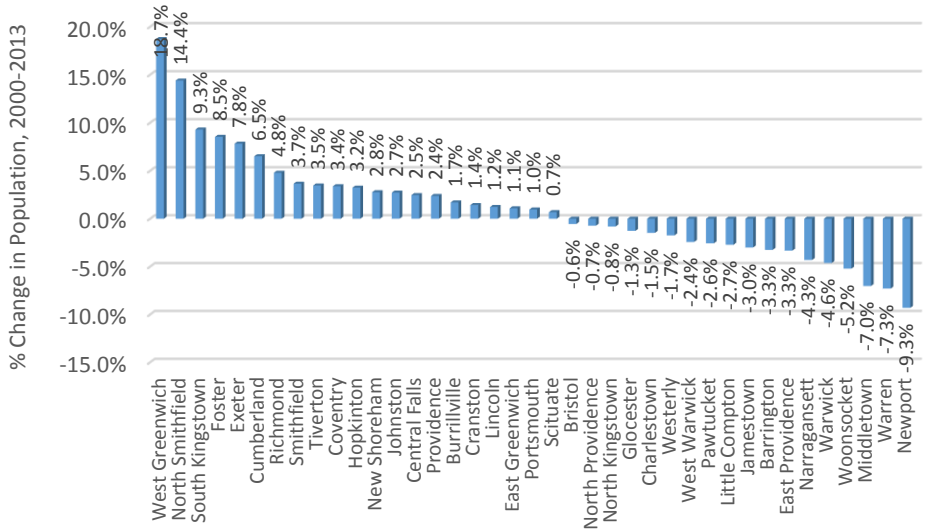
FIGURE 2: POPULATION TREND, RHODE ISLAND, 2000 TO 2013



Source: U.S. Census Bureau.

While the state's population stayed roughly the same over the last 14 years, there were significant variations in population growth across cities and towns in the state. Newport, Warren, Middletown, and Woonsocket - places with the largest population losses in Rhode Island - experienced population losses above 5 percent from 2000 to 2013. On the other hand, West Greenwich, North Smithfield, South Kingston, Foster, Exeter, and Cumberland experienced population growth above 5 percent between 2000 and 2013. Taking the peak population of 2003 as the reference, 26 out of 39 cities and towns lost population in Rhode Island from 2003 to 2013 (See Figure 3 and Table A1 in Appendix A).

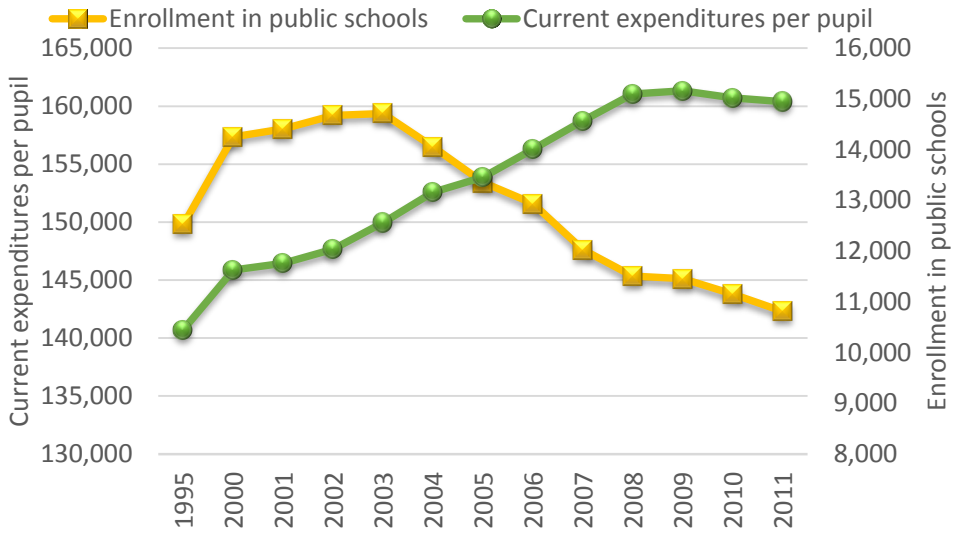
FIGURE 3: CHANGE IN POPULATION BY CITIES AND TOWNS, 2000 TO 2013



Source: U.S. Census Bureau.

These changes in population affected the demand for educational services across the state. In Rhode Island, the number of students enrolled in public elementary and secondary schools increased until 2003, but then this trend reversed and enrollment dropped from 159,375 in 2003 to 142,300 in 2011, a decrease of 10.7 percent. This significant decline in the student population during the 2000s led total enrollment to return to the level observed in the early 1990s. Notwithstanding, the average inflation-adjusted current expenditure per pupil attending the public school system increased from $10,435 in 1995 to $15,100 in 2008, an increase of 44.5 percent. The average inflation-adjusted current expenditure per pupil attending the public school system was $14,948 in 2011, a drop of 1 percent compared to 2008. The 2008 Great Recession pushed cities and towns to tighten their budgets and cut costs, thus triggering this reversal.

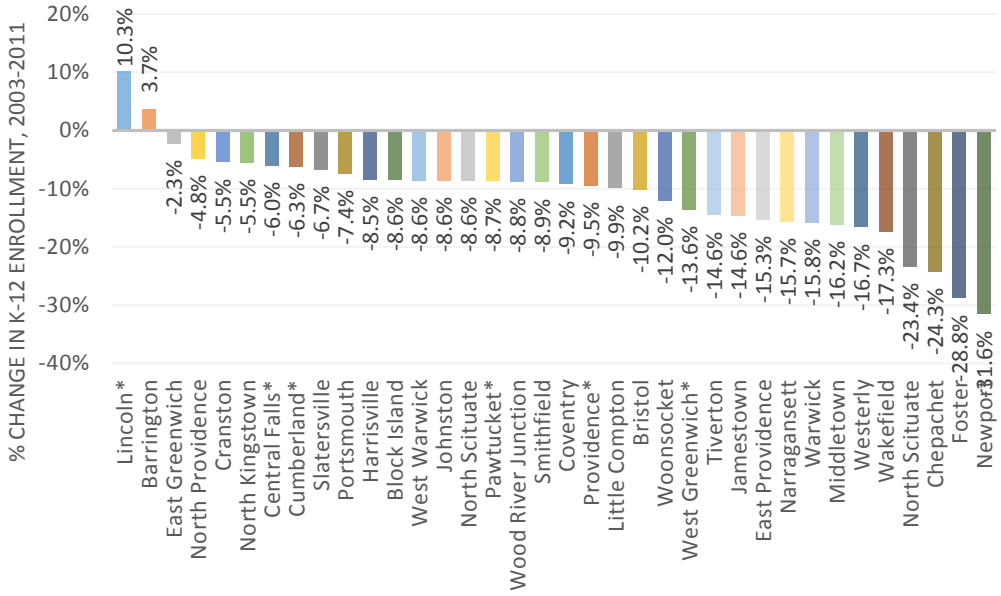
FIGURE 4: ENROLLMENT AND EXPENDITURE PER PUPIL, RHODE ISLAND, 1995-2011



Source: Center for National Education Statistics.
Note: Inflation-adjusted using the CPI

The changes in both demand and the cost structure for public education impacted cities and towns in very different ways in Rhode Island. Among the 36 regular and regional school districts in the state, only the Lincoln and Barrington school districts experienced an increase in the number of students enrolled in the public system from 2003 to 2011. These districts' good reputation for quality education likely helped to attract families with school-age family members. The number of K-12 students in all other school districts decreased, but the decline rates are very different across cities and towns in the state. As can be seen in Figure 5, during the same period the decline in the public school student population was 2.3 percent in East Greenwich and 4.8 percent in North Providence, compared to a decline of 28.8 percent in Foster and 31.6 percent in Newport.

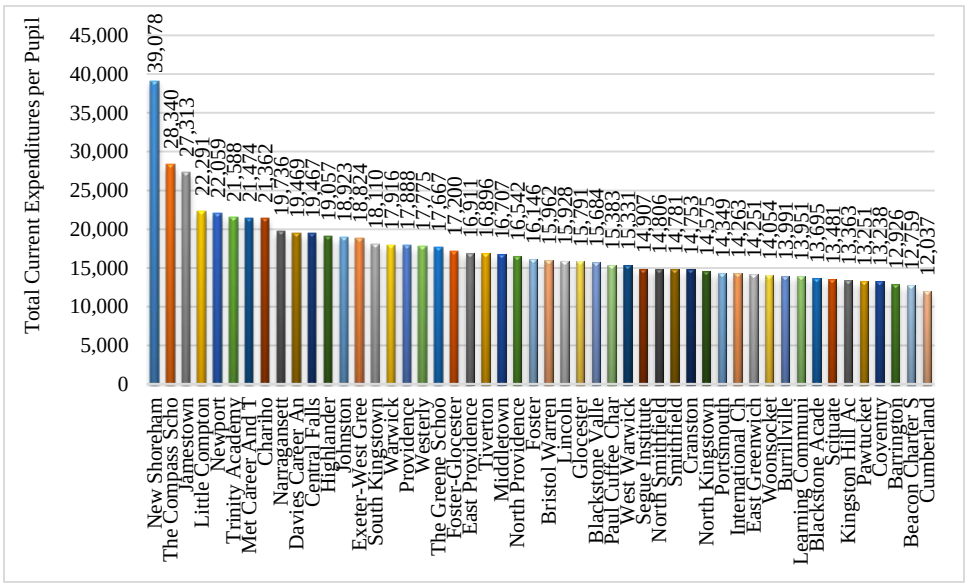
FIGURE 5: CHANGE IN K-12 ENROLLMENT, 2003-2011, RHODE ISLAND SCHOOL DISTRICTS



Source: Center for National Education Statistics. * denotes combined all school districts within a city.

Expenditure per pupil varies greatly across school districts in Rhode Island. As of 2011, current expenditure per pupil was $12,037 in Cumberland and $13,926 in Barrington compared to $19,467 in Central Falls and $22,059 in Newport. The large variation in the cost of delivering elementary and secondary education across school districts suggests that there exist major differences in the cost structure and, thus, opportunities to re-align costs and improve the efficiency of the public education system in the state.

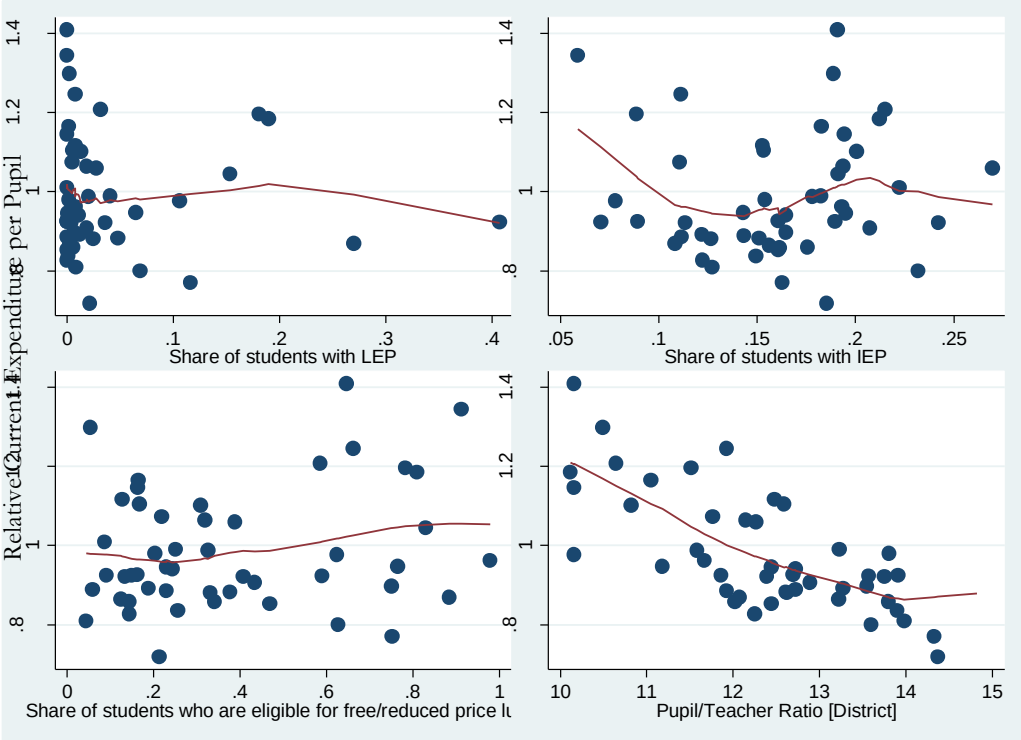
FIGURE 6: TOTAL CURRENT EXPENDITURES PER PUPIL, 2011, RHODE ISLAND



Source: Center for National Education Statistics.

The cost of providing education is affected by the school district's size, the staff composition (e.g. teachers per pupil and non-instructional staff per pupil), compensation scheme (salaries and benefits), and socio-economic attributes (e.g. poverty incidence, ESL education, proportion of students with special needs, etc.). For instance, schools provide a variety of services for students with special needs and these programs generally have a cost associated with them. Thus, the average cost of education is expected to increase with the rise of the proportion of students with special needs who are enrolled in the school district. In addition, to the extent that foreign-born students are less proficient in the English language than the native-born students; it takes additional resources to offer classes for students with limited English Language proficiency (ELP), which would raise the cost of providing education. According to the U.S. Census Bureau, there were 134,335 foreign-born residents (children and adults) living in Rhode Island in 2010, making up 12.8 percent of Rhode Island's population, just below the U.S. rate of 12.9 percent.[1] The American Community Survey 5-year estimates (2006 to 2010) show that the share of foreign-born population is the highest in Central Falls (41.8 percent) and the lowest in Greenville (at 3 percent).[2]

FIGURE 7: RELATIVE CURRENT EXPENDITURE PER PUPIL AND SOCIO-ECONOMIC CONDITIONS, 2011, RHODE ISLAND



Source: Center for National Education Statistics. Each "bullet" represents a school district; New Shoreham (Block Island), with a 2.3 "relative expenditure per pupil" is not included in the graph above.

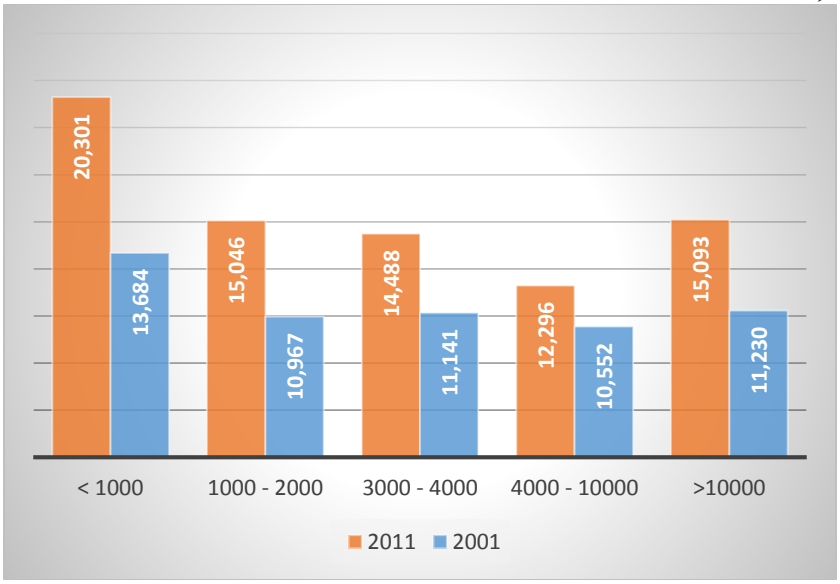
1 http://www.rikidscount.org/matriarch/documents/Rhode%20Island%20Children%20In%20Immigrant%20Families_FINAL.pdf (Accessed in January 15, 2015)

2 http://www.indexmundi.com/facts/united-states/quick-facts/rhode-island/foreign-born-population-percent/cities#chart (Accessed in January 15, 2015)

Figure 7 plots current expenditure per pupil relative to the state average against three key measures of socio-economic conditions and the pupil/teacher ratio. It shows that, on an aggregate basis, relative current expenditure per pupil is uncorrelated with the share of students with limited English proficiency and with the proportion of students enrolled in individualized education program (IEP). However, there is a weak positive correlation between relative current expenditure and the share of students who are eligible for free or reduced lunch price and a strong negative correlation between average cost and the pupil/teacher ratio. These correlations suggest that while socio-economic factors affect the cost of educational services, other factors including staff composition, compensation scheme and school size should explain most of the variations in expenditure per pupil across school districts in Rhode Island. While correlations are informative, a multivariate analysis provides a deeper insight of the factors determining the cost-structure. Section IV uses regression analysis to examine the drivers of the cost of providing public education.

Figure 8 plots school size and the average current expenditure per pupil across Rhode Island's school districts. It shows that there is a strong association between the size of the school district and the cost per pupil, with smaller school districts experiencing higher cost per pupil. However, the relationship is non-linear and very large school districts seem to experience diseconomies of scale because their average cost per pupil increases. This relationship seems to hold over time. However, the cost structure depends on several factors that may vary across school districts, thus the presence of economies of scale can only be determined within a statistical model that accounts for the heterogeneity across school districts. Section III examines this issue in detail.

FIGURE 8: AVERAGE CURRENT EXPEND PER PUPIL AND SCHOOL SIZE, 2011



Source: Center for National Education Statistics.

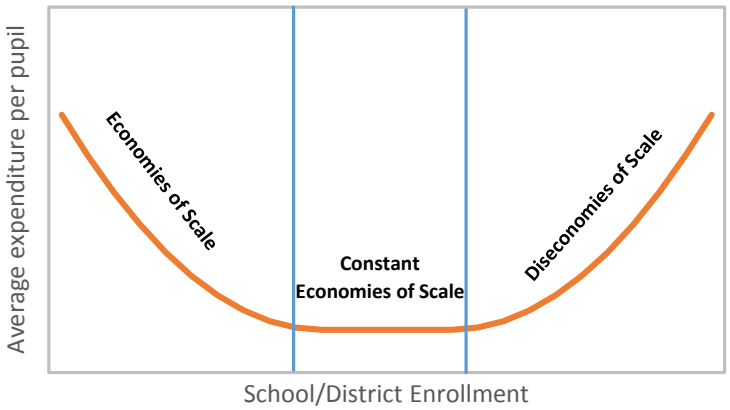
III. EDUCATIONAL SERVICES AND ECONOMIES OF SCALE

The financial structure of public education services has been the subject of debate over past decades in the United States. Developing an effective funding plan for the optimal use of schooling budget is difficult, because such a plan must consider and account for socio-economic factors and structural differences in school districts. To maximize the benefits of a limited education budget, policy

makers should ensure that the education budget is spent wisely. This often takes a variety of experiments and different strategies to produce better educational outcomes (Boser, 2013).

A key element and strategy arising from this debate has been linked to optimal school size and the notion of economies of scale. The term "economies of scale" refers to the cost advantage that arises with increased output. On the other extreme, "diseconomies of scale" refers to the cost increases when output increases. In the education setting, these terms can be used to examine what happens to the average cost per student as the size of the school district changes. Figure 9 graphically shows the concept of economies of scale.

FIGURE 9: ECONOMIES OF SCALE IN SCHOOLING



Economies of scale arise because of the inverse relationship between output and per-unit fixed cost; i.e. the greater the output, the lower the per-unit fixed cost because these costs are shared over a larger unit of goods. Economies of scale may also occur if the variable costs per unit decline because of operational efficiencies and synergies. The identification of the presence of economies (or diseconomies) of scale in a schooling district is important because educational outcomes of the schooling budget may be different in each case. For example, the same amount of funding per student will produce different levels of education services depending on the size of a school district. Under economies of scale, it would cost more to offer the same level of education services in small school districts compared with larger school districts.

A considerable amount of research examines the presence of economies and diseconomies of scale in the provision of local education. The results, however, are mixed and highly dependent on the specific conditions of the region or state.

One possible way of enabling economies of scale is through school district consolidation (Zimmer *et al.* 2009). Illinois and South Dakota are examples of state-level efforts to promote school consolidation. Indiana is also recommending school consolidation for districts with less than 2,000 students by providing funding to school districts interested in consolidation with neighboring districts. Zimmer, DeBoer and Hirth (2009) use 2004-2006 Indiana school district data to examine the potential for reducing costs through school district consolidation by enabling economies of scale. They find evidence supporting the efficacy of consolidation with optimal enrollment just under 2,000. However, school district consolidation also has non-monetary implications. For example, it was pointed out that these consolidations may dismantle the sense of community. For this reason, families and community leaders in many districts are against the school district

consolidation to preserve the culture and community-specific characteristics that have been solidly built into social fabric (Boser 2013).

Antonucci (1999: 2) finds that as the size of school districts expands, more costs incur to pay for "secondary or even non-essential activities", eventually leading the system to suffer from "penalties of scale". In a similar vein, Coffin (2011) emphasizes the needs of typical large urban school district having optimal size. He further argues for the disaggregation of larger urban schools into smaller districts, each of which accommodates not more than approximately 3,500 students, to improve the education cost control structure.

Another problem arising from the large-scale schools and districts pertains to the academic outcome of students. Oakerson (1992) finds that there is a negative relationship between the size of school district and the students' performance on standardized tests. He further finds that student's performance, other things equal, are lower in larger school districts. More specifically, Driscoll, Halcoussis and Svorny (2003) examine how the district size impacts the students' academic performance using California data and also find that the larger size of school districts hampers students' performance with its largest impact on the educational outcome of middle school students.

However, a large number of empirical work provides evidence supporting the presence of economies of scale in the provision of educational services. This literature supports a sentiment that is well represented by the statement of Illinois Gov. Pat Quinn. In his 2011 budget address, he stated that "Illinois should greatly reduce the number of school districts in the state" and "If we have fewer school districts, as many states do, we can find ways to economize." This potentially politically risky remark comes from the fact that the state had "868 school districts, more than almost any other state," thereby having created "a lot of unnecessary expense through duplication of services".[3]

Bowles and Bosworth (2001) investigate whether school size affects the average cost of providing education. They use Wyoming school districts data and find that in order to achieve similar outcomes, per student cost is higher in small schools than in large schools. Chakraborty *et al.* (2000) use panel data for Utah school districts in their study and find the existence of significant economies of scale at both the district and individual school level. However, their evidence is weaker for school size. Downes and Pogue (1994) use the Arizona data to determine adjustments for districts with students who require more care and attention. They find that districts with at-risk students such as students with limited English proficiency or eligibility for subsidized lunch (proxy for poverty), face higher costs.[4] In particular, when education output (measured by test scores) and other factors are held constant, districts with relatively high fractions of at-risk students are found to have relatively high per-student costs.

Using the data from the National Center for Education statistics' Common Core of Data, Boser (2013) compiles financial and enrollment data for all non-remote districts with 1,000 or fewer students, including the actual per-pupil cost. Their results provide evidence for the presence of

[3] http://articles.chicagotribune.com/2012-01-31/opinion/ct-edit-consolidate-20120131_1_school-districts-restructuring-of-public-education-cost-effective-education (Accessed in January 15, 2015)

[4] If education policy aims to compensate for differences across individual schools and school districts, the first task is to identify the factors that contribute to the rising cost. Thereafter, schools and districts under the influence of cost-raising factors could be given additional funds that would finance compensatory programs to properly respond to the effects of these factors on the rising cost. For example, a state grant may be provided to support programs to offer extra classes or remedial classes to enhance students' academic skills including English language proficiency.

economies of scale in education. In California more than $64 million may be lost on small school districts. In New Jersey, the estimated lost potential cost (money that would not have been spent if the districts were larger) is about $100 million, or about $1,000 per classroom teacher. However, these estimates are state-specific and relatively small in some states.

Although the efforts to promote school district consolidation have slowed in recent years because of concerns about its effectiveness, consolidation efforts are very much part of the conversation to improve the efficiency of education spending in many states. Despite all these efforts, Boser (2013) recognizes the difficulty to address the problems of small school districts.

Overall, the empirical literature shows that the cost of providing public education is determined by a myriad of factors including the size of the school district and socio-economic factors. However, the literature also makes it clear that the cost-structure of public education is specific to each economic area. Thus, a more precise understanding of the various factors driving educational cost in Rhode Island inherently requires an empirical analysis that uses quantitative analytical tools. The next section uses a panel data set to investigate the behavior of average schooling cost across school districts in Rhode Island. More specifically, the empirical model identifies factors that affect average schooling cost by considering economic conditions (poverty, for example), an education-related skill sets (English language proficiency, for example), and the staffing composition of school districts in the state.

IV. MEASURING ECONOMIES OF SCALE IN RHODE ISLAND

This section examines the average cost function for Rhode Island's public schools using a panel data, which includes data over time and across school districts. Panel data analysis has several advantages compared to traditional regression techniques. First, the sample size increases significantly, thus increasing the accuracy and consistency of the estimates. Second, it can also address the potential problems that may arise from omitting explanatory variables. More specifically, the use of panel data deals with a potential omitted variable bias that plagues cross-sectional regressions by combining time series and cross sectional data. This approach allows controlling for time-invariant unobserved characteristics of each school district. We follow Chakraborty *et al.* (2000) and Bowles and Bosworth (2002) and use the following econometric specification:

$$\ln AC_{i,t} = \beta_0 + \beta_1 \ln Q_{i,t} + \beta_2 \ln P_{i,t} + \beta_3 S_{i,t} + u_i + \varepsilon_{i,t} \qquad (1)$$

where *i* indexes school districts, *t* denotes year=2001,….2011, AC is the cost per pupil, Q is a measure of output or educational outcomes, P measures input prices (e.g., staff compensation), S a vector of variables that measure those attributes of the school district that influence educational cost (poverty incidence, students with special needs, etc.), u is the unobserved time invariant characteristic of each school district, and ε is an error term. In this study, Q measures the number of K-12 students in each school district. This approach is chosen because of the lack of time series measures of educational outcomes.

We estimate several variants of the equation above. All models are estimated using fixed effects[5] with a robust covariance matrix clustered by city in which the school district is located. The data used in the regression analysis are from the Center for National Education Statistics and includes 51 Rhode Island's school districts. The data are collected from 2001 to 2011, but the panel is unbalanced because some school districts were created during the time of the analysis. Table A2 in the Appendix provides aggregate descriptive statistics and the definition of all variables considered in the study.

TABLE 1: PANEL DATA ESTIMATES
Determinants of the Cost-Structure, Rhode Island School Districts, 2001-2011

	Dep. Var: ln Cost Per Pupil					Dep. Var: Cost Per Pupil	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ln Total Students	-0.322**	-0.125***	-0.138***	-0.112**	-0.102**		
	[-2.60]	[-3.66]	[-3.49]	[-2.58]	[-2.41]		
ln Real Teachers Salaries per pupil		0.518***	0.507***	0.548***	0.552***		7615.6***
		[9.12]	[9.25]	[9.15]	[7.61]		[6.62]
ln Real Admin. Salaries per pupil		0.389***	0.352***	0.339***	0.329***		5054.2***
		[11.56]	[11.13]	[9.29]	[8.17]		[9.39]
% Students who are eligible for free/reduced price lunch[a]		0.361***	0.305***	0.351***	0.386***		3316.5
		[3.70]	[3.03]	[3.55]	[3.66]		[1.64]
% Students in middle school[a]			0.118	0.226	0.291		5523.5
			[0.59]	[0.79]	[0.94]		[0.83]
% Students in high school[a]			0.953***	0.633***	0.678***		-1345.2
			[4.12]	[2.83]	[2.97]		[-0.24]
Ln Non-instructional staff per pupil				0.0124*	0.0132*		130.0
				[1.84]	[1.83]		[1.64]
% Students with LEP[a]					-0.180		-2254.1
					[-1.09]		[-0.72]
% Students with IEP[a]					0.0887		-173.9
					[0.46]		[-0.06]
Number of Students						-5.461***	-1.191**
						[-6.50]	[-2.62]
Number of Students Squared						0.0890***	0.0151
						[5.04]	[1.61]
Constant	11.90***	2.812***	3.025***	2.592***	2.501***	30190.5***	-89911.7***
	[12.79]	[4.10]	[4.48]	[3.33]	[3.08]	[12.25]	[-8.56]
Observations	463	460	460	379	337	463	337
School Districts	51	51	51	51	51	51	51
R-squared - Within	0.119	0.813	0.827	0.850	0.848	0.326	0.829
R-squared - Between	0.185	0.799	0.612	0.711	0.714	0.0353	0.539
R-squared - Overall	0.104	0.669	0.480	0.586	0.597	0.0252	0.367

Notes: t statistics in brackets, [d] p <0.12, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All regressions are fixed-effects estimates with a robust covariance matrix clustered by city in which the school district is located. [a] indicates that the variable is measured as a proportion, thus the coefficient estimate must be divided by 100 to produce semi-elasticities.

[5] The unobserved component can be treated as either fixed or random effects. This study uses the Hausman test to determine the best specification (whether fixed or random effects). The results of the test, not reported in the paper, support the use of fixed effects.

Table 1 reports the estimates of a set of alternative specifications for equation 1. The R^2 figures show that the right hand side variables explain a large proportion of the variations in the cost-structure of education both across school districts in Rhode Island (R-squared Between) and over time for each individual school district (R-squared Within). This implies that school districts are relatively homogenous and that the unaccounted heterogeneity is relatively small across school districts in Rhode Island. Overall, the coefficient estimates are in accordance with the literature discussed above.

Staffing and Cost-Structure

The empirical model suggests that differences in staffing composition and compensation are key determinants of the cost of providing K-12 education across school districts in Rhode Island.

The coefficient estimates on non-instructional staff per pupil is positive and significant. Holding per pupil compensation to both administration and instructional staff constant, model 5 implies that a ten-percentage point increase in non-instructional staff per pupil is associated with a 1.5 percent increase in the cost per pupil. Not surprisingly, this finding supports the view that small school districts may experience higher cost to deliver education because they may also have a larger ratio of non-instructional staff per student.

The estimates provide strong evidence that compensation (wages) to both instructional and non-instructional staff is the single most important driver of the average cost of K-12 education in Rhode Island. Controlling for other factors, model 5 in Table 1 implies that a ten percent increase teachers' salaries is associated with a 5.5 percent increase in the cost per pupil. In addition, a ten percent increase in salary paid to the school administration is associated with a 3.3 percent increase in the cost per pupil.

The model also indicates that controlling for staffing compensation and socio-economic conditions, educational costs vary with the composition of the student population (elementary, middle, and high school) in each school district. More precisely, providing high school education is relatively more costly than providing elementary and middle school education.

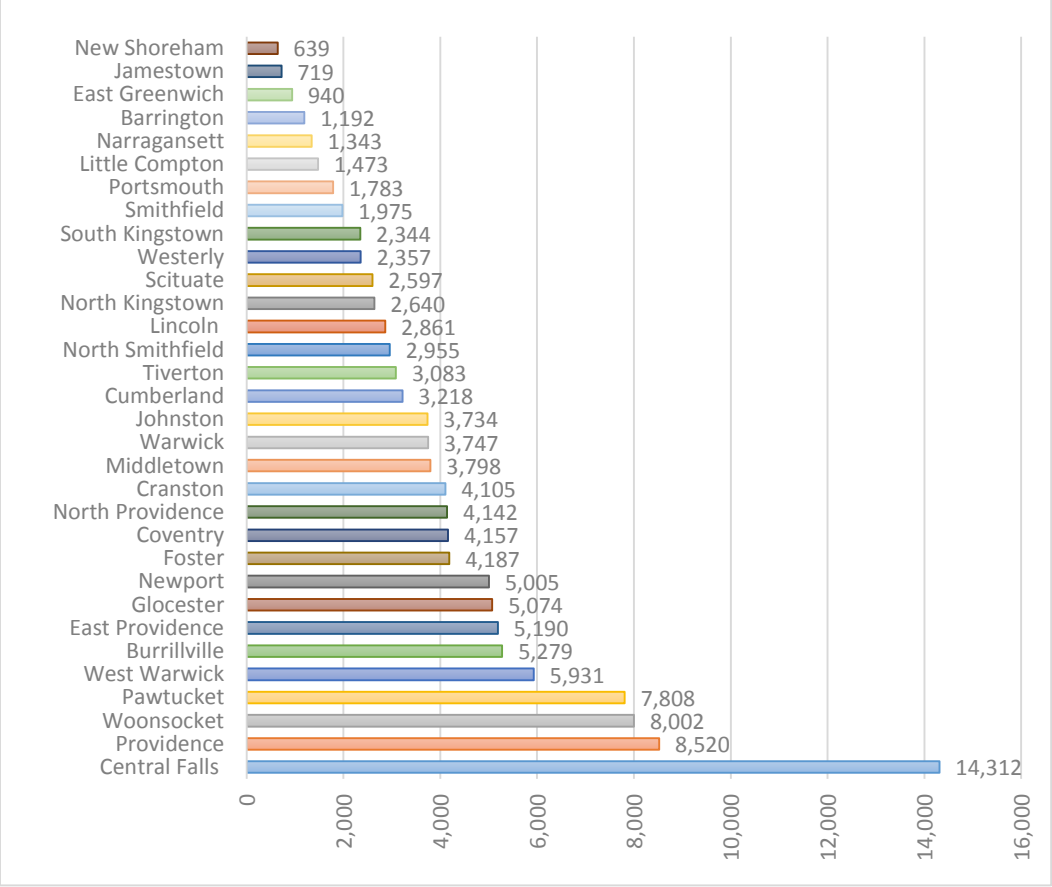
Socio-economic Conditions

This study finds evidence that socio-economic conditions play a significant role in explaining the cost of education in Rhode Island. More precisely, in all models of Table 1, the coefficients on the percentage of students who are eligible for free/reduced-price lunch (a proxy for poverty) are positive and statistically significant. The coefficient estimate of column 5 of Table 1 implies that a ten-percentage point increase in the student population who are eligible for free/reduced lunch is associated with a 3.8 percent increase in the cost per pupil. It is worth noting that controlling for the eligibility for free/reduced-price lunch, the coefficient on the percentage of students with limited English proficiency (LEP) and on individualized education programs (IEP) are not statistically significant. These findings suggest that poverty status is the relevant socio-economic determinant of the cost of educational services.

This finding suggests that it is important to recognize that state-level efforts are required to mitigate the impact of socio-economic and demographic changes on educational costs that local cities and towns are subject. And compensatory programs can ameliorate the effects of these factors on the rising costs of education. The school-funding formula enacted in June 2010 in Rhode Island

addresses this issue by allocating more state-level school aid to districts with limited ability to generate revenues and with a higher density of students living in poverty. Figure 10 reports how much each school district received in aid per pupil in FY 2014. It shows that districts with high poverty incidence (e.g. Central Falls, Providence, and Woonsocket) received larger transfers per pupil from the state government than districts with low poverty incidence (e.g. New Shoreham, Jamestown, East Greenwich, and Barrington). This suggests that state-level transfers from the State government mitigate the local burden of educating poor children.

Figure 10: District School Aid per Pupil, FY 2014, Rhode Island



Source: Authors' compilation using data from RIDE.

Economies of Scale

This study finds that regardless of the specification, there is strong evidence for the presence of economies of scale in educational services in Rhode Island. More precisely, accounting for several local characteristics, the coefficients on the size of the student population are negative and statistically significant in all models of Table 1. This implies that the cost per pupil in a small school district is higher than that in a relatively large school district. Model 3 of Table 1 suggests that a 10 percent increase in the size of the school district decreases the cost per pupil by about 1 percent.

Figure 8, however, shows that very large school districts might experience diseconomies of scale. To examine this case, we estimate a quadratic model (models 6 and 7) that allows identifying a potential turning point in cost per pupil as the size of the school district increases. The point estimate (model 6) suggests that congestion-costs that would lead to diseconomies of scale would only affect school districts with more than 30,000 students. However, the coefficient on the quadratic term turns statistically insignificant when regressors measuring socio-economic conditions and the cost-structure are added to the regression (model 7). Thus, the estimates indicate that the relatively higher cost per pupil experienced in the three largest school districts in Rhode Island (Cranston, Warwick, and Providence) are not caused by their large size, but rather associated with socio-economic factors and differences in compensation to both instructional and non-instructional staff that are specific to those districts. Moreover, accounting for these factors, those school districts would also experience a reduction on the average cost per pupil if they would increase enrollment.

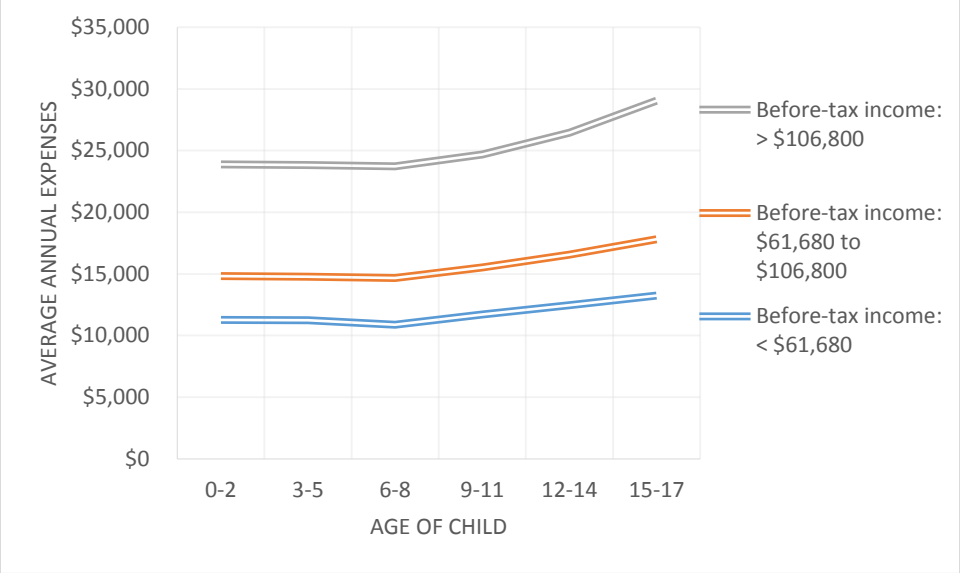
V. THE ECONOMIC IMPACT OF THE SCHOOL-AGE POPULATION ON THE LOCAL ECONOMY

The report *Expenditures on Children by Families, 2013*, produced by the Center for Nutrition Policy and Promotion at the USDA, estimates that in 2013 in the U.S., the average annual child-rearing expenses ranged from $12,940 to $14,970 for a child in a two-child, married-couple family with before-tax income less than $61,530.[6] These figures include child-specific expenses such as food, clothing, childcare and education, transportation, and miscellaneous expenses. The study highlights that housing accounted for about one third of total child-rearing expenses, followed by expenses with child care/education (18%), food (16%), transportation (14%), health care (8%), clothing (6%), and miscellaneous (8%). The effect of each of these components on expenditure changes as a child ages, with noticeable increases in expenses with food, transportation, clothing and health care.

Families living in urban areas in the Northeast have the highest child-rearing expenses. Middle-to low income families living in urban areas in northeastern states are expected to spend $212,430 in child-rearing expenses to raise a child from birth to age 18. The average annual child-rearing expenses ranged from $12,940 to $14,970 for a child in a two-child, married-couple family with before-tax income less than $61,530. Figure 11 shows that the child-rearing expenses in Northeastern states change significantly with the income level as well as with the age of the child.

[6] "Indirect costs involved in child rearing by parents (time costs, foregone earnings and career opportunities) are also not included in the estimates." (p. iv)

FIGURE 11: CHILD-REARING EXPENSES BY AGE AND INCOME LEVELS, URBAN NORTHEAST



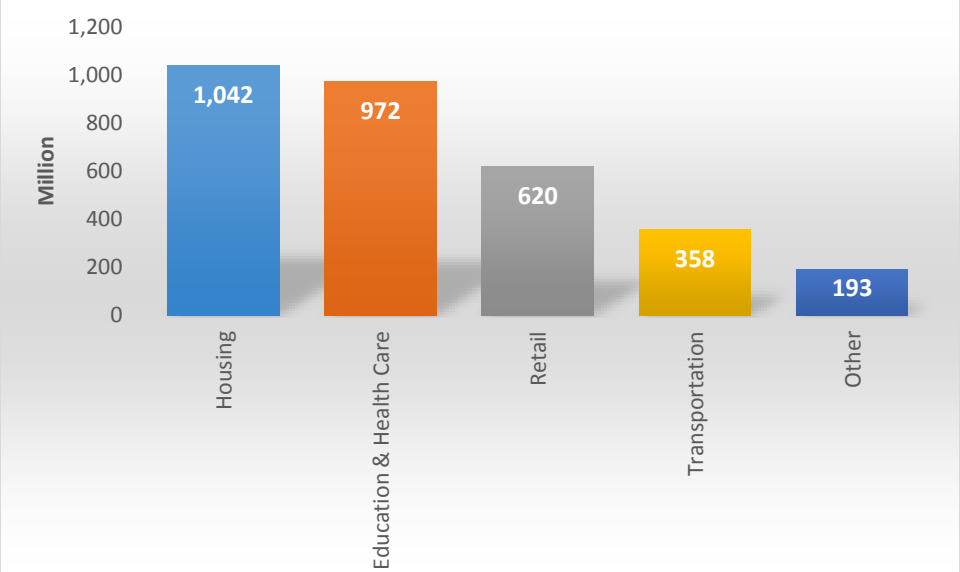
Source: Center for Nutrition Policy and Promotion, USDA.

The figures from the USDA imply that local economic activity is affected when a household adds a new child. While resources are moved from other uses to support the child, most of child-rearing expenses are local and, thus, have a significant impact on businesses activity in the city/town where the child lives. For instance, child-related expenses with housing, childcare, education, transportation, and food are usually incurred with local businesses and service providers. This report uses USDA figures to estimate the local economic contribution generated from child-rearing spending.[7]

Table A3 in Appendix A provides an estimate of total household spending required to support the school-age population for each city/town in Rhode Island. In 2013, annual school-age population related-spending is estimated to be $3.2 billion in Rhode Island. This figure includes $1.04 billion in housing spending, $972 million in education, childcare, and health care spending, $620 million in retail, $358 million in transportation, and $193 million in other spending across the state economy.

[7] The estimates are calculated using population data from the American Community Survey, child-rearing expenses from the *Expenditures on Children by Families, 2013* report produced by the Center for Nutrition Policy and Promotion at the USDA, and tax data from the Rhode Island Division of Taxation.

FIGURE 12: ECONOMIC CONTRIBUTION FROM SCHOOL-AGE POPULATION (MILLION) MAJOR INDUSTRIES, RHODE ISLAND, 2013



Source: Authors' calculations.

Note: These estimates are calculated using population data from the American Community Survey, the average child-rearing expenses in urban northeast from the *Expenditures on Children by Families, 2013* report produced by the Center for Nutrition Policy and Promotion at the USDA, and tax return data from the Rhode Island Division of Taxation.

THE INDIRECT AND INDUCED EFFECTS OF CHILD-REARING SPENDING

This study uses IMPLAN to determine the economic impacts of child-rearing spending on the economy of Rhode Island. IMPLAN is an economic analysis tool that takes data from multiple government sources and employs an estimation method based on industry accounts or *Input-Output Matrix* that allows using multipliers to make estimations of how changes in income/spending impact the local economy.[8]

[8] Details about IMPLAN's methodology is available at: https://implan.com/index.php?option=com_content&view=article&id=821:researching-implan-data&catid=185:data-information (Accessed on January 15, 2015)

Household spending on child rearing translates into direct demand for goods and services for the sectors listed above. This demand, in turn, feeds the economy via two major channels: first, it creates employment and income within housing, retail, education and health care, and transportation. The income created by the direct employment within these sectors is spent in local business and services, which further stimulates the private sector and *induces* the creation of private jobs and income in other industries in the state. The second channel operates throughout the supply chain (*indirect effect*) of housing, education and health care, transportation, and retail. This also stimulates the local economy via the purchase of goods and services from supporting business and service providers in the state.

Direct impact: number of jobs, earnings, and output created by child rearing spending.

Indirect impact: number of jobs, earnings, and output created throughout the supply chain (inter-industry) of housing, retail, education and health care, and transportation.

Induced effect: number of jobs, earnings, and output created by household spending of income earned either directly or indirectly from sectors that are impacted directly by child rearing spending.

The IMPLAN model accounts for spending leakage outside the state (the proportion of spending that have no impact on the local economy) using Social Accounting Matrix (SAM). The local purchase percentage is specific to each sector of the economy. For instance, SAM suggests that 92 percent of all childcare spending of Rhode Island residents is with local service providers. However, only 70 percent of all spending with furniture and home furnishing (a component of housing spending) is with stores in Rhode Island.

Table 2 provides estimates of the total economic impact of child rearing household spending for 2013. It shows that the $3.2 billion in *direct* child rearing spending creates $4.2 billion in output, which represents 7.9 percent of the state's Gross Domestic Product. In addition, child-rearing spending creates $1.7 billion in income for households and supports 45,793 FTE jobs in Rhode Island. The majority of the jobs created are in the service sector (35,488), followed by trade, transportation, information and public utilities (6,932), construction (3,092), and others (281).

TABLE 2: TOTAL ECONOMIC IMPACT OF CHILD REARING HOUSEHOLD SPENDING, RHODE ISLAND, 2013

Indicator	Total Impact
Employment	45,793 FTE Jobs
Earnings	$1.7 billion
Gross Domestic Product (GDP)	$4.2 billion
Gross Domestic Product (GDP, %)	7.9%

Source: Author's calculations using IMPLAN.

This study also estimates that the $3.2 billion in *direct* child rearing spending creates (see Table 3):

- $179.9 million in commercial and industrial taxes for local and state governments. This figure includes $70 million in sales taxes, $100.3 million in property taxes, $4.5 million in corporate profit taxes, $1 million in motor vehicles licenses, and $4 million in other taxes and fees collected by local and state governments.
- $40 million in household taxes and fees accrued by the state and local governments. This figure includes $30.8 million in personal income taxes, $1 million in property taxes, $1.1

million in motor vehicles licenses, and $7 million in other taxes and fees collected by local and state governments.

It is important to note that cities and towns only accrue revenues from property taxes and from "other fees" charged to corporations and households. Table 3 implies that the state government accrues 49 percent of the tax revenue generated by child rearing household spending; local cities and towns accrue 46 percent, and 5 percent is made of "other fees and taxes" that is accrued by both the state government and cities and towns.[9] Therefore, the state government accrues a little more than half of the tax revenues of attracting and retaining families with children. Because the burden of K-12 education falls mostly on cities and towns, this suggests that the cost and benefits of educating children are disproportionally biased in favor of the state government and against local cities and towns.

TABLE 3: ECONOMIC IMPACT OF CHILD REARING HOUSEHOLD SPENDING: LOCAL/STATE TAXES

Description	**$ (1,000)**
Commercial and Industrial	**$179,857**
Sales Taxes	$70,059
Property Taxes	$100,297
Motor Vehicle Licenses	$1,008
Other Fees and Taxes	$4,025
Corporate Profits Tax	$4,468
Personal /Households	**$40,014**
Personal Income Taxes	$30,762
Motor Vehicle License	$1,140
Property Taxes	$1,067
Other Fees and Taxes	$7,044

Source: Author's calculations using IMPLAN.

Table 4 (and Figure 2) shows that population growth has been virtually non-existent in Rhode Island for more than a decade. In addition, the population is getting older, with the median age jumping from 36.7 years in 2000 to 39.9 years in 2013, while the school-age population (0-17 years) decreased by 35,417 during this period. The share of the school-age cohort dropped from 23.6 percent in 2000 to 20.2 percent in 2013, a reduction of 3.4 percentage points.

TABLE 4: ECONOMIC IMPACT OF SCHOOL-AGE POPULATION CHANGE, 2000-2013

	2000[a]	**2010 [a]**	**2013 [b]**	**Change 2000-2013**
Total Population	1,048,319	1,052,567	1,051,511	3,192
Population 0 to 17 years	247,822	223,956	212,405	-35,417
Share Population 0-17 years	23.6%	21.3%	20.2%	-3.4%
Median Age (years)	36.7	39.4	39.9	3.2

Source: [a] U.S. Decennial Census; [b] American Community Survey

This reduction in the size of the school-age population affects economic activity because it affects household spending on local businesses and services in Rhode Island. This study uses IMPLAN to

[9] IMPLAN does not allow breaking down the amount that the state and local cities and towns receive in "other fees and taxes".

simulate how much economic activity was lost because of the reduction of 14.3 percent of the school-age population between 2000 and 2013. Table 5 presents the results and shows that, holding all other cost and demographic variables constant, a reduction of 35,417 school-age people is estimated to cause an decrease of $490 million in child-rearing spending in Rhode Island, which in turn reduces earnings by $262 million, employment by 7,045 FTE jobs, and Gross Domestic Product by $646 million, which represents 1.2 percent of the state's GDP.

TABLE 5 ECONOMIC IMPACT OF SCHOOL-AGE POPULATION INCREASE

Indicator	Total Impact
Increase in Population 0 to 17 years	35,417
Child Rearing Spending	$490 million
Employment	7,045 FTE Jobs
Earnings	$262 million
Gross Domestic Product (GDP)	$646 million
Gross Domestic Product (GDP, %)	1.2%

Source: Author's calculations using IMPLAN.

This study also estimates that the loss in the school-age population caused a loss of (see Table 6):

- $27.7 million in commercial and industrial taxes for the local and state governments. This figure includes $10.8 million in sales taxes and $15.4 million in property taxes.
- $6.2 million in personal income and property taxes that would be accrued by the state and local governments.

It is important to recognize that the empirical analysis in this section measures the direct and indirect impact of changes in the school-age population in a setting known as *static partial-equilibrium analysis*. Considerations of alternative allocation of resources and temporal adjustments would require a dynamic general-equilibrium analysis, which can only be done by making very restrictive and arbitrary assumptions about economic conditions. A general equilibrium analysis is beyond the scope of this report and calls for further research.

TABLE 6: ECONOMIC IMPACT OF SCHOOL-AGE POPULATION INCREASE: LOCAL/STATE TAXES

Description	$ (1,000)
Commercial and Industrial	***$27,671***
Sales Taxes	$10,779
Property Taxes	$15,431
Motor Vehicle Licenses	$155
Other Fees and Taxes	$619
Corporate Profits Tax	$687
Personal /Households	***$6,156***
Personal Income Taxes	$4,733
Motor Vehicle License	$175
Property Taxes	$164
Other Fees and Taxes	$1,084

Source: Author's calculations using IMPLAN.

VI. CONCLUSION AND POLICY IMPLICATION

In Rhode Island, from 2003 to 2013, 26 out of 39 cities and towns lost population. From 2003 to 2011, K-12 enrollment declined in 34 out of 36 regular and regional school districts. Lincoln and Barrington school districts were the exception and experienced increases in the number of students enrolled in the public system. The changes in both demand and the cost structure for public education impacted cities and towns in very different ways in Rhode Island. This report conducts a comprehensive and rigorous empirical analysis and provides information on the economic implications stemming from these demographic changes. The findings of this report are summarized below.

First, the empirical analysis with panel data finds evidence that socioeconomic conditions play a significant role in explaining the cost of K-12 public education in Rhode Island. For example, the percentage of students eligible for free/reduced-price lunch, a proxy for economic hardship, is positively associated with increasing cost of education. These findings suggest that poverty status is a relevant determinant of the cost of educational services.

Second, the estimates provide strong evidence that compensation (wages) to both instructional and non-instructional staff is the single most important driver of the average cost of K-12 education in Rhode Island. In addition, the proportion of non-instructional staff per pupil is positively related with the education cost. This finding supports the view that small school districts with a larger ratio of non-instructional staff per student will experience higher cost to provide K-12 public education in Rhode Island.

Third, there is strong evidence in support for the presence of economies of scale in educational services and that no school district is large enough to be subject to diseconomies of scale in Rhode Island. This implies that the cost per pupil will be higher in small school districts than in larger school districts. This finding suggests that the size of Rhode Island's school districts is economically inefficient and that increasing the size of the student population would reduce per pupil cost of K-12 educational services. Moreover, it can be inferred that the relatively higher cost per pupil experienced in the three largest school districts in Rhode Island (Cranston, Warwick, and Providence) are not caused by their large size, but rather it is associated with socio-economic factors and differences in compensation to both instructional and non-instructional staff in those districts.

Fourth, the annual school-age population related-spending is estimated to be $3.2 billion in 2013 - two major components being the expenditures for housing at $1.04 billion and for education, childcare and health care at $972 million. The $3.2 billion in direct child rearing spending creates $4.2 billion in output across Rhode Island's economy, which represents 7.9 percent of the state's Gross Domestic Product. Child-rearing spending also creates $1.7 billion in income for households and supports 45,793 FTE jobs in Rhode Island. This level of spending also creates $179.9 million in commercial and industrial taxes for local and state governments. This figure includes $70 million in sales taxes, $100.3 million in property taxes, $4.5 million in corporate profit taxes, $1 million in motor vehicles licenses, and $4 million in other taxes and fees collected by local and state governments. Child-rearing spending also creates $40 million in household taxes and fees accrued by the state and local governments. This figure includes $30.8 million in personal income taxes, $1 million in property taxes, $1.1 million in motor vehicles licenses, and $7 million in other taxes and fees collected by local and state governments. The state government, however, accrues a little more than half of the tax revenues generated by child-rearing related spending in the state.

Fifth, the loss of school-age population negatively affects economic activity because it reduces household spending on local businesses and services. Counter-factual simulations show that the loss of about 14.3 percent of the school-age population experienced between 2000 and 2013 reduced child-rearing spending by $490 million in Rhode Island, which in turn reduced GDP by $646 million, earnings by $262 million, and employment by 7,045 FTE jobs. In addition, this loss of school-age population reduced commercial and industrial tax revenues by $27.7 million and personal income and property taxes by $6.2 million. These figures include tax revenues for the local and state governments.

Overall, this report shows that household spending with child rearing has a significant impact on economic activity in Rhode Island. Attracting and retaining families with children contribute to the economy via increased spending on local business and services and generate significant tax revenue for the state government (e.g. sales taxes, income taxes, and corporate taxes) and for local cities and towns (e.g. property taxes and fees). In addition, attracting families with children would increase the student population and contribute to reduce average cost per pupil via efficiency gains from economies of scale in educational services.

This study, however, also identifies that the costs and benefits of attracting and retaining families with children are split unevenly between the state government and local cities and towns. More precisely, the burden of K-12 education falls mostly on cities and towns, while the state government accrues just over 50 percent of the tax revenue generated by child-rearing related spending. This suggests that the cost and benefits of educating children are disproportionally biased in favor of the state government and against local cities and towns.

These findings suggest that the strength of the state and local economies depend on a multi-track approach to optimize education spending and promote economic development:

- **Statewide**: focus on economies of scale
    - Local and state governments might engage in efforts to align the size of school districts to levels that take advantage of economies of scale. Local and state policy makers should consider optimizing K-12 enrollment through the development of higher density housing, local education consortiums, and consolidation when feasible.
        - Housing development aimed at attracting families with children would increase the student population and contribute to reduced average costs per pupil via efficiency gains from economies of scale in educational services.
        - Families generate significant tax revenue for the state government (e.g. sales taxes, income taxes, and corporate taxes) and for local cities and towns (e.g. property taxes and fees).

- **Locally**: recognize that state aid mitigates costs of educating children, particularly students with disadvantaged socio-economic backgrounds.
    - Cities and towns are compensated --via school aid transfers – when they educate low-to-moderate income families with children. The June 2010 school funding formula allocates more school aid from the state government to districts with limited ability to generate revenues and with a higher density of students living in poverty.
    - This study shows that factoring out state school aid, local cities and towns do not face additional costs to educate children of disadvantaged socio-economic

background compared to the costs of educating children from middle and upper classes.

- **Consider additional support mechanism to reduce city and town burden**
    - Because attracting and retaining families with children is important to foster economic activity across the state, additional financial support for K-12 education is still required to help cities and towns in Rhode Island to provide quality education to their K-12 students. This could be accomplished by increasing aid through the existing funding formula or through the creation of financial and quality incentives for school districts that choose to increase their size (e.g. additional state funds to school districts that add an X number of students during a period).

Disclaimer

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Appendix A

Table A1: Rhode Island City & Town Resident Population, changes from 2000 to 2010

Geographic Area	2000	2003	2010	2013	% Change 2000-2013	% Change 2003-2013
State of Rhode	**1,050,736**	**1,071,504**	**1,052,669**	**1,051,511**	**0.1%**	**-1.9%**
Bristol County	**50,723**	**50,914**	**49,845**	**49,220**	**-3.0%**	**-3.3%**
Barrington	16,841	16,788	16,301	16,293	-3.3%	-2.9%
Bristol	22,510	22,746	22,944	22,385	-0.6%	-1.6%
Warren	11,372	11,380	10,600	10,542	-7.3%	-7.4%
Kent County	**167,484**	**171,083**	**166,012**	**165,035**	**-1.5%**	**-3.5%**
Coventry	33,791	34,838	34,989	34,935	3.4%	0.3%
East Greenwich	12,990	13,438	13,138	13,131	1.1%	-2.3%
Warwick	85,947	87,239	82,593	81,971	-4.6%	-6.0%
West Greenwich	5,143	5,580	6,129	6,105	18.7%	9.4%
West Warwick	29,613	29,988	29,163	28,893	-2.4%	-3.7%
Newport County	**85,657**	**85,255**	**82,900**	**82,397**	**-3.8%**	**-3.4%**
Jamestown	5,642	5,673	5,408	5,472	-3.0%	-3.5%
Little Compton	3,601	3,622	3,495	3,503	-2.7%	-3.3%
Middletown	17,375	17,196	16,147	16,154	-7.0%	-6.1%
Newport	26,495	25,965	24,667	24,027	-9.3%	-7.5%
Portsmouth	17,218	17,401	17,379	17,383	1.0%	-0.1%
Tiverton	15,326	15,398	15,804	15,858	3.5%	3.0%
Providence	**622,881**	**636,454**	**626,941**	**628,600**	**0.9%**	**-1.2%**
Burrillville	15,839	16,390	15,994	16,109	1.7%	-1.7%
Central Falls	18,948	19,206	19,381	19,416	2.5%	1.1%
Cranston	79,435	81,214	80,419	80,566	1.4%	-0.8%
Cumberland	31,972	33,480	33,557	34,055	6.5%	1.7%
East Providence	48,772	49,611	47,049	47,149	-3.3%	-5.0%
Foster	4,290	4,453	4,612	4,656	8.5%	4.6%
Glocester	9,981	10,406	9,754	9,854	-1.3%	-5.3%
Johnston	28,274	29,114	28,799	29,045	2.7%	-0.2%
Lincoln	21,042	22,063	21,117	21,299	1.2%	-3.5%
North Providence	32,473	33,213	32,092	32,238	-0.7%	-2.9%
North Smithfield	10,646	10,944	11,972	12,178	14.4%	11.3%
Pawtucket	73,046	73,941	71,157	71,172	-2.6%	-3.7%
Providence	173,861	175,918	178,075	177,994	2.4%	1.2%
Scituate	10,362	10,791	10,333	10,433	0.7%	-3.3%
Smithfield	20,656	21,272	21,442	21,410	3.7%	0.6%
Woonsocket	43,284	44,438	41,188	41,026	-5.2%	-7.7%
Washington	**123,991**	**127,798**	**126,971**	**126,259**	**1.8%**	**-1.2%**
Charlestown	7,898	8,196	7,829	7,781	-1.5%	-5.1%
Exeter	6,071	6,258	6,442	6,546	7.8%	4.6%
Hopkinton	7,861	8,069	8,191	8,116	3.2%	0.6%
Narragansett	16,413	16,854	15,872	15,706	-4.3%	-6.8%
New Shoreham	1,013	1,038	1,050	1,041	2.8%	0.3%
North Kingstown	26,399	27,159	26,469	26,184	-0.8%	-3.6%
Richmond	7,265	7,634	7,707	7,613	4.8%	-0.3%
South Kingstown	28,012	28,949	30,628	30,615	9.3%	5.8%
Westerly	23,059	23,641	22,783	22,657	-1.7%	-4.2%

Source: http://www.dlt.ri.gov/lmi/census/pop/townpop.htm, Originally from the US Census Bureau, 2000 and 2010 Census

Table A2: Descriptive Statistics by School District, 2011, Rhode Island

School District	City/Town	Total Current Expenditures per Pupil	Relative Total Current Expenditures per Pupil	Total Pk-12 Stud.	Relative School District Size	% of students with LEP and/or IEP	% of students who are free/reduced price lunch eligible	Pupil/Teacher Ratio	% Administrative Staff
Barrington	Barrington	12,091	0.81	3,479	1.29	13.5%	4.4%	13.98	3.1%
New Shoreham	Block Island	34,359	2.30	128	0.05	21.9%	12.5%	2.67	3.8%
Bristol Warren	Bristol	13,155	0.88	3,433	1.28	15.1%	33.1%	12.63	3.5%
Segue Inst. For Learning	Central Falls	14,379	0.96	140	0.05	20.0%	97.9%	11.67	-
Central Falls	Central Falls	17,709	1.18	2,820	1.05	40.1%	80.9%	10.12	2.2%
Learning Community	Central Falls	13,002	0.87	471	0.18	37.8%	88.5%	12.08	-
Glocester	Chepachet	14,658	0.98	584	0.22	15.6%	20.2%	13.81	3.6%
Coventry	Coventry	12,498	0.84	5,311	1.97	15.1%	25.6%	13.9	2.8%
Cranston	Cranston	13,183	0.88	10,653	3.96	19.9%	37.6%	12.61	2.6%
Cumberland	Cumberland	10,732	0.72	4,815	1.79	20.6%	21.2%	14.37	2.7%
Blackstone Valley Prep	Cumberland	14,605	0.98	256	0.10	18.4%	62.5%	10.16	3.1%
East Greenwich	East Greenwich	13,279	0.89	2,387	0.89	14.7%	5.8%	12.72	2.9%
East Providence	East Providence	13,770	0.92	5,457	2.03	27.8%	40.7%	13.75	2.7%
Foster	Foster	13,847	0.93	274	0.10	16.1%	16.1%	12.69	2.7%
Burrillville	Harrisville	12,841	0.86	2,454	0.91	16.3%	34.1%	13.8	2.5%
Jamestown	Jamestown	19,413	1.30	485	0.18	19.1%	5.4%	10.49	2.8%
Johnston	Johnston	15,850	1.06	3,025	1.12	29.6%	38.9%	12.26	3.1%
The Compass School	Kingston	13,810	0.92	153	0.06	19.0%	9.2%	11.86	4.6%
Davies Career And Tech	Lincoln	18,609	1.24	816	0.30	11.9%	66.2%	11.93	3.7%
Lincoln	Lincoln	14,065	0.94	3,272	1.22	17.5%	24.4%	12.72	3.0%
Little Compton	Little Compton	17,133	1.15	309	0.11	19.4%	16.2%	10.16	6.4%
Middletown	Middletown	14,788	0.99	2,377	0.88	22.3%	25.1%	13.23	4.0%
Narragansett	Narragansett	17,404	1.16	1,463	0.54	18.4%	16.4%	11.05	3.1%
Newport	Newport	18,062	1.21	1,995	0.74	24.6%	58.5%	10.65	3.6%
North Kingstown	North Kingstown	13,328	0.89	4,390	1.63	13.3%	18.9%	13.27	2.6%
North Providence	North Providence	14,776	0.99	3,278	1.22	19.8%	32.6%	11.58	3.4%

School District	City/Town	Total Current Expenditures per Pupil	Relative Total Current Expenditures per Pupil	Total Pk-12 Stud.	Relative School District Size	% of students with LEP and/or IEP	% of students who are free/reduced price lunch eligible	Pupil/Teacher Ratio	% Administrative Staff
Scituate	North Scituate	12,374	0.83	1,628	0.61	12.2%	14.3%	12.25	4.0%
Foster-Glocester	North Scituate	13,810	0.92	1,296	0.48	9.0%	14.9%	13.91	4.6%
Blackstone Academy	Pawtucket	13,409	0.90	164	0.06	17.1%	75.0%	13.55	6.5%
International Charter	Pawtucket	13,795	0.92	312	0.12	47.8%	59.0%	13.57	4.0%
Pawtucket	Pawtucket	11,501	0.77	8,767	3.26	27.9%	75.2%	14.33	3.6%
Portsmouth	Portsmouth	12,932	0.87	2,772	1.03	15.8%	12.3%	13.22	2.7%
Paul Cuffee Charter Sch	Providence	14,168	0.95	559	0.21	20.8%	76.4%	11.18	2.5%
Trinity A. For The Perf. Arts	Providence	20,088	1.34	34	0.01	5.9%	91.2%		-
Met Career And Tech	Providence	21,060	1.41	650	0.24	19.1%	64.6%	10.16	7.2%
Urban Collaborative	Providence	-	-	142	0.05	0.0%	83.8%	15.11	11.2%
Highlander	Providence	17,879	1.20	282	0.10	27.0%	78.4%	11.51	-
Providence	Providence	15,616	1.04	23,381	8.69	34.5%	83.0%	14.82	2.2%
R.I. Sch For The Deaf	Providence	90,754	6.07	69	0.03	95.7%	42.0%	3.29	1.9%
Kingston Hill Academy	Saunderstown	13,223	0.88	179	0.07	11.2%	22.9%	11.93	3.6%
North Smithfield	Slatersville	12,849	0.86	1,750	0.65	18.1%	14.3%	12.02	3.4%
Smithfield	Smithfield	13,773	0.92	2,463	0.92	11.7%	13.3%	12.39	3.6%
Tiverton	Tiverton	14,144	0.95	1,906	0.71	19.6%	23.0%	12.44	3.3%
South Kingstown	Wakefield	16,527	1.11	3,504	1.30	15.8%	16.7%	12.59	3.1%
Warwick	Warwick	16,479	1.10	10,174	3.78	21.3%	30.8%	10.82	2.4%
The Greene School	West Greenwich	15,086	1.01	81	0.03	22.2%	8.6%		-
Exeter-West Greenwich	West Greenwich	16,678	1.12	1,805	0.67	16.0%	12.7%	12.48	4.4%
West Warwick	West Warwick	13,572	0.91	3,492	1.30	22.6%	43.4%	12.89	2.6%
Westerly	Westerly	15,916	1.06	3,077	1.14	21.2%	31.9%	12.15	3.0%
Chariho	Wood River Junct.	16,042	1.07	3,520	1.31	11.5%	21.9%	11.76	2.3%
Woonsocket	Woonsocket	11,947	0.80	6,015	2.24	30.0%	62.7%	13.6	3.9%
Beacon Charter School	Woonsocket	12,737	0.85	224	0.08	16.1%	46.9%	12.44	4.5%

Source: Center for National Education Statistics.

Table A3: Economic Contribution from School-age Population, Major Industries, ($1,000)

Town/City	Total Impact	Construction /Housing	Retail	Transportation	Education & Health Care	Other
Barrington	64,370	21,060	12,528	7,236	19,655	3,891
Bristol	52,443	17,158	10,207	5,895	16,013	3,170
Warren	29,570	9,675	5,755	3,324	9,029	1,787
Coventry	113,962	37,286	22,181	12,810	34,797	6,889
East Greenwich	47,115	15,415	9,170	5,296	14,386	2,848
Warwick	226,056	73,960	43,998	25,410	69,024	13,664
West Greenwich	20,742	6,786	4,037	2,331	6,333	1,254
West Warwick	82,843	27,104	16,124	9,312	25,295	5,008
Jamestown	17,227	5,636	3,353	1,936	5,260	1,041
Little Compton	10,198	3,337	1,985	1,146	3,114	616
Middletown	53,024	17,348	10,320	5,960	16,190	3,205
Newport	53,826	17,611	10,476	6,050	16,435	3,254
Portsmouth	53,453	17,488	10,404	6,008	16,321	3,231
Tiverton	43,905	14,365	8,545	4,935	13,406	2,654
Burrillville	46,506	15,216	9,052	5,228	14,200	2,811
Central Falls	77,405	25,325	15,065	8,701	23,635	4,679
Cranston	235,867	77,170	45,907	26,513	72,019	14,257
Cumberland	104,387	34,153	20,317	11,734	31,873	6,310
East Providence	127,177	41,609	24,753	14,295	38,832	7,687
Foster	14,930	4,885	2,906	1,678	4,559	902
Glocester	29,542	9,666	5,750	3,321	9,020	1,786
Johnston	82,012	26,833	15,962	9,219	25,042	4,957
Lincoln	60,869	19,915	11,847	6,842	18,586	3,679
N. Providence	85,112	27,847	16,565	9,567	25,988	5,145
North Smithfield	34,551	11,304	6,725	3,884	10,550	2,088
Pawtucket	232,103	75,939	45,175	26,090	70,870	14,030
Providence	589,155	192,758	114,668	66,224	179,892	35,612
Scituate	35,520	11,621	6,913	3,993	10,846	2,147
Smithfield	50,547	16,538	9,838	5,682	15,434	3,055
Woonsocket	143,656	47,001	27,960	16,148	43,864	8,683
Charlestown	19,469	6,370	3,789	2,188	5,945	1,177
Exeter	21,171	6,927	4,120	2,380	6,464	1,280
Hopkinton	24,865	8,135	4,840	2,795	7,592	1,503
Narragansett	32,545	10,648	6,334	3,658	9,937	1,967
New Shoreham	1,979	647	385	222	604	120
North Kingstown	91,781	30,029	17,864	10,317	28,024	5,548
Richmond	26,373	8,629	5,133	2,965	8,053	1,594
South Kingstown	81,127	26,543	15,790	9,119	24,771	4,904
Westerly	67,525	22,093	13,142	7,590	20,618	4,082
Statewide	**3,184,907**	**1,042,029**	**619,884**	**358,002**	**972,477**	**192,515**

Source: Authors' calculation using data from the USDA and U.S. Census.