5

Education and Economic Development

HELEN F. LADD AND FRANCISCO L. RIVERA-BATIZ

Puerto Rico has one of the strongest recent records of educational development in the world. With the exception of the Republic of Korea, the rise in the educational attainment of Puerto Rico's labor force between 1960 and 2000 is unmatched by any other country. During this forty-year period, the average schooling of Puerto Rican workers doubled from 6.2 years to 12.2 years.

Despite this remarkable accomplishment, Puerto Rico's education system today stands at a crossroads. The consensus among policymakers, the education establishment itself, and the population in general is that the public education system on the island is currently in crisis. Although substantial reforms intended to improve the system have been implemented over the past fifteen years, the reforms have failed to meet their objectives. Not only have they not improved the system, they may have weakened it. Thus it is not surprising that the newly elected governor of Puerto Rico, the Honorable Anibal Acevedo Vilá, has made improvement of the island's schools one of the three top priorities of his administration.

The authors are grateful for the comments and suggestions of Alan Krueger, Carlos Santiago, Barry Bosworth, Susan Collins, and Carlos E. Chardón as well as the assistance of Idrani Acevedo Hilario, Luis Bermúdez, María Colón de Marxuach, Aida Díaz de Rodriguez, Néstor Figueroa, Antonio Magriñá, Manuel Maldonado Rivera, William Ortiz Ramirez, Pablo Rivera Ortiz, José A. Santana González, and Migdalia Wiscovich Colberg.

The problems with the education system are cause for concern for Puerto Rico's prospects for economic growth. The average growth rate of per capita income on the island has already slowed down compared with its high values in the golden era of the 1950s and 1960s. From an average annual growth rate in per worker output of 4.8 percent in the period from 1950 to 1980, Puerto Rico's growth slowed down sharply to an average of 0.8 percent in 1980–2003 and could fall even further. An accounting of Puerto Rican economic growth suggests that the rise of schooling has been increasingly essential to its economic expansion, accounting for close to half of the increase in output per worker between 1975 and 2000.[1] Recent research also indicates that a drop in the quality of education can have a significantly negative impact on sustained economic growth.[2] Failure to reverse the education slump currently faced by Puerto Rico could severely constrain any prospects for the return of high growth to the island.

Ftn. 1

Ftn. 2

What has been Puerto Rico's experience with educational development? What are the main education challenges facing Puerto Rico at the present time? How do these challenges affect the island's prospects for economic growth? This chapter provides a comprehensive answer to these questions.

Expansion of the Education System

With the emergence in 1941 of the newly created Popular Democratic Party and its subsequent political success, economic and social development in Puerto Rico began to take off. With a program emphasizing development and social justice, the new policymakers implemented an array of reforms during the period of the island's dramatic economic growth.[3]

Ftn. 3

One of the priority areas was education. Starting in the mid-1940s, the government committed itself to raising the educational attainment of Puerto Rico's population. To this end, between 1944 and 1962 public spending on education quadrupled in real terms, resulting in a massive expansion of schools, teacher hiring, and purchase of books, materials, and equipment. The expansion of investments in education at both the school and university level has continued unabated until the present time.

Primary and Secondary Education

Table 5-1 reports trends in public and private school enrollments for selected years. Following the path of public school enrollments, which accounted for more than 95 percent of all students in the 1940s, total enrollments grew rapidly for several decades and then peaked in the early 1980s. The more than doubling

Tab. 5-1

1. See chapter 2 in this volume.
2. Hanushek and Kimko (2000).
3. For details of Puerto Rico's economic history during this time, see Dietz (1986) and Rivera-Batiz and Santiago (1996).

Table 5-1. *School Enrollment, Puerto Rico, Selected Years, 1950–2002*[a]

School year	*Public*	*Private*	*Total*	*Private as share of total (percent)*
1940	286,098	12,374	298,472	4.1
1950	416,206	25,552	441,758	6.1
1960	573,440	63,300	636,740	9.9
1970	686,770	89,106	775,870	11.5
1980	712,880	98,500	811,380	12.1
1990	644,734	145,800	790,534	18.7
2000	607,626	163,946	771,572	21.2
2003	565,763	185,745	751,508	24.7

Source: Data from Rivera-Batiz (1993); Commonwealth of Puerto Rico (1994, 1996a, 1998, 2000, 2004a).

a. Fall enrollment in public and private primary and secondary schools and public prekindergarten and kindergarten programs.

of the number of elementary and secondary school students from 1940 to 1970 is partly attributable to the growth in the school-age population. Contributing even more was the significant rise in the number of children who attended school. Among children of elementary school age (seven to thirteen), the net enrollment rate climbed from 66.8 percent in 1940 to 91.2 percent in 1970. For children of secondary school age (fourteen to nineteen), the net school enrollment rate of 24.5 percent prevailing in 1940 rose sharply to 72.7 percent by 1970.[4] Thus by the late 1960s most children of elementary school age and, remarkably, two out of three children of secondary school age were attending school. Ftn. 4

After reaching its peak of 712,880 students in 1980, enrollment in public schools declined by 20.6 percent to 565,763 students in 2003. Total enrollment, which includes the increasing number of students in private schools, decreased by somewhat less, about 7.4 percent, during this period. This decrease in total enrollment reflects a decline in fertility as well as an out-migration of the island's population, both of which have led to a contraction of the school-age population. It does not reflect a drop in enrollment rates. Census Bureau data indicate that as of 2000, the net enrollment rate of children in the elementary school age range had risen to 98.9 percent and in secondary education to 91.3 percent. By 2003 a quarter of all elementary and secondary school students were in private schools.

The school system in Puerto Rico is divided into four levels: preschool, which includes prekindergarten and kindergarten; elementary school, which covers first to sixth grade; intermediate school (*escuela intermedia*), encompassing the seventh to ninth grades; and high school (*escuela superior*), which covers the tenth to

4. Vázquez-Calzada (1988, pp. 370–71).

Table 5-2. *Enrollment in Institutions of Higher Education, Puerto Rico, Selected Years, 1949–2002*

School year	*Total*	*Public sector*[a]	*Private sector*	*Private as share of public (percent)*
1949–50	12,497	11,348	1,149	9.2
1959–60	24,532	18,223	6,309	25.7
1970–71	63,073	42,516	20,557	32.5
1980–81	131,184	54,127	77,057	58.7
1990–91	154,055	55,691	98,374	63.9
1999–2000	175,453	73,653	101,800	58.0
2000–01	185,015	74,018	110,997	60.0
2001–02	190,776	73,838	116,938	61.3
2002–03	199,842	74,506	125,336	62.7

Source: Data from Commonwealth of Puerto Rico, Council on Higher Education (2004).

a. Enrollment in the University of Puerto Rico system and in specialized higher education institutions (Colegio Universitario de Justicia Criminal, Colegio Tecnológico de San Juan, Conservatorio de Música, Escuela de Artes Plásticas, and the Institutos Tecnológicos in Manatí, Guayama, Ponce and San Juan).

twelfth grades. Of the 565,763 students in the public school system in 2003–04, 40,673 were enrolled in prekindergarten and kindergarten, 272,719 in elementary schools, 137,773 in intermediate schools, and 114,598 in high schools.

Higher Education

Tab. 5-2 A similar expansion occurred at the tertiary level, as documented in table 5-2. From 12,500 students in 1949–50, total enrollment rose to almost 200,000 in 2002–03. As with primary and secondary education, the initial expansion of tertiary education was primarily in the public sector. The University of Puerto Rico—the island's main public institution of higher education—was created in 1903 on its Río Piedras campus, which is now the largest (with an enrollment of 21,666 students in 2002–03). Over time, new campuses were created in Mayagüez, Aguadilla, Arecibo, Bayamón, Carolina, Cayey, Humacao, Utuado, and Ponce. In addition, the University of Puerto Rico system includes a Medical Sciences campus.

Fewer than twenty thousand students were enrolled at the University of Puerto Rico in 1960, when only three campuses were operating; by 2002–03, the university system had expanded to close to seventy thousand students. In addition to the University of Puerto Rico system, the higher education public sector is in charge of a set of smaller, career or vocationally oriented institutions, including the Colegio Universitario de Justicia Criminal, Colegio Tecnológico de San Juan, Conservatorio de Música, Escuela de Artes Plásticas, and the Institutos Tecnológicos in Manatí, Guayama, Ponce, and San Juan.

Expanding even more rapidly, enrollment in the private institutions overtook enrollment in the public sector in the mid-1970s and now accounts for 62.7 per-

cent of all students in tertiary education. The largest private university is the Interamerican University, which had eleven campuses scattered over the island and 43,269 students enrolled in 2002–3, followed by the three campuses of the Ana G. Mendez University System (Metropolitan University, University of the East, and University of Turabo) with a total of 27,227 students.

Educational Attainment

The sharp rise in enrollment rates at various levels of education in Puerto Rico since the late 1940s has led to a remarkable increase in educational attainment among its adult population. From an average level of schooling in 1940 of 2.7 years, by 2000 Puerto Rico's population twenty-five years of age or older had achieved an average of 11.0 years of schooling (see figure 5-1). Fig. 5-1

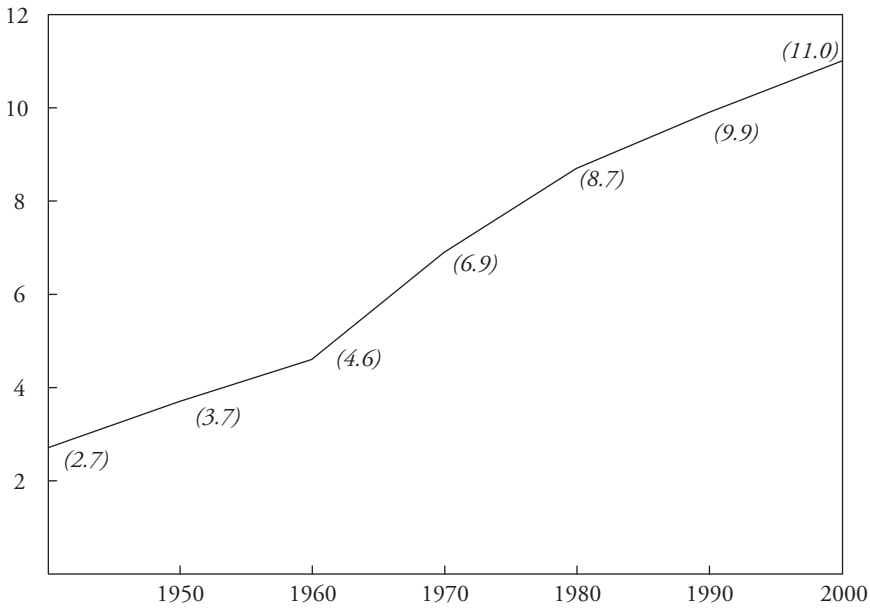
Correspondingly, Puerto Rico's gains in educational attainment have sharply increased the human capital of its workforce. Between 1960 and 2000, the average schooling of the island's labor force fifteen years of age and older rose by 6.0 years, far exceeding the worldwide average expansion of 3.2 years and exceeding the gains in all countries other than the Republic of Korea.[5] The 12.2 years Ftn. 5 of average schooling of Puerto Rico's labor force in 2000 was about the same as that of the United States (with an average of 12.1 years for its labor force fifteen years or older), beyond that of the most-educated Latin American nations, such as Chile (8.5 years), Argentina (8.5 years), Peru (7.8 years) or Uruguay (7.7 years), and matching or exceeding that of many high-income countries, such as France (8.9 years), Denmark (10.6 years), Great Britain (11.0), Finland (10.5), and Ireland (9.5).

The dramatic increase in enrollment in—and graduation from—colleges and universities has been associated with a sharp increase in the proportion of Puerto Rico's population that has attained a college degree or more. Table 5-3 Tab. 5-3 reports the educational level attained by persons twenty-five years of age or older every ten years since 1960. In 1960 the proportion with a college degree or more was 3.5 percent. By 2000 that proportion had risen to 18.2 percent. When the adults who had attended some college are added to those who received a degree, the 2000 proportion doubles.

These data place Puerto Rico in the upper tier of nations ranked by their proportion of college-educated adults. As of 2000, the United States topped the list, with 28 percent of adults aged twenty-five to sixty-four having been awarded a college degree. Puerto Rico's 20.2 percent put it below Norway and the Netherlands but above or tied with all other Organization for Economic Cooperation

5. By this measure, Puerto Rico increased its schooling from 6.2 to 12.2 years during the period 1960–2000. The Republic of Korea's gain of 6.4 years started from a slightly lower base of 4.7 years. Jordan also had a gain of 6.0 years but started from an even lower base of 2.4 years. Bosworth and Collins (2003).

Figure 5-1. *Educational Attainment of Adult Population, Puerto Rico, Selected Years, 1940–2000*[a]



Source: U.S. Census of Population for Puerto Rico, various years.
a. Persons aged twenty-five and older.

and Development member nations and well above developing countries with equivalent levels of per capita income. Of interest as well is that our analysis of 2000 Census Bureau data shows the proportion of college graduates in Puerto Rico also exceeded the proportion of Puerto Ricans in the United States with a college degree, which was 13.4 percent for the population aged twenty-five to sixty-four.

School Retention and High School Graduation Rates

Despite these rapid gains in average educational attainment, many policymakers in Puerto Rico believe that the school dropout rate remains excessively high and constitutes a serious problem, perhaps the most serious problem in the island's
Ftn. 6 education system.[6] Children and youth aged twenty-one or younger are required by law to attend school until they complete high school, but those laws do not guarantee that students remain in school, and many in fact do not complete

6. See, for example, Commonwealth of Puerto Rico, Department of Education (2003c, p.1).

Table 5-3. *Educational Status of the Adult Population, Puerto Rico, Selected Years, 1960–2000*[a]
Percent

Highest level of education attained	*1960*	*1970*	*1980*	*1990*	*2000*
Less than high school	85.0	72.9	59.5	50.4	40.2
High school graduate	7.5	15.0	21.3	21.0	22.2
Some college	4.0	6.0	8.9	14.3	19.4
College or more	3.5	6.1	10.3	14.3	18.2

Source: Data from Rivera-Batiz and Santiago (1996); v.s. Department of Commerce (2003).
a. Persons aged twenty-five and older.

high school. The question here is whether the dropout picture is as dismal as many perceive it to be.

The simplest measure of school dropouts is the event dropout rate, which is calculated as the percentage of students who left school between the beginning of one school year and the beginning of the next. The cumulative dropout rate is the sum of the event dropout rates over several years. In Puerto Rico, the cumulative dropout rate for public high schools (for grades nine through twelve) was 34.4 percent in 2002–03, down from 39.4 percent in 1991–92. The cumulative dropout rate for all levels in public schools (grades one through twelve) was 40.1 percent in 2003–04, down from 56.5 percent in 1991.[7] Ftn. 7

These estimated dropout rates are relatively high and, if valid, would constitute a serious problem for Puerto Rico, although it is worth noting that they are currently declining. However, this indicator is flawed in that it does not account for the many students who leave the public school system for reasons other than dropping out.[8] Some of them may migrate with their families out of Puerto Rico, Ftn. 8 enrolling in schools on the U.S. mainland or in other countries. Census data indicate that between 1990 and 2000 as many as 103,078 children aged six to eighteen, constituting about 12 percent of the population in that age group residing on the island in 1990, migrated from Puerto Rico to the U.S. mainland. Other students may leave the public school system to enroll in a private school. The share of private school students has now risen to about 25 percent. Finally, some students who leave the school system participate in the General Educational Development (GED) program, which is widely offered in Puerto Rico. Many young people aged seventeen, eighteen, and nineteen take and pass the GED, thereby earning

7. Commonwealth of Puerto Rico, Department of Education (2003c, p. 11). By following student cohorts over time and calculating the cumulative dropout rate on this basis, Neil Allison and Arthur McEwan (2003) calculate that the proportion of students entering public middle schools who did not complete high school was 35.1 percent in 2000, down from 44.6 percent in 1994.

8. See NCES (2004a).

high school equivalency certificates. Whatever one may think about the relative skills indicated by—and the relative value of—a high school diploma versus a GED certificate, both provide equivalent credentials and allow students to pursue higher levels of education. Therefore, it seems inappropriate to consider GED graduates as part of the population that has dropped out of school.

An alternative measure, the status dropout rate, is not subject to the deficiencies of event dropout rates. This approach measures the dropout rate as the percentage of young persons (aged eighteen to twenty-four in our case) who are older than the typical high school completion age but who are not enrolled in high school and never received a high school credential (diploma or GED certificate). This indicator measures more closely the proportion of school dropouts in the population, that is, those youth living in Puerto Rico who dropped out of school at some time in the past and never received their high school credential.[9]

Ftn. 9

Tab. 5-4

Table 5-4 shows the distribution of school enrollment of Puerto Ricans aged eighteen to twenty-four and their U.S. mainland counterparts in the year 2000; estimated dropout rates are presented in the third row of the table. Overall, 55.1 percent of the relevant Puerto Rican population was not enrolled in school. This figure can be disaggregated into the 33.8 percent who had already completed high school and the 21.3 percent who had not received a high school credential. The latter constitute high school dropouts, since they are young people past the high school completion age who were not enrolled in school and had not received a high school diploma or equivalency. This estimate is substantially lower than the 40 percent rate obtained through the use of cumulative event dropout rates from the public school system. Thus it can be seen that the flaws in the event dropout rate in the Puerto Rican context lead to a huge overestimate of the true dropout rate.

The true dropout rate in Puerto Rico is quite comparable to that for blacks in the United States and is far lower than that for U.S. Latinos, as shown in the second through fifth columns of table 5-4. To be sure, it is significantly higher than that for the United States as a whole (21.3 versus 16.2 percent), but that differential is consistent with the far lower average income of Puerto Ricans. Thus we conclude that though Puerto Rico does indeed have a dropout problem, the problem is not as serious as some policymakers believe.

A related issue is school delay, defined as the proportion of students who fail to be promoted from one grade to the next. One can estimate the magnitude of accumulated school delay by calculating the proportion of students aged eighteen

9. Although preferable to cumulative event dropout rates, this method is not without problems. As Allison and McEwan (2003, p. 4) observe, "Surveys tend to under-represent lower income, jailed, and other populations. Respondents also tend to over-state their educational attainment and avoid admitting to dropping out of school." At the same time, there is no reason to conclude that individual responses to surveys in Puerto Rico are less reliable than those in the United States, providing a stronger basis for data that are comparable with the mainland.

Table 5-4. *School Enrollment of Persons Aged 18 to 24, Puerto Rico and the United States, 2000*
Percent

		United States			
Status	*Puerto Rico*	*Total*	*White*	*Black*	*Latino*
Not enrolled in school	55.1	55.4	52.0	58.4	69.0
Completed high school[a]	33.8	39.2	42.0	38.4	32.4
Did not complete high school (estimate of dropout rate)	21.3	16.2	10.0	20.0	36.6
Enrolled in school	44.9	44.6	48.0	41.6	31.0
Enrolled in high school or less (estimate of school delay)	10.5	10.7	9.9	13.7	11.2
Enrolled in college	34.4	33.9	38.1	27.9	19.8

Source: Data from U.S. Department of Commerce (2003). Authors' tabulations.
a. Includes GED certificate.

to twenty-four who are still enrolled in high school or a lower grade, as reported in the next to last line of table 5-4. Those proportions are about the same in Puerto Rico (10.5 percent) and the United States (10.7). However, school delay among black and Latino youth in the United States is higher than the Puerto Rico average. In 2000 close to 14 percent of African American youth aged eighteen to twenty-four was still enrolled in high school or a lower grade. Among Latinos in the United States, the proportion was 11.2 percent.

Despite the slightly higher high school dropout rate on the island, the data in the final row of table 5-4 show that the percentage of youth aged eighteen to twenty-four enrolled in higher education is about the same in Puerto Rico and the United States (34.4 versus 33.9). Since the United States has one of the highest tertiary education enrollment rates in the world, this constitutes a remarkable achievement for Puerto Rico.

This discussion confirms that in terms of years of schooling, the island stands as one of the great educational miracles of the past fifty years. From a dismal situation in the 1940s, by 2000 Puerto Rico had rates of school attainment that were comparable to those of the top countries in the world. Furthermore, Puerto Rico's ability to keep students in the system, especially as they move from secondary to higher education, matches that of the United States, one of the world's leading countries with respect to higher education.

School Quality and Student Achievement

Although Puerto Rico's progress in educational attainment is beyond dispute, less clear is what has been happening to the quality of education, especially during

the past fifteen years. Rapid expansion of education need not bring with it higher quality. In Latin America, countries such as Chile, Brazil, and Mexico, where educational attainment levels have risen quickly, continue to rank among the worst performers in international assessments of student achievement such as the Trends in International Mathematics and Science Study (TIMSS) and the Program for International Student Achievement (PISA).[10] Yet in other countries the quality of education has been sustained at high levels at the same time that the quantity has expanded. Such is the case with the East Asian tigers, including Singapore, Korea, and Taiwan.

Ftn. 10

Student Achievement: Current Levels

Evaluating student achievement in Puerto Rico's school system is made difficult by the absence of any systematic student testing in schools until the mid-1990s. Even then, the implementation of schoolwide testing occurred only gradually, and the tests cannot be compared over time since they were changed from year to year in a haphazard way. Only in response to the requirements of the federal No Child Left Behind legislation, enacted in January 2002, did Puerto Rico establish a more reliable testing battery, designed and managed by the Educational Testing Service in Princeton, New Jersey. The tests, called Puerto Rican Tests of Academic Achievement (Pruebas Puertorriqueñas de Aprovechamiento Académico), were first administered in April 2003 to all public school students in the third, sixth, eighth, and eleventh grades. In April 2004 the fourth, fifth, and seventh grades were added. Given that one out of four students is now in private schools, even these new tests provide an incomplete picture of overall student achievement in Puerto Rico.

Tab. 5-5

Table 5-5 presents the overall results of the Puerto Rican achievement tests for the years 2002–03 and 2003–04. Following the No Child Left Behind guidelines, the test scores are converted into three levels: basic, proficient, and advanced. Students who score at the basic level are considered not to be proficient in the subject matter. In Puerto Rico, tests have been administered in three subject areas: mathematics, Spanish (reading), and English (as a second language). The table includes test scores for students tested in grades three, six, eight, and eleven.

Assuming that the test makers have defined proficiency in a reasonable way, the results in table 5-5 present a sobering picture of the overall student achievement in Puerto Rico's public school system. In all three subjects and for both years, more than half of the students scored at the basic level, indicating that less than half were proficient in the indicated subject areas. With only two years of data, it is difficult to say much about trends. Nonetheless, the increase from 51.8 percent scoring at the basic level in Spanish in 2002–03 to 58.0 percent in the following year is worth noting. Both because the levels measure the performance of differ-

10. OECD (2004); Gonzalez and others (2004).

Table 5-5. *Public School Student Performance on the Puerto Rican Achievement Test, 2002–2004*[a]
Percent

	Students at basic (below proficient) level	
Subject	*2002–03*	*2003–04*
Math	54.3	54.8
Spanish	51.8	58.0
English as a second language	50.0	50.3

Source: Data from Commonwealth of Puerto Rico, Department of Education (2003a, 2004b).
a. All students tested in grades 3, 6, 8, and 11.

ent groups of students and because of random variation from one year to another, one must be careful not to make too much of the change. At the same time, the apparent decline in student performance in Spanish is fully consistent with longer-term trends indicated by scores on the Puerto Rican equivalent of the Scholastic Assessment Test (SAT) (discussed below) and also with curriculum reforms enacted during the 1990s that put more focus on the teaching of English in an effort to promote a more bilingual society.

Of course, the proportion of students performing below a standard of proficiency is closely related to the chosen standard. The higher is the standard, the lower will be the proportion of students who meet it. Given that under No Child Left Behind each state sets its own standards, it is not appropriate to compare the results in Puerto Rico with those of other states. The only comparable measures across states emerge from the nationwide National Assessment of Educational Progress (NAEP), in which Puerto Rico does not participate. Given that most, if not all, states have adopted proficiency benchmarks well below (and sometimes substantially below) the NAEP standards, it is reasonable to suspect that this is true of Puerto Rico as well. Thus it is likely that had performance been measured against the U.S. NAEP standards, the performance of public school students in Puerto Rico would have appeared even less satisfactory.

Students also appear to do less well on the Puerto Rican Tests of Academic Achievement as they progress through school. In both Spanish and math, the percentage of students performing at the basic level—that is, below proficiency—is greater in the higher grades than in the lower grades. This pattern is particularly pronounced in math. As shown in table 5-6, the percentage of students performing at the basic level in math rises steeply from about 40 percent in third grade to 65 percent in eleventh grade. This pattern contrasts with the reverse pattern emerging from NAEP scores in the United States, where students at higher grade levels show proficiency equal to or greater than those in lower grades.[11] Tab. 5-6 Ftn. 11

11. See NAEP (2000, 2004).

Table 5-6. *Public School Student Performance in Math Achievement, 2002–2004*
Percent

	Students at basic (below proficient) level	
Grade	*2002–03*	*2003–04*
Overall	54.3	54.8
Third	41	39
Sixth	49	48
Eighth	65	65
Eleventh	65	67

Source: Data from Commonwealth of Puerto Rico, Department of Education (2003b, 2005).

That two-thirds of public school students in the eleventh grade failed to display basic proficiency in math skills attests to a major educational concern for Puerto Rico, particularly as the island seeks to compete with other countries in attracting industries such as pharmaceuticals, biotechnology, electronics, and finance that rely heavily on highly educated technical workers.

Trends in Puerto Rican College Board Scores

The only Puerto Rican student achievement data available over time are for high school seniors who take the battery of tests included in the University Assessment and Admissions Program (Programa de Evaluación y Admisión Universitaria). This Puerto Rican equivalent of the SAT is specially designed and administered by the College Board's Puerto Rico and Latin America Office for high school students applying to colleges and universities in Puerto Rico. The battery includes the Academic Aptitude Test (Prueba de Aptitud Académica), with verbal and quantitative components, and Achievement Tests (Pruebas de Aprovechamiento Académico) in English, Spanish, and mathematics.

Data of this type need to be interpreted with caution. First, the rising enrollment rates documented earlier suggest that student populations previously not represented in the educational system have increasingly gained access to primary and secondary schools. The resulting change in the composition of students, particularly in public schools, can alter student outcomes, even when school quality remains the same. Thus declining test scores may reflect the changing characteristics of students rather than declining quality of schooling.

Second, the increasing share of students who attend private schools compounds this issue. One must be particularly careful in interpreting the separate test score trends for students in the two education sectors. To the extent that the more able students have been shifting to private schools, the average test scores for public school students might well decline even in the absence of a decline in the quality of the public schools. In addition, the average scores for students in

Table 5-7. *Puerto Rico College Board Test Scores, Selected Years, 1994–2003*[a]

	1984–86			*1994–96*			*2002–03*		
Test	*All*	*Public*	*Private*	*All*	*Public*	*Private*	*All*	*Public*	*Private*
Aptitude									
Verbal	471	457	552	468	453	520	463	444	526
Quantitative	484	466	587	489	470	550	489	466	549
Achievement									
Spanish	476	463	552	471	456	520	449	434	497
Mathematics	483	464	595	490	471	556	441	460	546
English	434	418	533	447	425	522	440	416	535

Source: Data from College Board (1991, 2005), averages calculated by the authors.

a. Data for 1984–86 cover only October test scores; for other periods, the data include June and August test scores. "Public" refers to test takers in public schools; "private" to those in private schools. "All" also includes students who cannot be easily classified.

private schools might also fall as these schools absorb new students who perform at lower levels than the average for private schools.

With these interpretative warnings in mind, data on test scores for the University Assessment and Admissions test are presented on table 5-7, where we report average scores for all students and average scores disaggregated by type of school. Because scores jump around from year to year, we have simplified the table by averaging multiple years of results for each entry. Tab. 5-7

Based on the averages for all students, the trends that emerge for the early period displayed differences by the subject tested. Between the mid-1980s and the mid-1990s, test scores in quantitative reasoning, mathematics achievement, and English achievement all rose, while test scores on the verbal component of the aptitude test and on Spanish achievement fell. From the mid-1990s to the 2000–03 period, however, the patterns are clear: average test scores in all subjects either remained constant (quantitative reasoning) or fell. Most notable was the forty-nine-point drop in math achievement and the twenty-two-point drop in Spanish achievement. The decline in Spanish achievement might well be attributable to language policies and, in particular, an effort during the 1990s to raise the level of English proficiency.[12] At the same time, however, the drop in English achievement from the mid-1990s to the later period suggests that that effort was not successful. Although the declining test scores could potentially reflect changes in the tests over time or in the methods used to scale the test scores, a recent study examining these issues concludes that this is not the case.[13] Ftn. 12 Ftn. 13

12. Marco (2004b).

13. Marco (2004a, p. 5); see also Marco (2004b).

The pattern of change in test scores since the 1980s also differs for private and public schools. For private school students, scores have dropped continuously since the mid-1980s, with the exception of English achievement test scores, which declined between the mid-1980s and mid-1990s but have since recovered, and verbal aptitude scores, which declined substantially in the 1980s and by 2003 had risen only slightly. For public school students, the patterns are also clear: although test scores mostly rose between the mid-1980s and the mid-1990s, the trend abruptly turned around after the mid-1990s, when average test scores fell in all subjects.

One potential contributing factor that applies particularly to the decline in the scores of private school students is the increasing number of students who are opting out of the University Assessment and Admissions Program in favor of the U.S. version of the SAT so that they can attend mainland universities. Our analysis of Census Bureau data indicates that in 1980 there were 5,064 persons enrolled in U.S. universities who had been born in Puerto Rico and who had been living in Puerto Rico in 1975. By 2000, the comparable figure had grown to 8,744. This growth would contribute to the decline in test scores to the extent that such students had indeed opted out of the Puerto Rican test and were among the more academically talented students. Nonetheless, it would not help explain the declining test scores for public school students unless such students came from the public system. More relevant, but not the whole explanation, for that trend is the movement of students between the public and private schools.

A Bifurcated System

Emerging clearly from the data in table 5-7 are striking differences in average test scores of private and public school students. These differences illustrate the bifurcation of the education system, and they do not bode well for the long-term health of the island's public school system. On one side is the public school system that historically served more than 90 percent of all Puerto Rican students but now increasingly serves the lower-performing students of poor and lower-middle-class families. On the other is the private system that has traditionally catered to the higher-performing children of wealthy and upper-middle-class families.

About 25 percent of all Puerto Rican school children are now in private schools, more than double the current rate in the United States and also more than double the 1980 rate for Puerto Rico. The socioeconomic divide between
Tab. 5-8 public and private schools is dramatic, as shown in table 5-8. Data from the 2000 census show that the average income of Puerto Rican households with students in public schools is only about a third that of households with students in private schools. Consistent with that difference, the poverty rate among households with public schools students, at 66.8 percent, is almost three times that of households with private school students (23.0 percent).

Table 5-8. *Economic Profile of Public and Private School Students, Puerto Rico, 2000*
Units as indicated

Group	*Average household income per capita (dollars)*	*Poverty rate (percent)*
Puerto Rico, overall	8,066	48.7
Households with public school students	4,170	66.8
Households with private school students	11,960	23.0

Source: Data from U.S. Department of Commerce (2003), authors' tabulations.

That private schools are increasingly the schools of choice for those who can afford them is evident from the rising share of students enrolled in them. As a result, the private school sector has grown from a relatively small one offering elite education to a small portion of the wealthy population to a much larger and more diverse system. In 1960–61 there were 63,300 students in 133 private schools in Puerto Rico; 54 percent of these schools were Catholic schools, 21 percent were non-Catholic religious (mostly Protestant), and 25 percent were nonsectarian.[14] Ftn. 14 By 1990–91, 145,800 students were enrolled in 875 private schools; and in 2003–04, an estimated 185,745 students attended 987 private schools, 77,000 of whom (slightly more than 40 percent) were in Catholic schools.[15] Ftn. 15

Why has the private sector grown at the expense of the public school system? Despite considerable diversity in both the private and public school systems, private schools are generally perceived to offer on average a richer academic environment (especially in the teaching of English), with fewer discipline problems and greater safety, differences that have been found as well between private and public schools in the United States and other countries.[16] Such differences Ftn. 16 seem to be particularly significant in Puerto Rico. For instance, the newspaper *El Nuevo Día* reports that a group of school teachers and other professionals interviewed informally "all agree that a major factor why parents send children to private schools is that the latter offer a curriculum that is more demanding than that offered in public schools. . . . Security is another essential factor in an environment where violence and crime permeates all levels of society."[17] Ftn. 17

Private schools generate their revenues from tuition and fees as well as from private sources and the federal government. Although Puerto Rico's constitution prohibits the use of state and local public funds for schools other than public schools, private schools do receive U.S. government federal funds, which they apply for through the commonwealth's Department of Education.

14. Lopez Yustos (1992, p. 169).
15. Commonwealth of Puerto Rico, General Council of Education (2004).
16. See Coleman, Hofer, and Kilgore (1982).
17. Yadira Valdivia, "Attractiveness of Private Schools," *El Nuevo Dia,* August 13, 1991, p. 19.

Although they continue to offer education to the middle- and higher-income classes of Puerto Rico, the private schools have become increasingly heterogeneous, the academic standards of some of the new ones falling far below those of the more established elite private schools. To operate a private school, a license must be obtained from the General Council of Education. Although these licenses must be periodically renewed, the renewal process does not require a significant academic review. The council accredits schools, but only at the request of the institution. Many private schools are accredited by U.S.-based accreditation organizations or have their own accountability systems. However, there is currently no mechanism for public monitoring of the quality of private schools.

Both the greater heterogeneity of private school students and the growth of institutions with lower-quality offerings help explain the falling test scores in the private school system. Thus it is no coincidence that the expansion of the private sector coincides with the declining average College Board test scores of students in private schools over the past twenty years and particularly from the mid-1980s through the mid-1990s, as shown in table 5-7.

The consequences of private sector growth for the public school system are also potentially profound, especially to the extent that the students who leave the public school system are the more able. As such students leave, it becomes increasingly difficult for the public system to keep its test scores from falling and thereby to convince families that the public system is not deteriorating, leading to another round of departures; and so the cycle continues.

Disparities within the Public School System

Even within the public school system wide differences in achievement exist between students in wealthier neighborhoods and those in lower-income communities. For instance, in the 2003–04 school year, the average score of students taking the College Board's University Assessment and Admissions Program quantitative test at the Antilles Public High School in Guaynabo, a wealthy suburb of San Juan, was 555, which exceeds the average among private high schools. In contrast, the average score in the Maria Teresa Piñero School, serving low-income students in the municipality of Toa Baja, was 397, and in the Lola Rodriguez de Tió School, in a low-income community in Carolina, 401.

Income-related disparities in educational outcomes are also visible in other indicators, such as school dropout rates. In some poor communities, high dropout rates lead to a significant emptying of schools in the higher grades. Table 5-9 illustrates this exodus for a set of high schools in low-income neighborhoods in various parts of the island. Overall, in 2002–03, fall enrollment in the twelfth grade was 73.6 percent of the fall enrollment in the tenth grade. In the specific schools shown in the table, however, twelfth-grade enrollment was substantially lower: only about 50 percent of tenth-grade enrollment in three of the schools and as low as 24 percent in one school. Although some of this emptying of schools

Tab. 5-9

Table 5-9. *Public High School Enrollment, Puerto Rico, Selected Schools, 2002–2003 School Year*

School	Grade			*Twelfth grade as share of tenth grade (percent)*
	Tenth	*Eleventh*	*Twelfth*	
Overall, Puerto Rico	44,922	38,353	33,062	73.6
San Juan, ID 62422	164	139	98	60.0
Trujillo Alto, ID 69047	378	227	206	54.5
Utuado, ID 16220	189	124	92	48.7
Ponce, ID 52514	703	537	342	48.6
San Juan, ID 61440	228	118	99	43.4
Mayagüez, ID 42168	313	123	76	24.2

Source: Data from NCES (2004b).

could reflect the movement from public schools into other schools within and outside Puerto Rico, most of it appears to be the result of students dropping out of the system.

The higher dropout rates for students from low-income families are more explicitly illustrated in table 5-10. The third row of the table shows that the dropout rate—defined as the share of the eighteen- to twenty-four-year-old population who are not in school and did not complete high school—was 35.3 percent for youth in low-income households in contrast to only 8.7 percent for students in households at the top of the income distribution. Tab. 5-10

In addition, the table shows that 12.9 percent of the youth aged eighteen to twenty-four residing in low-income households were still enrolled in high school, a school delay rate more than 50 percent higher than the 8.0 percent delay rate among the richest third of the households. Although school delay is not as negative an indicator as dropping out of school, the grade retention and repetition that it reflects are often associated with poor academic performance. Furthermore, evidence suggests that forcing a student to repeat a grade is not likely to lead to any significant improvement in academic achievement and typically increases the probability that he or she will drop out of school.[18] Ftn. 18

If the dropout and school delay rates for youth residing in households at the low end of the income ladder are combined, 48.2 percent of persons aged eighteen to twenty-four were still in high school or had dropped out of school altogether. That almost half of the youth residing in the poorest households in Puerto Rico were experiencing severe school difficulties suggests a cycle of poverty and poor schooling that would need to be broken for the island to increase in any significant way the income and education of its most disadvantaged populations.

18. Hauser (2004); Alexander, Entwisle and Kabbani (2001); Holmes (1989).

Table 5-10. *School Enrollment of Persons Aged 18 to 24, by Household Income, Puerto Rico, 2000*[a]
Percent

Status	*Overall*	*Low income*	*High income*
Not enrolled in school	55.1	61.5	47.3
Completed high school[b]	33.8	26.2	38.6
Did not complete high school (estimate of dropout rate)	21.3	35.3	8.7
Enrolled in school	44.9	38.5	52.7
Enrolled in high school or less (estimate of school delay)	10.5	12.9	8.0
Enrolled in college or more	34.4	25.6	44.7

Source: Data from U.S. Department of Commerce (2003), authors' tabulations.

a. Low- and high-income households are defined here as those in the bottom 30 percent and the top 30 percent, respectively, of the income distribution.

b. Includes GED equivalency.

The lack of progress in overall student achievement, the movement of students out of the public system, and the education system's apparent failure to meet the needs of the bulk of Puerto Rico's poor population are all cause for concern. They are not, however, the result of inattention or lack of concern on the part of education policymakers within Puerto Rico.

Policy Initiatives Related to Schools: 1990 to the Present

During most of Puerto Rico's history, and especially since 1898, when it became a territory of the United States, the public elementary and secondary school system on the island was a highly centralized, state-controlled enterprise. Reforms in the 1960s introduced seven educational regions but only as a means of providing more structure to the governance system, not to decentralize it. No major changes in the system were undertaken until serious reform discussions began in the late 1980s.[19] The effort to reform and improve the system during the 1990s included both the attempt to decentralize the system and the investment of significant new resources.

Ftn. 19

School Governance

After an intensive process of study and discussion, a major overhaul of Puerto Rico's school system was passed by the Puerto Rican legislature, and signed into law by the governor, in 1990. The Organic Law of the Department of Education (Law 68, passed on August 28, 1990) starts by noting the significant changes

19. See Osuna (1923), Rodriguez Bou (1947), Gómez Tejera and Cruz López (1970), and Lopez Yustos (1992) for historical accounts of Puerto Rico's educational system.

occurring globally that affect education, acknowledging the general level of dissatisfaction with the Puerto Rican school system, and stating the need to implement a package of comprehensive school reform. The introduction ends with the following statement: "With this law we state our commitment to bring high-quality educational opportunities on an equal basis to all Puerto Ricans."[20] Ftn. 20

The 1990 Organic Law made some significant changes in the governance of the school system. Before that point, the Department of Education of Puerto Rico, which operates a unified school district in charge of K–12 education for the whole island, tightly controlled all areas of public schools, from the curriculum and instruction to teacher selection and textbooks. Its administrative structure was organized on the basis of a few regions, each of which encompassed large parts of the island. No formal mechanism existed for the active participation of teachers, parents, and school directors in the operation of schools or the design of curriculum and instruction. The Organic Law was intended to decentralize the system and increase participation by adding an administrative layer of local school districts (each headed by a superintendent) that would aid in the administration of the system and in distributing the curriculum and instructional services offered by the regions to schools; and creating more participation of stakeholders through the introduction of school-based councils that would foster the input of parents, teachers, students, and community members into the curriculum of the school and its interactions with the community.

Despite the rhetoric of decentralization, the Organic Law had little effect on the distribution of authority because virtually all administrative decisions remained in the hands of the Department of Education. But the law was quickly extended in 1993, when an ambitious new legislative initiative further decentralized the school system. The first step in this process occurred with the passage of the Community Schools Development Act (Law 18) in June 1993, which turned over major decisionmaking powers to the schools. The building block of the new school-based management reforms was the creation of autonomous community schools (*escuelas de la comunidad*) governed by school councils in collaboration with school directors. The school-based management team was to take responsibility not only for school curriculum but also a variety of management, fiscal, and instructional affairs, from the selection and payment of contractors for repair and maintenance services to the design of new instructional methods and activities. The Community Schools Development Act was implemented quickly, and over the course of a few years in the mid-1990s, all elementary and secondary schools were converted into community schools.

After the system of community schools was fully in place, the government replaced the Organic Law of 1990 with the law that currently governs the public education system in Puerto Rico, the 1999 Organic Law of the Department of

20. Commonwealth of Puerto Rico (1990, p. 2).

Education (Law 149). This law formally placed community schools at the center of the system, providing them, in principle, with even broader autonomy in controlling their instructional, curricular, fiscal, and managerial affairs, including the hiring of teachers and management of their budgets. At the same time, the law reassigned functions and powers to the system of ten regions and eighty-four school districts, giving districts the function of managing academic affairs and regions the function of managing administrative affairs. The Central Office of the Department of Education retained its decisionmaking power over schools, meaning that the more than fifteen hundred school directors respond directly to the secretary of education, and the Central Office continues to monitor and approve a myriad of school-based decisions.

In addition to these major governance reforms, a number of other legislative actions have introduced over the past fifteen years, including an attempt to establish a voucher system that would have permitted public school students to use public funds to attend private schools. This effort was derailed by a ruling from Puerto Rico's Supreme Court that such a program would represent an unconstitutional use of public funds for the support of religious institutions. Other reforms include changes to the teacher certification requirements and teacher salary structures in 2002, as well as reforms related to the unionization of teachers and other public employees in the school system.

Financing Primary and Secondary Education

In addition to these governance changes, during the 1990s Puerto Rico significantly increased its public spending on elementary and secondary education. Included in public spending are both operating or current fund expenditures and capital expenses or general improvements. The latter, which are used for school construction, major repairs, and remodeling, generally constitute a small fraction of the overall budget and are highly volatile. As a result, we focus here on operating expenses, which include categories such as the salaries of teachers, books and materials for schools, and administrative expenses.

Tab. 5-11 Table 5-11 shows the changes in real operating public expenditures per student in elementary and secondary education between the 1970–71 and 2002–03 fiscal years (adjusted for inflation using the Puerto Rico Consumer Price Index). As can be seen, expenditures rose in the 1970s and remained essentially unchanged until the 1990s. Between 1990–91 and 2001–02, total spending for public education increased by more than 50 percent in constant dollars, despite declining enrollment. By 2002–03, spending had increased another 14 percent. As a result, by 2003, spending per student had risen to $4,145, about double its level in 1990 and more than triple its level in 1970.

Despite this sharp spending increase in the 1990s, in 2001–02 Puerto Rico's spending per student was only about half the U.S. average, only a third that in wealthy high-spending states such as New Jersey, New York, and Connecticut,

Table 5-11. *Public Spending on Elementary and Secondary Education, Puerto Rico, Selected Years, 1970–2003*[a]
Dollars, except as indicated

Fiscal year	*Spending (millions of dollars)*	*Number of students*	*Spending per student*
1970–71	945,457	686,770	1,377
1980–81	1,454,991	712,880	2,041
1990–91	1,414,572	644,734	2,194
1994–95	1,909,456	619,655	3,081
2001–02	2,176,361	604,177	3,602
2002–03	2,482,733	598,933	4,145

Source: Data from Commonwealth of Puerto Rico, Department of Education (1973, 1983, 1993, 1996, 2004a).

a. Operating expenditures, in constant 2003 dollars.

and significantly less than in Utah and Mississippi, the lowest-spending U.S. states (table 5-12). Nevertheless, Puerto Rico's expenditures on primary and secondary education per student relative to personal income (33.2 percent in 2001–02) greatly exceeded the average in the United States (25.4 percent) and in each of the states listed in the table. Tab. 5-12

One reason for the growth in spending during the 1990s was the rise in island income. Reflecting the rebound of economic growth in the United States, Puerto Rico's GNP per capita grew at an average annual rate of 1.7 percent in real terms between 1990–91 and 2002–03. But there is more to the story than income growth. While income per capita grew at the rate of 1.7 percent a year, public expenditure per student rose at an annual rate of 5.3 percent. As a result, education spending per student as a percentage of GNP per capita rose from 22 percent in 1990–91 to close to 34 percent by 2002–03.

Not all of this spending was financed by taxes collected in Puerto Rico. As a territory of the United States, Puerto Rico receives federal aid for education, primarily in the form of Title I funds for disadvantaged students and Title VI grants for educational improvement. Combined, these two sets of programs accounted for close to 60 percent of the more than $700 million in federal appropriations for the 2000–01 fiscal year. The combination of a high poverty rate among its children and low spending per student means that federal aid accounts for a far larger share of education spending in Puerto Rico than in any U.S. state. Such aid accounted for 31.4 percent of all operating expenditures in 1990–91 and 32.6 percent in 2002–03. These shares contrast with an average share of about 7 to 8 percent in the United States as a whole, 13 to 14 percent in Mississippi, and 8 to 9 percent in Tennessee.[21] Ftn. 21

21. NCES (2003).

Table 5-12. *Public Spending on Elementary and Secondary Education, Relative to Personal Income, Puerto Rico and Selected U.S. States, 2001–2002*
Dollars, except as indicated

Region	*Spending per student*	*Per capita personal income, 2001*	*Spending as share of per capita personal income (percent)*
Puerto Rico	3,563	10,733	33.2
United States	7,734	30,413	25.4
High-spending states			
Washington, D.C.	12,102	40,539	29.9
New Jersey	11,793	38,625	30.5
New York	11,218	35,878	31.3
Connecticut	10,577	42,377	25.0
Massachusetts	10,232	38,864	26.3
Low-spending states			
Utah	4,910	24,639	19.9
Mississippi	5,354	21,653	24.7
Tennessee	5,959	26,808	22.2
Arizona	5,964	25,878	23.1
Idaho	6,011	24,506	24.5

Source: Data from NCES (2004e); U.S. Department of Commerce (2004); Commonwealth of Puerto Rico (2004b).

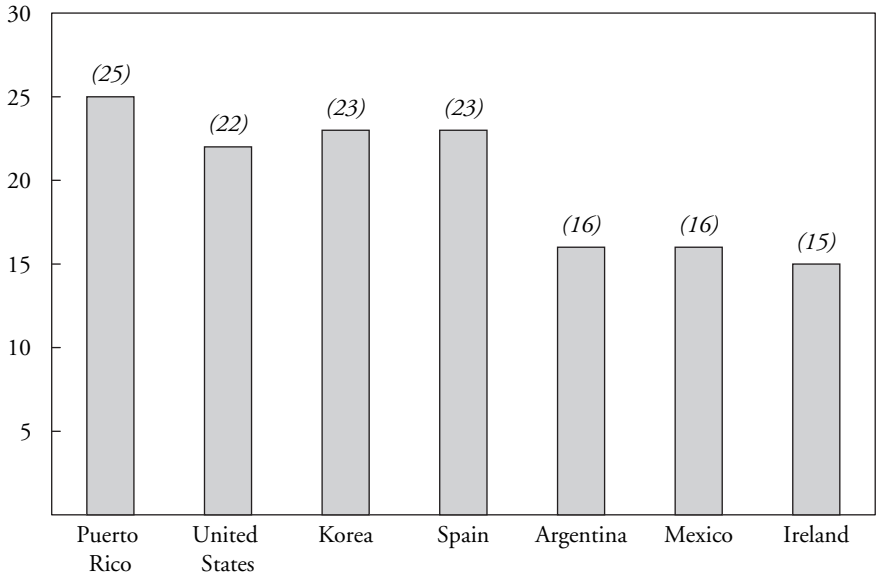
a. Operating expenditures, in current dollars.

Even after adjusting for this federal aid, it appears that by world standards Puerto Rico is making an unusually large effort in public education. Based on the standard measure of education effort—spending (from own sources) per
Fig. 5-2 student divided by GNP per capita—figure 5-2 shows that Puerto Rico's share of 25 percent exceeds the average share of 22 percent for Organization for Economic Cooperation and Development member nations, the U.S. share of 22 percent, and also the far lower shares in Mexico (16 percent), Ireland (15 percent),
Ftn. 22 and Argentina (16 percent).[22]

Another way to measure Puerto Rico's effort in financing public education is to look at its expenditures on education as a share of its general fund budget. This share has hovered around 20 percent for many years. In fiscal year 2002–03, for instance, the primary and secondary education expenditure charged to the general education fund of Puerto Rico's government was equal to $1,580,573,000, whereas the government's total general fund was $7,842,700,000, so that edu-

22. The share for Puerto Rico includes only public spending (financed by state and local sources), while the shares for other countries include both private and public spending; see UNESCO (2003) and OECD (2003).

Figure 5-2. *Public Spending on K-12 Education Per Student as Share of GNP Per Capita, Selected Countries*
Percent



Source: OECD (2003); Commonwealth of Puerto Rico (2004a).
a. Excludes U.S. (federal) government spending on education.

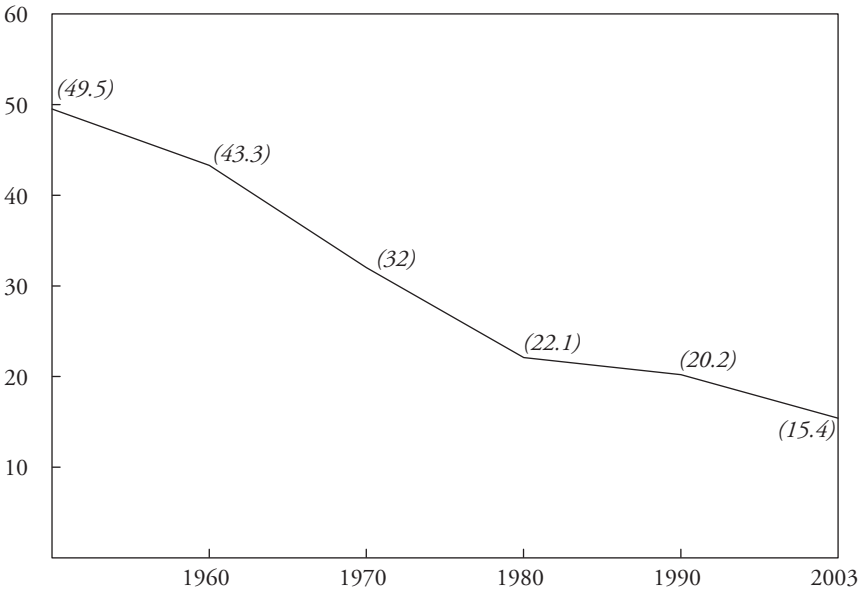
cation expenditures were 20.1 percent of all government expenditures.[23] This share far exceeds that in most other countries. In 2000, for example, elementary and secondary education spending as a proportion of total government expenditures was 14.4 percent in the Republic of Korea, 10.3 percent in Denmark, 7.1 percent in Ireland, 9.2 percent in Spain, 15.2 percent in Chile, 10.9 percent in Argentina, and 9.4 percent in Uruguay.[24] Ftn. 23 Ftn. 24

The greater investments made by Puerto Rico in the area of public education in the 1990s partly financed the hiring of teachers. Figure 5-3 shows the sharp drop in the student-to-teacher ratio in Puerto Rico since the 1950s. In the 1952–53 school year, 9,251 teachers were serving 458,000 students in the regular program of the public school system, a ratio of 49.5 pupils per teacher. By 1980–81, the number of students had risen to 712,880, but the teaching labor force had increased by 32,292, achieving a ratio of 22.1 students per teacher. From 1980–81 to 2003–04, the rising number of teachers was combined with a Fig. 5-3

23. Commonwealth of Puerto Rico (2004a); for details on the behavior of education expenditures over time, see Rivera-Batiz (1995a).

24. UNESCO (2003).

Figure 5-3. *Student-to-Teacher Ratio, Puerto Rico, Selected Years, 1952–2003*[a]
Percent



Source: Rivera-Batiz (1993); Commonwealth of Puerto Rico (1994, 1996a, 1998, 2000, 2004a).
a. Students and teachers in regular programs of instruction.

drop in the public student population, leading to a drop in the student-to-teacher ratio to 15.4 in 2003–04—lower than the U.S ratio of about 16.1 pupils per
Ftn. 25 teacher in 2002–03.[25]

Teacher salaries in Puerto Rico are about half those in the mainland United States. For the 2002–03 school year, the average annual salary of teachers in
Ftn. 26 Puerto Rico was $22,164, compared with $45,771 in the United States.[26] Even states with the lowest salaries, such as South Dakota ($32,414), Oklahoma ($32,277), North Dakota ($33,869) and Mississippi ($35,135), have substan-
Ftn. 27 tially higher salaries than Puerto Rico.[27] The average starting salary of a teacher in Puerto Rico with a bachelor's degree was $18,000 in 2002–03, the equivalent of a base salary of $1,500 a month. By comparison, the average starting salary in the United States was $29,564, or $2,464 a month.

Teacher salaries in Puerto Rico are lower today in real terms than they were in the late 1960s. From 1968–69 to 1992–93, the base monthly salary for those with

25. NCES (2003, p. 18).
26. American Federation of Teachers (2004, table 1).
27. The salary differences between Puerto Rico and these states would be greater if the differences in the cost of living among them were taken into account. See Nelson, Drown, and Gould (2001, p. 13).

a bachelor's degree (adjusted for inflation and measured in 2003 dollars) declined from $1,768 to $1,408. Since that time, it has slightly increased to $1,500. One of the main stated objectives of the teacher union is to raise this base salary.

Historically, and up to the late 1990s, teachers in Puerto Rico were organized through labor organizations that acted to improve the working conditions of teachers but did not negotiate directly with the government. The three main teacher organizations in Puerto Rico are the Puerto Rican Teacher Association (Asociación de Maestros de Puerto Rico), the Federation of Teachers of Puerto Rico (Federación de Maestros de Puerto Rico), and Puerto Rican Educators in Action (Educadores Puertorriqueños en Acción). In 1998 the Labor Relations Law of Public Service Employees in Puerto Rico (Law 45) officially sanctioned the syndication of public sector employees, allowing them to negotiate collective bargaining agreements with the government. Because the law specified that only one organization could represent the employees of any specific group of government workers, in 1999 teachers selected the Federation of Teachers as their collective bargaining organization, and since that time the federation has been in charge of negotiating with the Department of Education.

The Failure of School Reform

Given the trends and patterns in achievement levels documented earlier, it is clear that the combination of governance reforms and significant additional spending on education has not yielded the desired results. Instead of gaining, achievement levels have failed to increase and may have actually deteriorated. Families have shown their lack of confidence in the public system by increasingly opting for private schools. Instead of promoting more equity in the sense of high quality education for all, the system continues to fail students from the poorest households. Their glossy promotion by government authorities notwithstanding, the governance reforms have failed to introduce fundamental change in teaching and learning and may, in fact, have made things worse.

The problems with the reform effort were many and are not hard to identify. One is that a good number of the reforms implemented after the first Organic Law was passed in 1990 were imposed from above by the Department of Education. They were quickly passed as laws before a consensus had been created among stakeholders. They were then implemented without much preamble, in the form of orders from the Department of Education. This process created widespread distrust and resistance as well as an unenthusiastic response to the reforms from those most central to their dictates: teachers, students and their parents, and school directors. This problem is not unique to Puerto Rico. Governments in various other countries have forced decentralization programs upon schools in an authoritarian way.[28] Ftn. 28

28. See, for instance, the case study of decentralization reforms in Colombia in Hanson (1995).

The politicized environment in which most public institutions operate on the island complicated the situation. As a political party comes into power, not only do policies change, but also most aspects of government decisionmaking—from personnel and procurement to the official languages used in the public sector—become colored by party loyalty. Policies are often designed and implemented with the goal of seeking political gain, not necessarily because they are the most appropriate. In the area of education, politically motivated policies are often used to manipulate broad areas in the school system, from curriculum and language policy to testing and assessment.

The environment among teachers epitomizes the problem. Each of the three teacher organizations in Puerto Rico has a core membership that is affiliated with one of the three main political parties. Even after the Federation of Teachers became the sole bargaining agent for the teachers, the other two organizations remained in existence and have been publicly critical of the federation's actions and initiatives. The competing organizations have also questioned the legitimacy of the federation and have even gone to court to try to void its authority as their members' representative.

A second problem with the governance reforms is that they were introduced too abruptly. As a result, much of the school system was unprepared for the massive administrative shifts associated with decentralization. A recent qualitative study of the impact of the reforms on the effectiveness of school directors observes that the decentralization program failed to generate a more efficient system in part because school directors were unprepared for the new tasks they were asked to do:

> An example is the management of school budgets, for which directors have no assistance. In the conversations I have had over the last year with over 200 school directors, I have not found a single one that has received adequate support to handle the new management functions. Furthermore, many directors indicate that they have had to reduce their academic management duties in order to deal with the financial management of the schools. One of the tasks they can no longer fulfill is the supervision of the teachers and their instructional activities, to ensure that the quality of schooling is increasing.[29]

Ftn. 29

Although new institutional structures were created on paper to foster increased school autonomy and participation, a third limitation of the reforms is that these structures—to a greater or lesser extent—did not succeed in doing so. A case study of the implementation of the reforms on one school during the late 1990s concludes that "in the dimension of participation, this research . . . failed to identify any significant changes relative to the situation before the reforms

29. Castillo Ortiz (2002, p. 3).

were implemented."[30] The school had created a school council, as required under the Community Schools Development Act (Law 18), but the council never met. Furthermore, the author of this study observed no change in the way parents, teachers, and students worked together nor in the way the school was involved with the community. Ftn. 30

These failures have been systematic throughout the school system. An exhaustive study carried out in 2002 and 2003 by the management consultants McKinsey & Company led the Department of Education itself to conclude that despite the reforms, the administrative system remained highly centralized. The island's fifteen hundred schools still report directly to the secretary of education but are also subject to several layers of authority that embody different and often conflicting approaches.[31] The McKinsey study finds that the department continues to have "highly-centralized processes that block the effective implementation of school autonomy."[32] It also concludes that the reforms have made the administrative process more confusing, with "a lack of clarity of roles and functions, leading to gaps and duplication of effort," and have created a "bureaucratic structure" that has "insufficient lines of communication throughout the school system."[33] A 2000 survey of school directors finds that an "excessive administrative burden" and a "lack of parental involvement and assistance in schools" were two of the three main problems they faced (teacher absenteeism, discussed later in this chapter, being the third).[34] Ftn. 31 Ftn. 32 Ftn. 33 Ftn. 34

A fourth problem is that the substantial increase in resources flowing into the school system in the 1990s had an unhealthy side effect. As often happens when government institutions receive large sums of money over short periods of time, corruption turned out to be a problem. From 2001 to 2004, the Department of Education was the subject of extensive local and federal investigations regarding the diversion of education funds for personal or political gain in the period 1993 to 2000. Indeed, the former secretary of education, Victor Fajardo, who was at the helm of the Department of Education in the middle and late 1990s, is currently in jail, having been charged with and convicted of a variety of law violations associated with the use of department funds. Many of his aides and other staff have also been investigated, and some convicted, as well. In response to the irregularities, the federal Department of Education froze hundreds of millions of dollars in funding for Puerto Rican schools during the 2002 through 2004 fiscal years.[35] Ftn. 35

30. Martí-Vazquez (2000, p. 238–39). See also Quintero (2006, p. 5).
31. Commonwealth of Puerto Rico, Department of Education (2004c, p. 6).
32. Commonwealth of Puerto Rico, Department of Education (2003).
33. Commonwealth of Puerto Rico, Department of Education (2004c, p. 6).
34. Castillo Ortiz and Marrero (2003, p. 1).
35. Camile Roldán Soto, "Up to Date the Department of Education with the Federal Government," *El Nuevo Día,* June 16, 2004, p. 10.

Table 5-13. *Administrative Density in Schools, Puerto Rico and the United States, Selected Years, 1988–2001*
Percent

Characteristic	Puerto Rico		United States,
	1988–89	*2003–04*	*2000–01*
Non-classroom staff per 100 classroom staff	86.7	88.5	59.2
Administrative staff per 100 classroom staff	33.5	28.0	13.6
Administrative staff per 1,000 students	16.4	18.2	8.5

Source: Data from Commonwealth of Puerto Rico (1992, 2004a); NCES (2003).

That the school governance legislation over the past fifteen years has yet to generate a simpler and more decentralized system is clear from the continuing bureaucracy within the Department of Education. The total staff of the department increased from 61,611 in 1988–89 to 69,906 in 2003–04, and the department remains by far the largest agency within the government of Puerto Rico. In 2003–04 there were 219,835 government employees, and the Department of Education accounted for 31.8 percent, or almost one out of every three.

Tab. 5-13 Table 5-13 presents some indicators of the bureaucratic and administrative density of the Puerto Rican Department of Education. The staff of the regular program of the Department of Education can be divided into classroom staff (teachers and teaching aides) and nonclassroom staff (all other employees). Among the latter, the administrative staff (which includes management as well as office workers) can also be identified. From 1988–89 to 2003–04, the number of employees in nonclassroom staff per 100 employees in classroom staff rose from 86.7 to 88.5. Although the administrative staff per 100 employees in classroom staff declined from 33.5 to 28.0 over the period, this decline reflects the large increase in classroom teachers rather than any absolute decline in bureaucratic bloat. If administrators are measured relative to students, the story changes: that indicator rises from 16.4 in 1988–89 to 18.2 in 2003–04.

These figures are exceedingly high compared with those in the United States in 2000–01, the nearest year for which there is comparable data. The number of nonclassroom employees per 100 employees in classroom staff was 59.2 in the United States, substantially lower than the 88.5 in Puerto Rico in 2003–04. The number of administrative staff per 100 employees in nonclassroom staff was 13.6 in the United States, less than half the equivalent figure on the island in both 1988–89 and 2003–04. The number of administrative employees per 1,000 students was 8.5 in the United States, again about half the equivalent figure for Puerto Rico. Even when one makes the comparison to a state such as New York, which includes New York City and is not known for its bureaucratic leanness, Puerto Rico does not look good. For instance, though the number of nonclassroom staff per 100 classroom employees was 68.1 in New York in 2000–01,

which exceeds the U.S. average of 59.2, it still falls far short of the indicator for Puerto Rico. Thus Puerto Rico appears to have ended up with the worst of both worlds: a poorly implemented effort at decentralization that disrupted the functioning of schools and an increasingly bloated centralized bureaucracy.

The last failure of the governance reforms, and perhaps the most important, is their insufficient attention to accountability throughout the school system. In line with the McKinsey & Company study, the Department of Education concluded in 2004 that "there is no accountability in any part of the school system."[36] Ftn. 36
The student assessment component of the reforms has become operational only in the past two years, with the outsourcing of the testing to an independent, external agency (the Educational Testing Service, headquartered in Princeton, New Jersey) and only in response to the pressures originated by the federal No Child Left Behind legislation.

Beyond assessment, accountability at the school level continues to be a problem. Absenteeism among both students and teachers is rampant. A recent study documents that among both groups, the average level of absenteeism is equivalent to five weeks of class during the academic year.[37] With respect to students, the Ftn. 37
problem could be reduced by tougher enforcement of truancy laws at the school level. The absenteeism of teachers is more complicated and deserves additional research. To the extent that high absenteeism reflects poor working conditions in the schools, such as student violence, the situation might improve if teachers in Puerto Rico had greater assistance in the form of teacher aides. Such aides are virtually absent, accounting for only 0.3 percent of all school system staff on the island in 2001–02, in contrast to their 11.4 percent share in the United States. Regardless of the cause of the absenteeism, however, there is little doubt that it is harmful to students. This is especially true in Puerto Rico, where schools often do not provide substitute teachers; if teachers are absent, students are typically sent home.

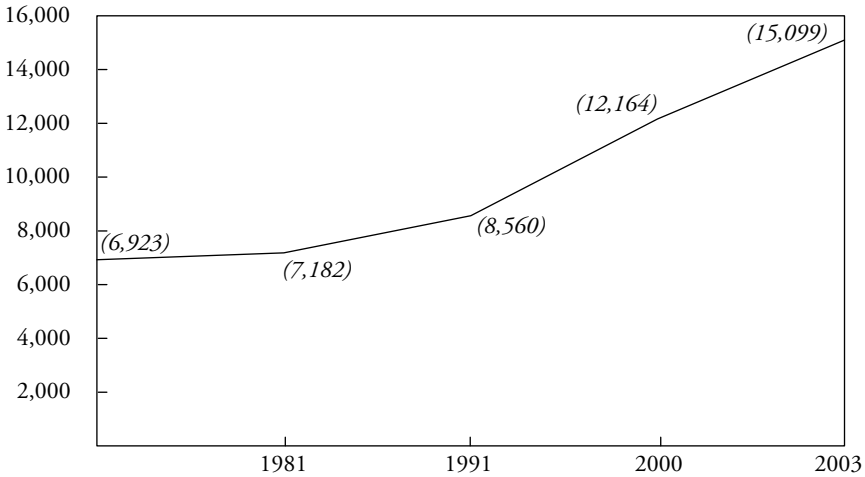
Given the many serious problems with how the school governance reforms were implemented, it is probably safe to conclude that they contributed to the decline in student achievement within the public schools during the 1990s both directly, by the disruption they generated, and indirectly, by inducing some students to shift to private schools. In addition, as noted earlier, some specific aspects of the reform effort may be directly implicated in the declining test scores—for example, the marked emphasis on English instruction may to some degree responsible for the decline in Spanish scores.

Policy Issues in Higher Education

Higher education raises its own set of policy issues. These include the level and composition of funding for the public university system, concerns about its

36. Commonwealth of Puerto Rico, Department of Education (2004c, p. 6).
37. Castillo Ortiz and Marrero (2003, p. 28).

Figure 5-4. *Public Spending on Higher Education Per Student, Puerto Rico, Selected Years, 1975–2003*[a]
Constant dollars (2003)



Source: NCES (2004a; 2003, p. 379, table 337).
a. Data for University of Puerto Rico system only.

productivity, and questions about potentially adverse distributional consequences of government funding of a system that serves the wealthier students on the island.

Funding and Spending

With the rapid growth in enrollment in the island's public university system noted earlier, one might suspect public spending to have lagged behind. In fact, Fig. 5-4 that has not been the case. As shown in figure 5-4, public spending, expressed in constant 2003 dollars, has risen quickly in the University of Puerto Rico system. Despite rising enrollments, the University of Puerto Rico managed over recent years to more than double its real expenditures per student, from $7,182 in 1980–81 to $15,099 in 2002–03. This spectacular growth has brought public spending on higher education in Puerto Rico close to the U.S. average. In 1980–81 public spending per student in Puerto Rico was about 75 percent of that in the United States; by 2000–01 it had risen to about 95 percent of the U.S. average.

That Puerto Rico's per capita income is so much lower than that of the United States means that the island is spending a far higher percentage of its income on education. Our calculations for 2001–02 show that public spending per student in Puerto Rico expressed as a percentage of per capita gross national product, at 133.8 percent, was triple that of the United States (41.0 percent), triple the

average in Latin American and Caribbean countries (44.9 percent), and more than double that of upper-income countries (66.5 percent).[38] Ftn. 38

The comparatively high ratio of public spending on higher education per student in Puerto Rico does not extend to the private sector. In 2000–01, private colleges and universities in Puerto Rico spent, on average, $4,507 per student, less than a third of that spent in the public institutions. This pattern contrasts with that in the United States, where in the same year private colleges and universities spent an average of $25,245 per student, far exceeding the $14,494 spent by public universities. These differences translate into significant differences in the numbers of students per faculty member across the two sectors. In 1999–2000, the ratio of 14.9 students per faculty member in the island's four-year public universities was about two-thirds the ratio of 23.7 in the less well funded private universities. The patterns are reversed for U.S. universities, where four-year public institutions had an average of 14.6 students per faculty member (about the same as in Puerto Rico), while the much better funded private universities were able to reduce their ratios to 12.4 students per faculty member.[39] Ftn. 39

Although Puerto Rico spends almost as much per student in its public universities as does the United States, it pays its professors less. Table 5-14 shows the average pay differentials between full-time instructional faculty in four-year degree-granting institutions in Puerto Rico and the United States. This pay differential widens with the seniority of the faculty: assistant professors in Puerto Rico's public sector earn 73.2 percent the salary of their counterparts in the United States, whereas for full professors the rate is only 60.7 percent. These differences are not readily attributed to differences in qualifications. At the University of Puerto Rico at Río Piedras, for instance, close to 70 percent of full-time faculty holds a doctorate, while the equivalent average for research universities in the United States is 72.7 percent.[40] Tab. 5-14 Ftn. 40

Student Outcomes and Quality

Only a small proportion of students in four-year higher education institutions in Puerto Rico graduates in four years. At the University of Puerto Rico at Río Piedras, for example, only 12.5 percent of undergraduate students complete their degrees within four years of entering the institution, and about 50 percent of undergraduates take six years.[41] These extended times to graduation are not atypical among urban institutions serving populations of part-time students, many of whom work and go to school at the same time. For instance, six-year Ftn. 41

38. NCES (2003); World Bank (2004).

39. NCES (2003). These data are for full-time equivalent students per full-time equivalent faculty.

40. For Puerto Rico, see University of Puerto Rico at Río Piedras (2005); for the United States, see NCES (2003).

41. University of Puerto Rico at Río Piedras (2005).

Table 5-14. *Average Salary of Full-time Instructional Faculty at Public Universities, Puerto Rico and the United States, 1999–2000*
Dollars

Rank	*Puerto Rico*	*United States*
Assistant professor	35,612	48,671
Associate professor	41,270	57,984
Full professor	49,960	82,344

Source: Data from NCES (2003, p. 292).

graduation rate is 48.6 percent at George Mason University,, 44 percent at San Diego State University, and 37.8 percent at the University of Nevada at Las Vegas. By the standards of most comprehensive research universities, including public universities, these graduation rates are quite low.

About 61 percent of those graduating from Puerto Rican institutions of higher education in 2000–01 were granted bachelor's degrees, approximately 24 percent associate degrees, and the remaining 15 percent graduate-level or professional
Ftn. 42 degrees.[42] In the United States, the share of graduate and professional degrees is significantly higher, equal to 25 percent of all those receiving degrees in the country in 2000–01. The shortfall in Puerto Rico is not in professional degrees but rather at the master's and doctoral levels, where Puerto Rican universities
Ftn. 43 lag in their program offerings and enrollments.[43]

Compared with their United States counterparts, students who graduate in four years from Puerto Rican institutions tend to be focused on science, technology, and business. Of the students who graduated in four years and received their degrees in Puerto Rico in 2000–01, 55.2 percent were enrolled in the computer science, engineering, natural science, and business fields, while the equivalent proportion for U.S. students was only 37.8 percent. These data suggest that many university students are responding to signals provided by the labor market on the island. Indeed, the growing pharmaceutical, biotechnology, electronics, transportation, finance, and banking sectors all have increased the demand for the technical and professional workers that Puerto Rican universities are churning out in high numbers.

This synergy between the most dynamic sectors of the Puerto Rican economy and the island's universities has been intensifying in recent years, as typified by linkages between the pharmaceutical industry and the universities. At the University of Puerto Rico at Río Piedras, external research and development funding of study in the natural sciences tripled during the past five years, rising to $18.9 million in 2004–05 and accounting for two-thirds of the external fund-

42. NCES (2003).
43. NCES (2003).

ing received by the institution.[44] Three major biotechnology research centers at the University of Puerto Rico have been funded by the National Institutes of Health and the National Science Foundation: the Neuroscience Center for the Molecular Study of Development and Behavior, the Center for the Study of Protein Structure, Performance, and Dynamics, and the Center for the Development of a Biomedical Research Information and Collaboration Network. Several pharmaceutical companies with operations in Puerto Rico have expressed interest in participating in the research activities of the centers, including SmithKline, Pfizer, and Bristol-Myers Squibb. According to Dr. Manuel Gomez, the University of Puerto Rico's vice president for research and academic affairs at the time these projects were funded, "We identified a niche in the scientific academic R&D that could be used to produce technology transfer, generate new patents, and develop human resources for the growing biotechnology industry."[45] Ftn. 44 Ftn. 45

Determining how productively higher education funding in Puerto Rico is being used is difficult, given the almost complete absence of data on student achievement for college seniors or recent college graduates. The only data available come from the College Board's Teacher Certification Exam. This exam, a requirement for teachers in the public school system, was first offered in 1989 and is taken primarily by recent graduates. The proportion of test takers who pass the exam exhibited virtually no trend in the period from 1989 to 2003. For example, the proportion of students who passed the Test of Fundamental Concepts and Communication Skills component (by scoring above 89 in a scale that ranges from 40 to 160) ranged between 72 percent and 80 percent over that period, with no upward or downward trend observed. Note, though, that the number of students taking the exam rose, from 2,350 in 1989 to 5,116 in 2003.

Furthermore, it is difficult, if not impossible, to compare the quality of higher education institutions in Puerto Rico and in the United States. The rankings provided by institutions such as the National Research Council and popular publications such as *U.S. News &World Report* do not typically include Puerto Rican colleges and universities. The few surveys that have ranked Puerto Rican institutions focus mostly on graduate-level or professional education. In these surveys, the island universities—both public and private—are usually at the bottom of the list of American universities examined.

In the absence of any systematic evidence on the extent to which public higher education institutions in Puerto Rico—whose expenditures per student are broadly equal with those in the United States—produce learning and achievement among its graduates comparable with those of the American institutions, the most one can do is raise questions and point to the need for additional research on the productivity of the system as measured by the relationship

44. University of Puerto Rico at Río Piedras (2005).
45. Martinez (2002), p. 1.

between academic outcomes and spending. A further question is the extent to which any evidence of low productivity reflects the problems affecting the elementary and secondary education system—which are then sequentially transmitted to higher education institutions in the form of underprepared students—or whether any shortfall is mostly the result of internal deficiencies of the public universities. These issues should be a matter for future research.

Distributional Concerns

The United States and Puerto Rico differ quite significantly in the way they
Tab. 5-15 finance expenditures for public higher education (see table 5-15). One striking difference is in the portion of spending accounted for by tuition and fees: 18.1 percent in the United States in contrast to only 7.3 percent in Puerto Rico. These differences reflect major differences in annual revenue from tuitions and fees. In the United States, the average annual tuition and fees for four-year institutions was $3,746 in 2001–02; the equivalent range that year for the University of Puerto Rico was $790 to $1,245.

Close to 70 percent of funding for the University of Puerto Rico system comes from the commonwealth government. The commonwealth supplies funds to the university by using a formula based on the University Act of 1966, which granted the University of Puerto Rico system a fixed percentage of central government revenues.

The second major source of funds for Puerto Rican public higher education is the federal government. These funds include federal appropriations, grants, and contracts, which amounted to 15.8 percent of all university revenues in 2000–01. In addition, the federal government indirectly funds a significant portion of the 7.3 percent of revenues generated through tuition. This funding comes in the form of student aid, available through Title IV of the federal Higher Education Act, the largest source of which is the Pell grant program. Because much of this financial aid is awarded on the basis of need, and because the average income of Puerto Rican families is relatively low, a large share of Puerto Rican students enrolled in higher education institutions is eligible for a Pell grant. Overall, Puerto Rico received more than $600 million in higher education financial assistance from the U.S. government in 2003–04. Only six states received a greater volume of funds: California, Florida, New York, Pennsylvania, Texas, and Virginia.

In fiscal year 2002–03, the maximum Pell grant was $4,050. Estimates are that as many as 50 percent of the students in the University of Puerto Rico sys-
Ftn. 46 tem receive Pell grants.[46] Evidence suggests that students enrolled in private colleges and universities on the island rely even more heavily on Pell grants to fund

46. José A. Delgado, "Possible Reductions in the Pell Grants," *El Nuevo Día,* January 14, 2004, p. 18.

Table 5-15. *Sources of Financing of Public Higher Education, Puerto Rico and the United States, 2000–2001*
Percent, except as indicated

	Puerto Rico	*United States*
Current fund revenue (dollars)	1,000,293,000	176,645,215,000
Tuition and fees	7.3	18.1
Federal appropriations, grants, and contracts	15.8	11.2
State appropriations	68.9	35.6
Other revenues (local appropriations, endowment income, revenue from hospital services, and auxiliary enterprises)	8.0	35.1

Source: Data from NCES (2004a).

their studies. In 2003–04, for example, as many as 86 percent of students at the Interamerican University and 85 percent of those in the Ana G. Mendez University System received Pell grants.[47] Ftn. 47

This higher reliance on Pell grants in the private sector implies that, unlike elementary and secondary education, the public universities cater to the wealthier components of Puerto Rican society. Indeed, both the University of Puerto Rico at Río Piedras and the University of Puerto Rico at Mayagüez, which would be considered among the elite universities in Puerto Rico, tend to enroll a larger proportion of students who attended private high schools, most of whom come from families with incomes above the Puerto Rican average. Although these institutions seek diverse populations, their relatively high admissions standards generally favor students from higher socioeconomic backgrounds. For instance, the 2004–05 freshman class at the University of Puerto Rico in Río Piedras had an average combined score of 1,166 on the Academic Aptitude part of the Puerto Rico College Board test, compared with an average of 945 for the overall population taking the test battery.

The distributional implications of this pattern are perverse given that tuition and fees are lower at public than at private universities. In 2003–04, tuition and fees at the University of Puerto Rico at Río Piedras were equal to $920, compared with $3,703 at Interamerican University, the largest private university, and $2,848 at the private Metropolitan University. These relative costs imply that the large subsidies to the public sector, which allow it to keep its tuition low, represent subsidies to the students from high-income families who attend the elite public higher education institutions. Thus the generous funding of the public institutions ends up redistributing income in favor of rich families and worsens the already highly skewed income distribution on the island. The perverse distri-

47. José A. Delgado, "Possible Reductions in the Pell Grants," *El Nuevo Día,* January 14, 2004, p. 18.

butional effect associated with the funding of public universities is not unique to Puerto Rico. It was identified as an issue in the late 1960s in the United States and more recently has received attention in the rest of the world.[48]

Ftn. 48

Low Male Enrollment

One final concern about higher education in Puerto Rico is that women far outnumber men in the island's institutions of higher education, in both the public and private sectors. In 2002–03 men constituted just 39 percent of the student body. Although this figure is somewhat lower than the 44 percent in the United States, it is consistent with the pattern evident in many other countries, where men often forgo higher education to enter the labor market.

The consequence of the growing gap in college enrollment between men and women is that in Puerto Rico women currently have higher educational attainment than men. In 2000 the proportion of women twenty-five years of age or older who had some schooling beyond high school was 40.1 percent. For men, the corresponding figure was only 34.7 percent. One possible reason for the differentially high enrollment of women in college is the relatively high economic return to university education in Puerto Rico, particularly for women.

Education, Labor Market Returns, and Economic Growth

Viewed as an investment in human capital, education is intended to make persons more productive and thereby to raise the wages they can command in the labor market. Cross-sectional models from many different countries and time periods consistently confirm that more education, as traditionally measured by years of schooling, is associated with higher earnings.[49] Some studies have also found a significant effect of educational quality on labor market outcomes.[50] Somewhat less clear in the literature are the returns to education in the form of national economic growth. Various theoretical models in the economics literature posit a strong relationship between education and growth, though both the theorists and the empiricists disagree about whether it is the growth of human capital, as measured by changes in spending on education or changes in educational attainment, or the stock of human capital, as measured, for example, by the level of educational attainment of the population—that matters for growth.

Ftn. 49
Ftn. 50

Labor Market Returns to Education

In Puerto Rico, as elsewhere, the correlation between education levels and labor market outcomes is strong. This relationship is shown separately for men and women in table 5-16, with attention both to the probability of being unemployed

Tab. 5-16

48. Hansen and Weisbrod (1969); Task Force on Higher Education and Society (2002).
49. See Psacharopoulos (1994), Card (1999), and Patrinos and Psacharopoulos (2004).
50. Card and Krueger (1992, 1996).

Table 5-16. *Education and Labor Market Outcomes, Puerto Rico, by Sex, 1999–2000*[a]

	Unemployment rate (percent)		*Annual wages (dollars)*	
Education level	*Male*	*Female*	*Male*	*Female*
Overall	13.5	17.1	25,320	19,826
Less than high school	22.4	37.0	15,382	13,551
High school diploma or equivalent	15.0	23.2	17,526	14,313
Some college	10.3	17.5	23,058	16,904
College degree	4.8	6.3	37,264	22,950
More than college	2.4	3.6	61,367	34,029

Source: Data from U.S. Department of Commerce (2003), authors' tabulations.

a. Data are for persons sixteen years of age or older in the labor force. Unemployment rate is for 2000; wages are 1999 annual earnings of full-time, year-round workers.

and to annual wages. Women at all levels of education fare less well in the labor market then men in that they have higher rates of unemployment and lower annual salaries. For both men and women, higher levels of education are associated with lower rates of unemployment—and hence greater probabilities of being employed—but the relationship is particularly striking for women. In 2000 a woman with a college degree had more than a 93 percent chance of being employed, in contrast to the far lower probability of about 77 percent for a woman with only a high school diploma (or its equivalent) and only 63 percent for one without a high school degree. With respect to wage differentials, the relative differences are reversed, with men exhibiting larger expected gains than women in annual earnings, both absolutely and relatively, from higher levels of education.

These patterns may help explain the higher enrollment of Puerto Rican women in colleges and universities. For women, a college education greatly increases the likelihood of finding employment. Moreover, though the wage gains associated with a college degree are smaller for women than for men, without a college degree a woman's earning prospects are bleak. Indeed, table 5-16 indicates that women need to acquire more education than men to achieve earnings comparable to those of men. For instance, women with a college degree earn on average close to $23,000, an amount that is almost 70 percent higher than average earnings of women without a high school diploma but still somewhat less than the average earnings of men with some college.

Women's need to acquire substantially higher levels of education to attain a certain salary level provides a strong incentive for them to invest in greater levels of human capital and helps explain the overwhelming female presence in institutions of higher education in Puerto Rico. The lower salaries received by women also were found in analyses in which we controlled for age, experience, hours of

Table 5-17. *Return to Hourly Wages of Education and Experience, Puerto Rico, Selected Years, 1970–2000*[a]

	Estimated coefficients			
Variable	*1970*	*1980*	*1990*	*2000*
Constant	−0.7038	−0.0371	0.1905	0.6853
	(−16.2)	(−1.9)	(25.0)	(41.0)
Education	0.0848	0.0806	0.0850	0.0852
	(31.6)	(68.3)	(72.1)	(79.4)
Experience	0.0236	0.0230	0.0266	0.0215
	(10.2)	(24.0)	(29.5)	(27.4)
Experience squared	−0.0003	−0.0002	−0.0003	−0.0002
	(−7.3)	(−13.0)	(−29.4)	(−11.8)
Summary statistic				
R^2 (adj.)	0.18	0.14	0.13	0.16
N	5,116	29,997	40,021	40,067
Sample mean	0.405	1.200	1.580	2.120

Source: Data from U.S. Department of Commerce (1974, 1983, 1994, 2003), authors' tabulations.
a. Standard deviations in parentheses. The dependent variable here is in (hourly wage).

work, marital status, and other variables. One suspects that occupational segregation and pay discrimination may be significant forces operating in Puerto Rican labor markets.

Statistical models are commonly used to estimate so-called Mincerian returns to an additional year of education. These rates of return emerge from regression models in which the logarithm of hourly wages of persons in the labor market is estimated as a function of years of schooling and years of work experience. For our estimates, we use as the dependent variable the logarithm of the hourly wage of persons in the labor market aged sixteen or older (with positive wages). The explanatory variables are years of schooling, years of experience (calculated as age minus years of schooling minus six) and experience squared.

Tab. 5-17 Table 5-17 presents our regression results using Census Bureau data for 1970, 1980, 1990, and 2000. The rate of return to an additional year of education in Puerto Rico declined from 8.48 percent in 1970 to 8.06 in 1980 before rising to 8.52 in 2000. Thus the return in the most recent year was essentially the same as it was in 1970.

Ftn. 51 Tab. 5-18 This flat trend for Puerto Rico contrasts sharply with the rising rate of return to education in the United States over the same period.[51] Table 5-18 also pre-

51. See, for example, the survey by Katz and Autor (1999) and Murphy and Welch (2001). Similar patterns have emerged for a variety of other high-income as well as many developing countries; see for instance, Pavcnik (2003).

Table 5-18. *Return to Education, Puerto Rico and the United States, Selected Years, 1970–2000*[a]

	1970	*1980*	*1990*	*2000*
Puerto Rico	0.0848	0.0806	0.0850	0.0852
U.S. mainland	0.0729	0.0726	0.0866	0.0933
Puerto Ricans on U.S. mainland	n.a.	0.0562	0.0681	0.0804
Born in Puerto Rico	n.a.	0.0504	0.0592	0.0727
Born on U.S. mainland	n.a.	0.0662	0.0811	0.0900

Source: Data from U.S. Department of Commerce (1974, 1983, 1994, 2003), authors' tabulations.
a. Mincerian rate of return to education per year of schooling.

sents the Mincerian rates of return for the mainland United States. In contrast to Puerto Rico, the rate of return to education in the United States rises steeply, from 7.3 percent in 1970 to 8.7 percent in 1990 and 9.3 percent in 2000. Thus although rates of return to education on the island exceeded those on the U.S. mainland in 1970, the opposite was true in 2000.

The rising rates of return to schooling in the United States over the past two decades apply as well to Puerto Ricans living on the mainland. Nonetheless, rates of return to education for Puerto Ricans on the mainland are lower than those for the overall population in the United States. As table 5-18 shows, this wedge is particularly significant for Puerto Ricans born on the island who migrated to the mainland. This shortfall in the rewards to schooling for out-migrants may be connected to a wide array of factors, including, for example, the possibility that rewards are lower for Spanish speakers and the possibility that employers underestimate the skills of Puerto Rican migrants.[52] Ftn. 52

The behavior of the Mincerian returns to education in Puerto Rico and the United States is similar to that of other measures connected to the returns to education. Table 5-19 compares the trends in the wage premium of college graduates relative to high school graduates with the comparable premium in the United States. In Puerto Rico, the ratio declined from 1.73 in 1970 to 1.47 in 1990 and then rose to 1.61 in 2000, leaving it still far below the 1970 level. In contrast, the wage premium for college graduates in the United States fell from 1970 to 1980 but then recovered and increased. The 2000 premium of 1.60 was far above its 1970 level. Tab. 5-19

Changes on both the supply and demand side account for the trends in the return to a college degree in Puerto Rico and for the differences between Puerto Rico and the United States. On the supply side, the key factor is the large increase in the number of college graduates on the island over the thirty-year period, which has exerted substantial downward pressure on the relative wages

52. Katz and Stark (1987).

Table 5-19. *Wage Premium of College Graduates Relative to High School Graduates, Puerto Rico and the United States, Selected Years, 1970–2000*
Percent

Year	*Puerto Rico*	*United States*
1970	1.73	1.46
1980	1.48	1.35
1990	1.47	1.55
2000	1.61	1.60

Source: Data from U.S. Department of Commerce (1974, 1983, 1994, 2003); Murphy and Welch (2001).

Ftn. 53 of college-educated workers in Puerto Rico.[53] By contrast, one of the reasons for the rising rate of return to education in the United States from 1980 to 2000 has been the slowdown in the rate of increase of schooling of the American pop-
Ftn. 54 ulation since 1950.[54]

On the demand side, the public sector is the largest single employer of college graduates in Puerto Rico. Forty-two percent of all employed workers on the island with more than a college degree (master's, doctorate, professional degrees) and 38 percent of all workers with a college degree were working for the government in 2000. Within the government sector alone, the wage premium for those with a college degree or more relative to those with only a high school diploma fell continuously throughout the thirty-year period. The ratio was equal to 1.95 in 1970, 1.63 in 1980, 1.54 in 1990, and 1.44 in 2000.

The wage premium for private sector employees also exhibited an overall downward trend from 1970 to 1990, dropping from 2.08 to 1.77. During the 1990s, however, it rose back to 1.97. This sharp increase in the wage premium for college-educated workers in the private sector presumably reflects the economic boom of that period. Census Bureau data show that from 1990 to 2000, the unemployment rate among men decreased from 19 percent to 13 percent and among women from 22 percent to 17 percent. This spike in the demand for private sector labor appears to have increased the demand for educated workers,

53. This effect could have been less significant if the substantial out-migration from the island since the 1950s had been associated with a brain drain. But various studies on this issue indicate that there has not been an overrepresentation of college graduates in the migrant outflows. See Ortiz (1986), Rivera-Batiz (1989), and Rivera-Batiz and Santiago (1996). Our analysis of Census Bureau data indicates that even in the 1990s, holding other things constant, the average schooling of out-migrants was slightly lower than that of the Puerto Rican population. For instance, in 1990 Puerto Ricans on the island aged twenty-five to thirty-four had 12.0 years of schooling. But those in this age cohort who out-migrated to the mainland between 1990 and 2000 had average schooling of 11.7 years. María Enchautegui (2004) has observed that the incentives to out-migration from Puerto Rico favor less skilled workers.

54. Katz (2004, p. 271).

resulting in the partial reversal of the declining returns to education in the 1990s. Whether there are also influences of technological change, industrial shifts in employment, or the impact of globalization on Puerto Rican labor markets is a matter for future research.

Education and Economic Growth

The impact of education on economic growth can occur through two mechanisms. First, education enters directly into production as an input. Workers with more education have greater knowledge and skills that contribute to the production process. Human capital, like physical capital, contributes to output growth as it is accumulated over time. Second, education influences total factor productivity growth or, more specifically, technological change. The endogenous growth models built by Robert Lucas and Paul Romer, for instance, identify human capital as a key determinant of technological change.[55] One expects that greater levels of human capital—and the attached knowledge and information base that comes with it—are a precondition for the innovation process to get started. As a result, some studies have postulated that the rate of technological change between two periods is dependent on the level of human capital existing in the initial period.[56] There might also be other, indirect mechanisms through which human capital can influence total factor productivity growth. For instance, higher levels of education are generally associated with improved public sector governance, and governance has been shown to be strongly connected to total factor productivity growth.[57]

Ftn. 55

Ftn. 56

Ftn. 57

In chapter 2 in this volume, Barry Bosworth and Susan Collins provide a growth-accounting methodology and decompose the sources of economic growth in Puerto Rico between 1950 and 2003. They find that in the 1950–75 period, Puerto Rico's accelerated annual growth in output per worker of 4.7 percent was explained mostly by increased physical capital per worker (55.3 percent) and somewhat by total factor productivity growth (29.8 percent). Human capital accumulation had a significant but smaller role, accounting for 14.9 percent of the growth. In the period 1975–2003, as both physical capital accumulation and total factor productivity growth slowed down, human capital became the dominant engine of growth in Puerto Rico. During this time, human capital accumulation accounted for 41.6 percent of the island's 1.2 percent annual growth in output per worker, exceeding the role of both increased physical capital per worker (33.3 percent) and total factor productivity growth (25.1 percent).

Bosworth and Collins examine the impact of increased education only through its role as a factor input in production. But both in theory and in empirical work,

55. Lucas (1993); Romer (1990).
56. See Krueger and Lindahl (2001) and Barro and Sala-i-Martin (2004).
57. Hall and Jones (1999); Rivera-Batiz (2002).

higher levels of education have been found to have an impact on total factor productivity growth. In the case of Puerto Rico, the relatively low levels of schooling back in the 1940s and 1950s would perhaps suggest a relatively minor effect of education on total factor productivity growth during those years. But by the 1960s and later, the accelerated increase in educational attainment on the island is likely to have had a positive impact on rates of innovation and total factor productivity growth.

In terms of Puerto Rico's prospects for growth, one can assume that the island's remarkable boom in educational attainment cannot be sustained for much longer and will slow down in the future. As a result, the contribution of human capital to Puerto Rican growth must come predominantly through its effects on total factor productivity growth. In this regard, quality of education becomes essential. Some recent evidence suggests that quality of schooling is
Ftn. 58 indeed highly associated with total factor productivity growth.[58] For instance, in a cross-country study examining the relationship between scores in international student achievement tests and growth in income per capita, Eric Hanushek concludes that "a difference in test performance of one standard deviation was related to a one percent difference in the annual growth rate of per-capita Gross Domes-
Ftn. 59 tic Product."[59]

It is precisely in this area that Puerto Rico's educational system is confronting serious challenges. As noted earlier, the available evidence from College Board test scores and elsewhere is that both the public and private school systems may be gradually deteriorating in quality. Unless policymakers deal seriously with raising the quality of schooling, or at least preventing further deterioration, the prospects for the contribution of education to growth are not good.

Improving quality is also crucial for other reasons. Given the large share of resources devoted to education, the island simply cannot afford to use them unproductively. Unproductive uses of those resources means taxes that are higher than necessary, which could, in turn, distort labor supply decisions and have an adverse effect on growth.

What Next? Policies for Education and Economic Development

Both in terms of gains in the educational attainment of its population and financial investments in education relative to the wealth of the island, Puerto Rico has an impressive record. The changes in educational attainment have undoubtedly made a significant contribution to Puerto Rico's recent economic development. Nonetheless, the island faces serious challenges at the present time.

Our analysis documents the presence of large disparities in educational outcomes, both between the public and private sectors and between public schools

58. Hanushek and Kimko (2000).
59. Hanushek (2002, p. 13).

in high- and low-income areas. Although the overall high school dropout rate on the island is close to 20 percent, rather than the much higher rates typically cited, the dropout rate in some poor neighborhoods is 50 percent or higher. The continuing presence of large numbers of students living in poverty with access only to low-quality schooling and experiencing high dropout rates not only is harmful to those students individually but also gives rise to social trauma and violence that spill over into all of Puerto Rican society.

Nor have the substantial waves of reform in the school system since 1990 done much to reduce inequities in the school system or to generate higher levels of student achievement. Because of a lack of accountability for performance throughout the system, smaller class sizes and more financial investments have not improved the quality of public schools enough to keep middle-class families within the public school system. Indeed, by disrupting the normal functioning of the public school system, the politicized reform process may well have contributed to the exodus of the more able students to the private sector, thereby increasing the challenges faced by the public school system and providing ongoing incentives for additional outflow.

The failure of the past fifteen years of reform poses a serious challenge for the island. The system is now facing the worst of both worlds: a large and politicized bureaucracy at the center and a failed program of decentralization of authority to the school level, with little or no accountability at either level. Any policy remedies for the island must be designed to reduce inequalities, raise overall student achievement and school quality, and make the public system more productive. Designing such policy remedies is difficult in any context. Any careful attempt to do so would require a much more detailed understanding, not only of the education system itself but also of the broader political and economic environment in which it operates, than we can contribute here. At the same time, we can bring to bear some of the international experience that may be relevant to the policy discussion. This experience relates most specifically to school-based management, accountability, instructional quality, and nonschool challenges.

School-Based Management

Decentralizing authority to the school level is not a policy idea unique to Puerto Rico. Many countries around the world, including England, Australia, New Zealand, and Chile, engaged in similar reforms at about the same time. Moreover, the World Bank has widely promoted school autonomy as a key reform for school effectiveness for many years: "If effective use is to be made of instructional inputs, institutions must be autonomous. . . . Fully autonomous educational institutions have authority to allocate their resources (not necessarily raise them), and they are able to create an educational environment adapted to local conditions inside and outside school."[60] Ftn. 60

60. World Bank (1995), p. 126.

Nonetheless, evidence from various countries suggests that the World Bank may have been overly optimistic about the benefits of school autonomy. New Zealand is a particularly interesting example because of the magnitude of its
Ftn. 61 change.[61] In contrast to Puerto Rico, New Zealand took great care in implementing its 1989 program of shifting operating authority away from its highly centralized national department of education to parent-dominated boards of trustees at the school level. In addition, the establishment of an independent review office provided an external mechanism for holding schools accountable both for national education goals and for school-specific goals articulated in school charters. On the positive side, most New Zealanders valued the new flexibility for schools, and ten years after the reforms it was difficult to find anyone who wanted to return to the centralized, bureaucratic system of the past. At the same time, despite the country's attention to implementation and the presence of the accountability system, emerging quite clearly from New Zealand's experience is the realization that the benefits of self-governance were far greater for the schools serving advantaged students than for those serving large proportions of poor students. School-based management not only failed to help the latter group of schools, in many situations it harmed them, largely because they lost various support systems to which they had had access under the previous system.

Further evidence that shifting authority to the school level is not a panacea emerges from the city of Chicago. In 1988 the parent-dominated councils of 550 local schools were given significant new authority to hire and fire school principals, to set school priorities, and to spend discretionary funds. Studies show that the effects of this program were mixed, at best. Although some schools per-
Ftn. 62 formed better, some remained unchanged, and others' performance declined.[62] About half the schools apparently did not even take advantage of the new freedom
Ftn. 63 to change their schools.[63] Similarly, other studies of school-based management in the United States and elsewhere show essentially no evidence of statistically significant increases in achievement, although some find evidence of higher stu-
Ftn. 64 dent attendance.[64]

The lessons for Puerto Rico are mixed. Given its past efforts to decentralize authority to the school level, additional efforts to make the system work better are probably warranted. Island policymakers should be under no illusion, however, that decentralization of authority to schools will, by itself, generate higher achievement. Nor will it reduce educational disparities across schools. At the same time, to the extent that it brings more parents into the schools and gives the local community, rather than the far-off bureaucracy in Hato Rey, some control, it could in some instances lead to better-managed schools, particularly

61. Fiske and Ladd (2000).
62. Bryk and others (1998).
63. Sebring and others (1996).
64. Ladd and Hansen (1999, p. 186).

in those communities in which families are most likely to consider opting out of the public school system in favor of private schools. A crucial element to making the system work, however, is the provision of support services to those schools that need them and the recognition that some schools may need alternative forms of governance arrangements.

Accountability

Missing from Puerto Rico's efforts to decentralize authority to the school level was any formal system of accountability. Supporters of the concept of decentralizing authority to the school level often suggest that accountability administered from the top down is not needed once authority is turned over to school communities, on the ground that the communities themselves have strong incentives to hold teachers and schools accountable. Yet that argument does not withstand close scrutiny. One reason has to do with the distinction between the private interest and the public interest in education. Parents themselves clearly have a direct private interest in the quality of their own children's education. In addition, however, the public has a large stake, as is evident from the fact that schooling is deemed so important to children's life chances that attendance is compulsory and schools are publicly funded. With that public funding comes the responsibility to make sure that the public interest is being served. A second reason relates to the differential capacities of local school communities to monitor the activities of their schools and to hold schools accountable for the quality of education provided. For these reasons, countries such as New Zealand and England included as central components of their decentralization efforts school inspection systems, to ensure that the schools were meeting national standards, and, in the case of England, national tests that provide publicly available information on the performance of the students in each school.

Like the U.S. states, Puerto Rico is now subject to the test-based accountability provisions of the federal No Child Left Behind Act of 2001 (NCLB). This law requires that states, including Puerto Rico, test all students annually in grades three through eight. As noted earlier, student testing has already begun in several grades and is expected to be extended to all grades by 2010. In addition, NCLB requires all states to assess schools based on whether they have made "adequate yearly progress" toward the 2014 goal of having all students achieving at proficient levels as determined by each state. Districts, in this case the Puerto Rico Department of Education, must provide supplemental services to students in schools that do not meet their average yearly progress goals for two years in a row, and after three years of failure, students in such schools are allowed to transfer to other public schools, at the discretion of the parents.

Certain parts of this legislation should be helpful to Puerto Rico. The greater assessment and accountability measures associated with NCLB are likely to have a positive effect on the system, given the lack of any reliable accountability and

student assessment tools in the past. The system has already introduced more-reliable test batteries, and it can build further on this effort by participating in the NAEP, the U.S.-wide testing benchmark. Doing so would allow the student achievement of Puerto Rican students to be compared with that of other children in the United States. Puerto Rico might also be well advised to become part of international assessment efforts, such as Trends in International Mathematics and Science Study (TIMMS) and the Program for International Student Assessment (PISA), which would allow its educational system to be compared with that of other countries.

In some ways, the NCLB-mandated reforms fit well with the island's past efforts to promote school autonomy. In particular, they provide greater incentives for schools to become agents of change. In fact, the NCLB may prove to be a catalytic influence on Puerto Rico's school system by forcing the centralized authorities to implement more effectively the school autonomy measures that were previously passed on paper but in reality have not yet been carried out across most of the system.

At the same time, NCLB could have some undesirable side effects. Unless the proficiency standards for Puerto Rico are set so low as to be meaningless, it is likely that large numbers of schools, particularly those serving the most disadvantaged students, will fail to meet their requirement of adequate yearly progress. Because the goal of 100 percent proficiency applies to all schools, the schools currently serving high proportions of low-performing students are required to make the greatest gains each year to meet the goal. Based on reasonable proficiency standards in the U.S. context, the required gains are likely to be
Ftn. 65 far higher than any gains that have historically been attained.[65] A high rate of failure, in turn, will introduce a new element of mobility into the Puerto Rican system, as students in failing public schools are permitted to transfer to other, more successful public schools, and it also could well further discredit the public school system, leading to a greater movement of students to the private sector. Although some students will undoubtedly benefit from the new options available to them, the overall effect could well be to exacerbate further the problems faced by many schools serving concentrations of disadvantaged students.

School-based accountability systems need not lead to these unintended consequences. The challenge for Puerto Rico will be to do as much as it can to avoid the negative effects of the federal legislation while seizing the opportunity to develop a more reasonable and constructive accountability system. Central to that approach will be attention to value added measures of accountability—that is, measures that are based on gains in performance rather than on proficiency levels—so that schools are not viewed as failures simply because they serve large proportions of students who initially perform poorly. In addition, such an

65. Linn (2005).

accountability system, if it is to raise achievement, must include additional support and assistance for schools determined to be underperforming. North Carolina's relatively sophisticated school-based accountability system provides insight into the elements needed for an effective system.[66] Ftn. 66

Chicago also has an accountability system that appears to have raised student achievement, albeit not by as much as simple comparisons of test scores over time might suggest.[67] The North Carolina system initially focused on holding Ftn. 67 schools accountable. The Chicago accountability system, however, which was introduced in 1996 after the district's early efforts to decentralize authority to the school level failed to raise overall achievement, concentrated not only on schools but also on students. In particular, it required all students to pass high-stakes tests in grades three, six, and eight before they would be promoted to the next grade. Over the course of five years, 147 Chicago elementary schools were placed on probation, with the threat that they could be closed down and reconstituted if they did not improve.

The new high-stakes initiatives were accompanied by three specific efforts to improve student learning.[68] These included expanded instructional time in the Ftn. 68 form of mandatory summer school for students who failed the test in the spring and longer school days for all students, big investments in a highly scripted curriculum, and the provision of an external partner to provide additional services and professional development for teachers in the schools on probation. The reforms were implemented by a new leadership team under the direct control of the mayor and with strong powers, including the ability to limit the authority of the teachers' union, and additional funding to improve the system's physical plant and raise teacher salaries. One lesson for Puerto Rico from the Chicago experience is that within the context of a highly politicized education system, it takes strong leadership to impose an effective accountability system. A second, crucial, lesson is that an effective accountability system requires much more than the imposition of high-stakes testing and identification of low-performing schools.

Improving Instruction

Indeed, evidence from around the world indicates that changes in governance, including both the decentralization of authority to the school level and accountability systems administered from the top down, are unlikely to have much effect on student achievement in the absence of fundamental efforts to improve the quality of instruction in the classroom. The New Zealand experience illustrates that most clearly. Although schools serving disproportionate shares of disadvantaged students had not only significant autonomy to make their own decisions but also strong incentives to improve school quality so as to minimize the out-

66. Ladd (2004).
67. Bryk (2003); Jacob (2003).
68. Bryk (2003, p. 244).

flow of students to other schools, there was little they could do to remedy the situation. Part of the problem was the difficulty in attracting high-quality teachers; another part was limited knowledge about what works best for students from
Ftn. 69 economically disadvantaged and immigrant families.[69] At first, New Zealand policymakers attributed the failures of such schools to poor leadership, but over time they have increasingly recognized the need to provide additional support to such schools that is more directly related to instructional needs.

Evidence from the United States increasingly highlights the importance to learning of high-quality teachers, and other studies provide support for the
Ftn. 70 importance of teacher preparation and certification.[70] For Puerto Rico, ensuring that all students have access to good teachers would require higher standards for
Ftn. 71 entry and graduation from teacher education programs;[71] improved programs of professional development; the fostering of a professional ethos among teachers that would, among other things, reduce rates of absenteeism among teachers; and new strategies for attracting high-quality teachers to the most impoverished schools.

Families, Communities, and Schools

Despite the significance of schools and school systems in determining student outcomes, a substantial literature in educational research suggests that socioeconomic
Ftn. 72 background is often paramount.[72] Although the school system cannot be expected to cure all of society's ills, there are things that can be done through the education system to counter some of the adverse effects of poverty. Compared with children from more advantaged families, those from poor families typically come to school less ready to learn, tend to lose more knowledge during the summer months, and have more difficulty making the transition from school to work. In each of these areas, Puerto Rico could undoubtedly do more than it is now doing. For example, following the literature on the benefits derived from preschool and summer
Ftn. 73 schools programs,[73] the island could invest more heavily in preschool programs and summer school programs for low-income students. In addition, the Department of Education could do more than it has to date to implement school-to-
Ftn. 74 work programs and to involve the private and service sectors in such programs.[74]

The neighborhoods in which children and youth live can also have a significant impact on their learning. The most proximate force connected to the inequities in education documented in earlier sections of this chapter is (neighborhoods)

69. Fiske and Ladd (2000), chapter 9.

70. Hanushek, Kain, and Rivkin (1998); Sanders and Rivers (1996); Ferguson and Ladd (1996); Darling-Hammond and Post (2000); Ladd and Hansen (1999, pp. 168–79).

71. See Rivera-Batiz (1995b).

72. Coleman and others (1966); Hanushek (1997); most recently and cogently, Rothstein (2004).

73. See the review by Krueger (2004, pp. 24–33).

74. See Rivera-Batiz (2003).

residential segregation on the basis of income. The concentration of low-income families in *barriadas* (neighborhoods), *residenciales* (public housing projects), and slums in various parts of the island also leads to public schools with high concentrations of children from low-income families. These schools, as we have seen, tend to have lower average student achievement rates and higher dropout and school delay rates.

The lack of social capital, the economic dislocation, and the violent environment permeating some low-income communities can severely affect learning by disrupting the learning process as well as by diminishing educational expectations.[75] Similarly, a few peers—both in local school and outside the school— Ftn. 75
can have significant negative impacts on the student achievement of many other students.[76] Tackling this problem will require the close monitoring of children Ftn. 76
by parents and communities. Substantial social and economic policies intended to benefit low-income families have been implemented over the years in Puerto Rico. Yet there has been no significant effort to integrate schools into the operations of these programs. Both geographically and institutionally, the two sets of programs rarely overlap. Such integration could potentially strengthen the bonds between schools and communities to beneficial effect.

Higher Education

Expenditures on public higher education per student in Puerto Rico are broadly equal with those in the United States. One suspects, however, that except in some specific areas they do not produce learning and achievement among its graduates comparable to those of the average American institution. The potentially low productivity of the system as measured by the relationship between academic outcomes and spending deserves further investigation. The extension of higher education opportunities over the past four and a half decades has made a significant contribution to Puerto Rico's economic growth, but increases in the quantity of education are subject to diminishing returns. A refocus on quality enhancements, in both public and private sectors, must be achieved if the tertiary education sector is to continue contributing to—instead of hindering—the island's growth prospects. Recently, some universities have been increasing their levels of research and development in the fields of science and technology, with the goal of promoting synergies with the substantial pharmaceutical, biotechnology, electronics, and other industries on the island. These efforts should continue, as they could contribute to Puerto Rico's prospects for growth.

The large subsidies that the public tertiary sector receives allow it to keep tuition and fees low, but they tend to disproportionately benefit the high-income families that send their children to the elite public colleges and universities.

75. Grogger (1997).
76. Hoxby (2000).

Thus public funding of public institutions ends up redistributing income in favor of rich families and worsens the distribution of income on the island. To reverse this perverse regime, a combination of policies should be implemented that encourage higher tuition and fees for those families that can afford them and provide scholarships for students who cannot. Implementing such reforms will be politically difficult, as is evident from the recent student general strike at the University of Puerto Rico in response to the administration's decision to raise tuition charges. To be successful, future efforts to raise tuition will need to be combined with additional financial aid.

Puerto Rico has joined the club of nations in the world with the highest proportion of college graduates in its population. But women far outnumber men in Puerto Rican colleges and universities. Although there are good economic reasons for women to invest more heavily in higher education than men, the sharply declining proportion of men attending tertiary education institutions should be a matter of concern. In the long term, the prospects of creating an underclass of Puerto Rican men whose lack of higher education prevents entry into mainstream labor markets may have profound social implications.

Conclusion

Puerto Rico can look back with pride at its miracle years in the area of educational development. However, today it stands at a crossroads. The high rate of growth in educational attainment can be expected to slow down considerably in the next few years. As this happens, the nation's prospects for growth from increases in the quantity of education are bound to decline sharply, and the island will have to rely on improvements in the quality of education. Enhancing quality is far more difficult than increasing quantity, however. Despite sharply rising funding for both K–12 and postsecondary education in recent years, quality has not improved. Moreover, almost fifteen years of governance reforms have not produced much in the way of positive results from the school system, and in the absence of other reforms additional governance reforms, particularly in the area of accountability, are likely to have, at best, small impacts. Instead, the focus must be on improving the academic environment and the quality of curriculum and instruction at the level of the classroom, in both K–12 and higher education. Unless the commonwealth makes a concerted effort on this front, the contributions of education to future economic growth are likely to be severely limited.

COMMENT

Alan B. Krueger

Helen Ladd and Francisco Rivera-Batiz have produced a chapter on the economic aspects of education in Puerto Rico that is as thorough as possible. It is well written and touches on all the right issues. I learned a lot from reading it. It also raises a lot of questions in my mind—as a good paper should. Indeed, the chapter provides a nice road map for future research projects.

As many of the other authors in this volume have noted, since 1960 Puerto Rico has seen one of the greatest expansions in educational attainment in the history of humankind. Average years of schooling for people aged twenty-five and older were 4.6 years in 1960, 6.9 years in 1970, 8.7 years in 1980, 9.9 years in 1990, and 11.0 years in 2000 (figure 5-1). Since the measure represents a stock, not a flow, this is a remarkable achievement. Moreover, given the low employment rates in Puerto Rico, especially among those with a low level of education, the social rate of return to education is likely to exceed the private return because an increase in education raises an individual's earnings capacity as well as the likelihood that he or she works. The increase in educational attainment—along with the museums that Will Baumol mentions in his comment on chapter 2—should be an important sales point for Puerto Rico's economic development.

Of course, the issue of the quality of education is also paramount, and improvement in school quality is most likely a key factor for future economic growth. Here I would counsel some caution about recent trends. There is a long history of claiming that education is failing and getting worse, regardless of the actual record. Consider the following sampling of evaluations of the state of public education on the mainland: In 1958 the historian Arthur Bestor opined, "Our standard for high school graduation has slipped badly. Fifty years ago a high-school diploma meant something. . . . We have simply misled our students and misled the nation by handing out high-school diplomas to those who we well know had none of the intellectual qualifications that a high-school diploma is supposed to represent—and does represent in other countries. It is this dilution of standards which has put us in our present serious plight." This view would have horrified the editors of the *New York Sun,* who in 1902 warned readers that school had become "a vaudeville show. The child must be kept amused and learns what he pleases." Going back even further, in 1845 Massachusetts's secretary of public education, Horace Mann, complained that students were not learning higher-order thinking skills, only memorizing "words of the textbook, without having . . . to think about the meaning of what they have learned."[1] Ftn. 1

1. The quotations in this paragraph are drawn from Rothstein (1998), which contains the original sources.

If all these criticisms were correct, it is hard to imagine how the United States became and has remained a superpower. If nothing else, the frequent complaints about education in the past—when it was exclusive and reserved for the elite—should lead to some skepticism toward contemporary pronouncements of deteriorating educational quality. Perhaps opinion leaders have an idealized view of the past, when they were students.

Ladd and Rivera-Batiz conclude that the education system on the island is badly malfunctioning and that the quality of schooling has declined. They may be right, but I am not persuaded by the evidence that is available. In view of the paucity of such evidence, and the long history of false pronouncements about the demise of education, I recommend reserving judgment.

Evaluating changes in the quality of education in Puerto Rico is exceedingly difficult for three reasons. First, with a vast increase in school enrollment, the composition of the student body has changed. If, as appears to be the case, the expansion in education occurred mainly among students from disadvantaged backgrounds, then the average achievement of students might have fallen as average years of schooling rose. But this does not necessarily mean that the average *quality* of schooling for students who historically would have gone to school has fallen; the average observed quality might have fallen because weaker students were added to the enrollment pool.

An analogy may be instructive. Think about the effect of adding an expansion team to major league baseball—say, the Tampa Bay Devil Rays. The Devil Rays (with a 27-56 win-loss record as of this writing) were staffed with below-average players, as they had turned to the expansion draft, minor leagues, and other sources to fill their roster. With the addition of the below-average team, the average quality of major league baseball players fell. Yet no one would say that the quality of baseball training had gotten worse or that players were exerting less effort. Similarly, one should be cautious about concluding that the quality of schools in Puerto Rico declined at a time when enrollment was drastically expanding to include students from less-advantaged families.

Second, the dramatic flight to private schools documented by the authors suffers from a similar problem. The portion of Puerto Rican school children attending a private elementary or high school increased from 12 percent in 1980 to almost 25 percent in 2003 (table 5-1). This is a remarkable increase. In the United States, by contrast, the portion of students attending private school has stayed relatively stable, at around 10 percent, for decades. If private schools siphoned off the higher-achieving students from the public schools, then, again, the composition of the students in public schools would have changed, making it appear that the quality of education had fallen when in fact only the composition of raw materials that the schools are supplied to work with has changed.

Third, because of a dearth of time-series data on student performance on the island, the evidence on which Ladd and Rivera-Batiz must base their conclusions

on school quality is necessarily sketchy. Basically, they have data on high school dropouts (rates that are not excessively high, though they are sometimes misinterpreted as being so), on achievement test scores in 2002–03 and 2003–04 (in grades 3, 6, 8, and 11), and scores from the College Board's Puerto Rican equivalent of the Scholastic Assessment Test since the mid-1980s.

Overall Puerto Rican College Board scores are essentially flat: from 1984–86 to 2002–03, verbal scores fell from 471 to 463, while quantitative scores rose from 484 to 489. But these scores are impossible to interpret because the percentage of students taking the exam surely increased. If more marginal students were added to the test-taking population, there is potentially a serious selection bias problem. Given the rapid rise in enrollment, maybe staying even is a sign of progress. (The trend in the achievement test scores is marred by a similar bias.)

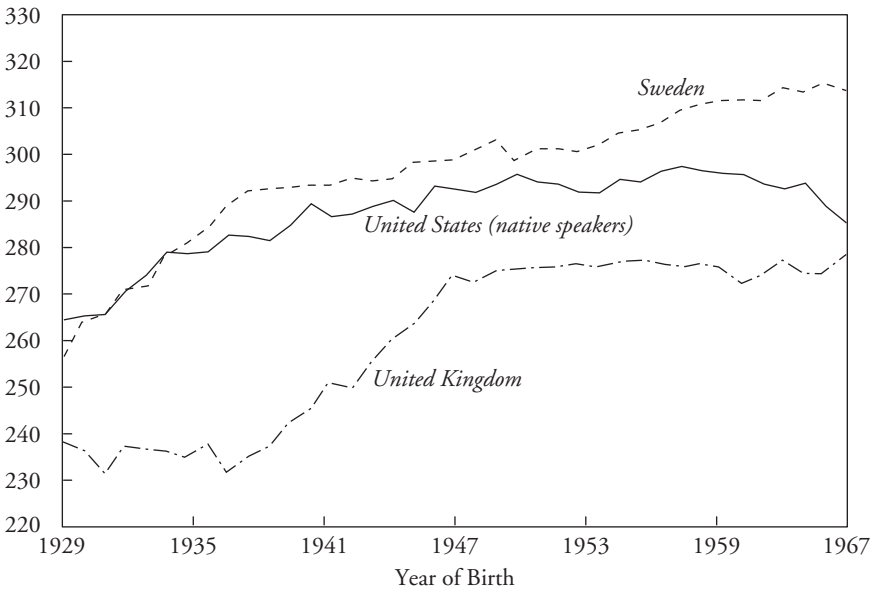
I do agree with the authors that proficiency rates are low on the island's new standardized test. But how one interprets that fact depends entirely on how the test is scaled. In an influential article in *Education Week,* Ronald Skinner shows that state proficiency levels are almost arbitrary.[2] Mississippi and Colorado both claim that 87 percent of their fourth-graders are proficient in reading, based on their state tests in 2003. Yet only 18 percent of fourth-graders in Mississippi and 37 percent of those in Colorado scored at the level of proficiency on the 2003 NAEP exam. In light of this finding, how does one interpret Ladd and Rivera-Batiz's report of 58 percent reading proficiency (in Spanish) among Puerto Rican students in 2003–04? The test was designed by the Educational Testing Service—which also administers the NAEP—so perhaps that is a high level of proficiency. How the test aligns with other assessments, and where the line is drawn for proficiency, is a matter worth investigating. Ftn. 2

The shortage of data on student performance is a stinging indictment of the Puerto Rican educational bureaucracy. I have a constructive suggestion, though. If Puerto Rico were to give the International Adult Literacy Survey, the data could be used to perform an analysis like that reported in figure 5-5. The data presented in this figure are "back-casted," in that people from different birth cohorts were given the literacy test at the same time, and mean scores were assigned based on their birth cohort. Although people's skills can obviously deteriorate or improve as they age, such effects should be more or less constant across countries.[3] It is clear from the figure that the United Kingdom and the United States saw rising scores and then appear to have peaked in the late 1940s, whereas Sweden (perhaps because of its efficient public sector) saw continued improvement. It would be instructive to add Puerto Rico to this type of a graph. Fig. 5-5 Ftn. 3

2. Skinner (2005).

3. Because psychologists find that there is not much deterioration in mental capacity before the early sixties, the aging effects may not be important anyway. Moreover, longitudinal data could be used to adjust for aging effects, if this is a major concern.

Figure 5-5. *Adult Literacy, Selected Countries, Five-Year Moving Average, by Year of Birth, 1929–1967*[a]



Source: Data from International Adult Literacy Survey, 1994 and 1996; authors' calculations.

a. Data are average scores on the prose component of the International Adult Literacy Survey. The scale is from 0 to 500.

Absent better data on cognitive tests, I would have a preference for looking at the monetary return to schooling. Here, the authors turn up little cause for alarm. The rate of return to schooling on the island was rock steady. (This contrasts with the Collins and Bosworth table 2-9, which shows a small rise in the payoff to schooling on the island, but the implication is the same.) This finding strikes me as remarkable for a couple of reasons. First, if the quality of education falls, one would expect the payoff to education to fall as well. Second, Puerto Rico witnessed an extremely fast rise in educational attainment, so the supply of skilled labor rose quickly; this supply shift would be expected to reduce wages
Ftn. 4 for skilled workers. Yet the payoff to better-educated workers did not fall.[4] It is possible that an increase in relative demand for skilled workers occurring at the same time caused the relative price of skilled labor to remain constant. (That the return to education did not rise in Puerto Rico is consistent with the island's

4. By way of a reference point, note that only the Palestinians come close to Puerto Rico in terms of the rapid expansion of education in the 1980s (Angrist 1995), and the Palestinians saw a sharp decline in the payoff to education. Puerto Rico can be thankful that it avoided other problems experienced by the Palestinians.

having a less than fully open labor market with the mainland, which saw a dramatic rise in the return to education in the 1980s.) Another possibility is that the mainland's relatively generous safety net has provided a floor that prevented wages of the less educated from falling, as they did on the mainland.

Third, in table 5-17 the authors report the return to a year of schooling for Puerto Ricans living on the mainland, both for those born in Puerto Rico and for those born on the mainland. The return is lower for the Puerto Rican migrants, which is not unusual for migrants—but the percentage gap was no larger in 2000 than it was in 1980, and in fact it is a little smaller, 24 percent versus 19 percent.[5] (Of course, this is difficult to interpret if there was a change in selective migration.) To probe these results further, the authors could compare the payoff to education for Puerto Ricans educated on the island and for those educated on the mainland, when they are observed in the same local labor markets on the mainland—similar to what David Card and I did in our 1992 paper for the *Journal of Political Economy.*[6] Ftn. 5 Ftn. 6

Although not dispositive, neither of these facts suggests that the quality of education on the island has deteriorated or strayed far from that on the mainland. Hence I would counsel caution in interpreting trends in the quality of education in Puerto Rico.

What is it that the authors are seeking to measure? Are they interested in how Puerto Rico's students would have performed absent the increase in educational attainment that occurred as compared with their actual performance, given the increase in educational attainment? Are they interested in Puerto Rico's performance relative to the rest of Latin America? Are they interested in Puerto Rico's performance compared with the mainland? It is not always clear which counterfactual the authors have, or should have, in mind.

These concerns notwithstanding, I agree with the authors that the next phase of Puerto Rico's educational policy will be much more difficult. I like to distinguish between the intensive and the extensive margins. The extensive margin is more years of education. The intensive margin refers to human capital attainment at a given number of years of education; that is, school quality. Because the extensive margin is approaching the college level, I would suspect that it is much harder to increase now than it has been in the past; this has been the mainland's experience since the extensive margin reached the college level in the 1970s. The situation may be better in Puerto Rico because college tuition costs are lower, owing to the prevalence of Pell grants, but I suspect that average years of education in Puerto Rico will increase more gradually in the future. As for the intensive mar-

5. One caveat to this conclusion, however, is that Puerto Rico has a particularly low employment rate, so one needs to be concerned that the estimated return to education does not represent the return for the whole population.

6. Card and Krueger (1992).

gin, most countries have found that raising the quality of human capital for a given year of schooling is much harder than raising educational attainment.

The authors' policy recommendations strike me as eminently sensible. I would suggest that they go somewhat further, however. For example, more could be done on teachers' incentives. Adam Smith wrote, "In modern times, the diligence of public teachers is more or less corrupted by the circumstances, which render them more or less independent of their success and reputation in their
Ftn. 7 particular professions."[7] Ladd and Rivera-Batiz claim that Puerto Rican teachers average five weeks of absence, and apparently substitute teachers are not used to fill the void. If so, then students in Puerto Rico attend 14 percent fewer days of school (25/180) than students on the mainland—which might account for the lower payoff to a year of education on the island than on the mainland.

I am also not persuaded that more teacher aides would help in Puerto Rico.
Ftn. 8 The U.S. experience has been that teacher aides are not particular effective.[8] If aides are used as substitute teachers, however, they may be able to bring about some improvement.

I conclude by highlighting some of the questions that, based on my reading of the chapter, should be a priority for future research:

—To what extent can the rapid rise in income in Puerto Rico over the past half century explain the rapid rise in educational spending? That is, can an Engle curve predict the increase in spending on education in Puerto Rico? One way to approach this question would be to use historical time-series evidence on the relationship between educational spending and income on the mainland to predict the growth in educational spending in Puerto Rico, based on Puerto Rico's income growth.

—Why has private school enrollment increased so much in Puerto Rico? Is this phenomenon an income effect? Is it a result of religious affiliation? Is it because the quality of public school instruction has declined? Is it because parents are seeking a different peer group for their children from that which is available in public schools?

—Why is the college graduation rate of Puerto Ricans on the island higher than that of Puerto Ricans on the mainland? What does this say about the quality of education on the island? What does this say about the nature of education and expectations on the mainland? How do second-generation Puerto Ricans fare on the mainland insofar as college education is concerned?

—Now that No Child Left Behind requires regular assessment, what are the trends in student achievement on the island? Will the standards used for assessment remain constant over time? Will standards and increased accountability improve Puerto Rican public schools?

7. Smith (1937, p. 733).
8. Krueger (1999).

COMMENT

Carlos E. Santiago

Helen Ladd and Francisco Rivera-Batiz take up possibly the most important issue facing the future of the Puerto Rican economy today—the contribution of education to economic development. The transition to a knowledge-based economy should be Puerto Rico's highest priority, given its basic character as an export-oriented open economy with limited natural resources. The chapter provides an excellent overview of topics relating education and economic development in Puerto Rico, and it does so from a sobering perspective.

Clearly, the conclusion that the dramatic gains made in schooling and educational attainment over the past forty years have not translated into a labor force that is prepared for today's economy deserves considerable discussion. The conversion of universal education to a highly trained labor force capable of that meeting the needs of the emerging knowledge-based economy will continue to be a challenge for the island.

Why should educational quality matter more than widespread educational attainment in the Puerto Rican context? It is clear that the economy itself is requiring a more highly skilled labor force. Those individuals with basic capabilities in the sciences, mathematics, engineering, and technology are increasingly highly valued. This has become a real challenge for Puerto Rico, which in many respects has focused on universal educational attainment at all levels.

The expansion of private education in Puerto Rico, from K–12 to college and beyond, is a significant phenomenon. The growth of private education relative to public education recalls some of the debates going on in the United States, particularly in many urban centers. However, the issues of school choice and school vouchers have not made much headway in Puerto Rico. A long tradition of religion-based educational institutions and the expansion of other private institutions in Puerto Rico suggests that the private-public dichotomy does not play out in the same way as it does in the United States.

Another significant topic raised by Ladd and Rivera-Batiz is the intrahousehold changes in educational attainment by gender. The changes at the household level beg for additional analysis. The dramatic increase of women in higher education institutions has important implications for explaining changes in labor force participation, male-female expected wage differentials, and reliance on transfer payments, as well. Divorce rates in Puerto Rico, which have matched those of the United States since the early 1970s and are among the highest in Latin American and the Caribbean, are another possible factor in the gender imbalance in higher education.

Another question raised is whether public policy matters in educational reform in Puerto Rico. In particular, have the educational reforms of the 1990s

been able to halt the decline in student quality? The authors argue that they have not, but it may be a bit too soon to tell. We have a sense of what it takes to enhance student quality, more generally—small classes, appropriate physical plant and infrastructure, neighborhood and parental involvement, decentralization, well-trained teachers, good administration, and accountability. Unfortunately, almost all these elements have to be in place if there is to be a real turnaround in educational quality. Again, these are issues that are hotly debated and contested in many parts of the United States, and some of those discussions should be applicable and instructive to the Puerto Rican context.

The authors also explore the issue of higher education financing in Puerto Rico. The Puerto Rican experience runs contrary to what has been happening at universities in the United States, particularly public universities over the past twenty years. That the Puerto Rican public higher education system—the University of Puerto Rico—is constitutionally mandated to receive a fixed percentage of island budget expenditures is a formula that, on the surface, many university administrators would love to have. In the United States, both tuition and fees have been rising and are now outpacing the growth of tax revenue support for public higher education.

The chapter suggests that general purpose revenues from the Puerto Rican government cover approximately 70 percent of operating expenses in public higher education. This figure contrasts sharply with the trend of public higher education financing in the United States, which continues to decline. For example, the share of operating expenses covered by tax support is between 20 and 25 percent for the University of Wisconsin and the State University of New York systems and less than 10 percent for the University of Colorado system; and institutions in Virginia, such as the University of Virginia, Virginia Tech, and William and Mary, are now lobbying hard with their legislature to try to achieve charter university status. The declines in funding for public higher education in the United States can be attributed to a number of factors, one of the most important being that mandated health care expenditures are crowding out spending on public higher education in state budgets.

A great deal of change is occurring in the landscape of public higher education financing in the United States, and some of those trends do not appear to be taking place on the island. This is not to suggest that public higher education is adequately funded in Puerto Rico; but certainly the transition to increased private funding that many U.S. public universities are experiencing does not seem to be taking place on the island.

The relevant question is this: Are universities in Puerto Rico serving as catalysts for economic development and growth? If not, why not? Research universities are increasingly stimulating economic development as they generate new technologies, drive innovation, and commercialize their research. Technology transfer programs and incubator sites have become mainstays of research universities in

the current economic environment. More than ever before, institutions of higher education need to be stimulating entrepreneurship as well as training individuals in science, technology, engineering, and mathematics. These are now functions that are increasingly expected in light of the changing needs of the high-tech economy. Puerto Rico simply cannot afford to bypass this stage if it wants to compete effectively at the national and international level. We know that, within the U.S. context, the areas that are growing at the most rapid pace are those that are in some proximity to one or more major research universities that are fueling growth in today's economy.

Another area that needs greater attention is an assessment of the quality of the teaching corps on the island. This issue is not directly addressed in the chapter, but the need to professionalize the teaching corps at the K–12 level is receiving increasing attention in broader circles. This is clearly an expensive undertaking, but it is crucial to enhancement of teacher quality. The need to merge pedagogy and content is essential; the former needs to be addressed by schools of education, while the latter must emanate from schools of arts and sciences.

In reviewing the island experience with education and economic development, it is important to acknowledge and integrate into the analysis the growing numbers of Puerto Ricans who reside in the continental United States. The frequency of migration between the island and the mainland is considerable. Moreover, recent Current Population Survey data suggest that the size of the Puerto Rican population on the U.S. mainland is surpassing that of the island population. In and of itself, that may not be an important feature in the analysis, but the reality is that the Puerto Rican population is, to some extent, a commuter population traveling back and forth from island to mainland with increasing frequency. During the early stages of Puerto Rican industrialization, massive numbers of people moved from rural to urban areas and then migrated off the island. In just one decade, from 1950 to 1960, 25 percent of the labor force and more than 25 percent of the population left the island.[9] This fact certainly makes the Puerto Rican experience unique. Ftn. 9

In evaluating the role of education in Puerto Rican economic development it is also important to take into account the relative stagnancy of the economy since the mid-1970s. To better understand the impact of education on the economy, one needs to move beyond a narrow focus on education and instead explore larger economic conditions. Some of the structural changes occurring in the mid-1970s in Puerto Rico culminated in long-term sluggish growth. The theme of significant positive change and yet substantial challenges runs through most of the chapters in this volume. Dramatic oil price increases in the early 1970s disrupted the island's petrochemical industry as oil tankers circumvented the island on their way to U.S. refineries. At the same time, major public policy

9. Rivera-Batiz and Santiago (1996, pp. 44–45).

shifts occurred on the island, including parity between commonwealth and federal minimum wages and the advent of significant expansion of transfer payments. In the mid-1970s New York City, which at the time was the primary mainland destination for Puerto Rican out-migrants, was in bankruptcy. This had a devastating effect on the Puerto Rican population in the United States: income levels plummeted, and Puerto Ricans moved from the United States to the island in large numbers. New York City's default has not been repeated, but among its deleterious effects was the claim that Puerto Ricans in the United States were not following the path of economic success as had other immigrant groups. This led some authors to claim that Puerto Ricans in the United States constituted a segment of the urban underclass.

This reality has changed dramatically over the past twenty years, and increasing educational attainment among Puerto Ricans in the United States has been the most important factor in rising incomes. Data from the 1990 and 2000 censuses show that growth in household per capita income among Puerto Ricans in the United States has surpassed that of the population at large. Educational attainment has been the key to this phenomenon, particularly increases in the numbers of Puerto Ricans holding two-year associate degrees.

Another comparative perspective can be taken from the experience of Ireland. Puerto Rico's push for economic development during the 1950s was of particular interest to the Irish. As an island economy, Ireland looked at Puerto Rico's promotion of foreign direct investment as a strategy that would lead to higher incomes and lower unemployment. Ireland also embarked on a development path that focused on foreign investment and export growth and was led by a development agency similar to that in Puerto Rico.

In the past twenty-five years, Ireland has joined the ranks of the highest-income countries in Europe, while the Puerto Rican economy remains sluggish, at best. The lesson for Puerto Rico lies in the massive investments that the Irish made in their educational system, particularly in higher education. Their focus on training in science, mathematics, and engineering has paid off dramatically, and the correlation between the growth in expenditures on education and the growth in GDP is remarkable.

Between 1995 and 2001, university spending in Ireland (from public and private sources) grew by 70 percent, the largest growth rate in Europe and one that far outpaced the U.S. rate (21 percent). Ireland's GDP rose 69.7 percent over that same period, again surpassing the rest of Europe and the United States
Ftn. 10 (22.3 percent).[10] Ireland has been able to make a successful transition to the knowledge economy and now stands as a leader in crucial areas such as software development. It may be time for Puerto Rico to look at the recent Irish experi-

10. John Schmid, "Stealing Some Roar from the Celtic Tiger," *Milwaukee Journal Sentinel,* August 18, 2005 (www.jsonline.com/bym/news/aug05/349423.asp).

ence, just as the Irish once replicated the early strategies of Puerto Rico to grow its economy.

Finally, one of the underlying themes through this chapter, as well as some of the other contributions to this volume, is the notion that Puerto Rico's development experience has deviated from the norm and that the island currently stands at a crossroads in terms of immediate directions for the economy. Ladd and Rivera-Batiz convey a sense of urgency in addressing some of the issues discussed—a message that should be heeded.

References

Alexander, Karl L., Doris R. Entwisle, and Nader S. Kabbani. 2001. "The Dropout Process in Life Cycle Perspective: Early Risk Factors at Home and School." *Teachers College Record* 103, no. 5: 760–822.

Allison, Neil, and Arthur McEwan. 2003. "Students Dropping Out of Puerto Rico Public Schools: Measuring the Problem and Examining the Implications." Working paper. Boston: University of Massachusetts.

American Federation of Teachers. 2004. *Annual Survey of Teacher Salaries: 2002–2003.* Washington.

Angrist, Joshua. 1995. "The Economic Returns to Schooling in the West Bank and Gaza Strip." *American Economic Review* 85, no. 5: 1065–87.

Barro, Robert J., and Xavier Sala-i-Martin. 2004. *Economic Growth.* 2d ed. MIT Press.

Bosworth, Barry, and Susan Collins. 2003. "Growth Accounts Database." Excel file. Brookings.

Bryk, Anthony S. 2003. "No Child Left Behind: Chicago Style." In *No Child Left Behind? The Politics and Practice of School Accountability,* edited by Paul E. Peterson and Martin R. West, pp. 242–68. Brookings.

Bryk, Anthony S., and others. 1998. *Academic Productivity of Chicago Public Elementary Schools.* Chicago: Consortium on Chicago Schools Research.

Card, David. 1999. "The Causal Effect of Education on Earnings." In *Handbook of Labor Economics,* edited by Orley Ashenfelter and David Card, 3A:1801–63. Amsterdam: North Holland.

Card, David, and Alan Krueger. 1992. "Does School Quality Matter? Returns to Education and the Characteristics of Public Schools in the United States." *Journal of Political Economy* 100, no. 1: 1–40.

———. 1996. "Labor Market Effects of School Quality: Theory and Evidence." In *Does Money Matter? The Effect of School Resources on Student Achievement and Adult Success,* edited by Gary Burtless, pp. 97–140. Brookings.

Castillo Ortiz, Alicia. 2002. "Critical Analysis of Models, Approaches, and Strategies of School Supervision." *Cuadernos de Investigación en la Educación,* no. 17: 1–6.

Castillo Ortiz, Alicia, and Glory Marrero. 2003. "Study of Absenteeism among Teachers and Students in the Public Schools of Puerto Rico." San Juan: University of Puerto Rico, Graduate School of Education.

Coleman, James S., and others. 1966. *Equality of Educational Opportunity.* U.S. Government Printing Office.

Coleman, James S., Thomas Hoffer, and Sally Kilgore. 1982. *High School Achievement: Private and Public Schools Compared.* New York: Basic Books.

College Board. 1991. "Profile of the Students Tested by the University Assessment and Admissions Program (PEAU)." San Juan: College Board Office of Puerto Rico and Latin American Activities. Mimeograph.

———. 2005. "Profile of the Students Tested by the University Assessment and Admissions Program (PEAU)." San Juan: College Board Office of Puerto Rico and Latin American Activities. Mimeograph.

Commonwealth of Puerto Rico. 1975. *Economic Report to the Governor.* San Juan: Planning Board of Puerto Rico.

———. 1985. *Economic Report to the Governor.* San Juan: Planning Board of Puerto Rico.

———. 1990. *Organic Law of the Department of Education of Puerto Rico (Law Number 68).* San Juan.

———. 1992. *Budget of the Commonwealth of Puerto Rico.* San Juan: Office of Management and Budget of Puerto Rico.

———. 1994. *Budget of the Commonwealth of Puerto Rico.* San Juan: Office of Management and Budget of Puerto Rico.
———. 1996a. *Budget of the Commonwealth of Puerto Rico.* San Juan: Office of Management and Budget of Puerto Rico.
———. 1996b. *Economic Report to the Governor.* San Juan: Planning Board of Puerto Rico.
———. 1998. *Budget of the Commonwealth of Puerto Rico.* San Juan: Office of Management and Budget of Puerto Rico.
———. 2000. *Budget of the Commonwealth of Puerto Rico.* San Juan: Office of Management and Budget of Puerto Rico.
———. 2004a. *Budget of the Commonwealth of Puerto Rico.* San Juan: Office of Management and Budget of Puerto Rico.
———. 2004b. *Economic Report to the Governor.* San Juan: Planning Board of Puerto Rico.
Commonwealth of Puerto Rico, Council on Higher Education. 2004. "Higher Education Enrollment: Historical Statistics." San Juan (October).
Commonwealth of Puerto Rico, Department of Education. 1973. *Analysis of Budget Proposal.* San Juan.
———. 1983. *Analysis of Budget Proposal.* San Juan.
———. 1993. *Analysis of Budget Proposal.* San Juan.
———. 1996. *Analysis of Budget Proposal.* San Juan.
———. 2003a. "Puerto Rico State Report Card 2002–2003." San Juan: Commonwealth of Puerto Rico (September).
———. 2003b. "Report on Student Achievement of the Commonwealth's Public Schools." San Juan: Commonwealth of Puerto Rico (September).
———. 2003c. "Rethinking Our Department of Education: Transition Report." San Juan. AQ1
———. 2004a. *Analysis of Budget Proposal.* San Juan.
———. 2004b. "Preliminary Summary Statistics, Annual Yearly Progress." San Juan: Commonwealth of Puerto Rico (October).
———. 2004c. "Rethinking Our Department of Education: Proposed Model." San Juan. AQ2
———. 2005. "Summary of Statistics of Annual Yearly Progress." San Juan (January).
Commonwealth of Puerto Rico, General Council of Education. 2004. "School Enrollment in Puerto Rico, 2003–2004." San Juan: Department of Education.
Darling-Hammond, Linda, and Laura Post. 2000. "Inequality in Teaching and Schooling: Supporting High-Quality Teaching and Leadership in Low-Income Schools." In *A Notion at Risk: Preserving Public Education as an Engine for Social Mobility,* edited by Richard Kahlenberg, pp. 127–67. New York: The Century Foundation Press.
Dietz, James L. 1986. *Economic History of Puerto Rico: Institutional Change and Capitalist Development.* Princeton University Press.
Enchautegui, María. 2004. "Selectivity Patterns in Puerto Rican Migration to the U.S." Working paper. Río Piedras: University of Puerto Rico, Department of Economics.
Ferguson, Ronald, and Helen F. Ladd. 1996. "How and Why Money Matters: An Analysis of Alabama Schools." In *Holding Schools Accountable: Performance-Based Reform in Education,* edited by Helen F. Ladd, pp. 265–98. Brookings.
Fiske, Edward B., and Helen F. Ladd. 2000. *When Schools Compete: A Cautionary Tale.* Brookings.
Gómez Tejera, Carmen, and David Cruz López. 1970. *The Puerto Rican School.* Sharon, Conn.: Troutman.
Gonzalez, Patrick, and others. 2004. *Highlights from the Trends in International Mathematics and Science Study (TIMSS).* U.S. Department of Education.
Grogger, Jeff. 1997. "Local Violence and Educational Attainment." *Journal of Human Resources* 32, no. 4: 659–82.

Hall, Robert E., and Charles I. Jones. 1999. "Why Do Some Countries Produce So Much More Output per Worker than Others?" *Quarterly Journal of Economics* 114, no. 1: 83–116.

Hansen, W. Lee, and Burton Weisbrod. 1969. "The Distribution of Costs and Direct Benefits of Public Higher Education: The Case of California." *Journal of Human Resources* 4, no. 2: 176–91.

Hanson, Mark. 1995. "Democratization and Decentralization in Colombian Education." *Comparative Education Review* 34, no. 1: 101–19.

Hanushek, Eric A. 1997. "Assessing the Effects of School Resources on Student Performance: An Update." *Educational Evaluation and Policy Analysis* 19, no. 2: 141–64.

———. 2002. "The Seeds of Growth: The Long-Run Importance of School Quality." *Education Next* 2, no. 3: 10–17.

Hanushek, Eric A., John Kain, and Stephen Rivkin. 1998. "Teachers, Schools, and Academic Achievement." Working Paper 6691. Cambridge, Mass.: National Bureau of Economic Research.

Hanushek, Eric A., and Dennis A. Kimko. 2000. "Schooling, Labor-Force Quality, and the Growth of Nations." *American Economic Review* 90, no. 5: 1184–1208.

Hauser, Robert M. 2004. "Progress in Schooling." In *Social Inequality,* edited by Kathryn M. Neckerman, pp. 271–335. New York: Russell Sage Foundation.

Holmes, C. Thomas. 1989. "Grade Level Retention Effects: A Meta-Analysis of Research Studies." In *Flunking Grades: Research and Policies on Retention,* edited by Lorrie Shephard and Mary Smith, pp. 16–33. London: Falmer Press.

Hoxby, Caroline. 2000. "Peer Effects in the Classroom: Learning from Race and Gender Variation." Working paper 7867. Cambridge, Mass.: National Bureau of Economic Research.

Jacob, Brian A. 2003. "A Closer Look at Achievement Gains under High-Stakes Testing in Chicago." In *No Child Left Behind? The Politics and Practice of School Accountability,* edited by Paul E. Peterson and Martin R. West, pp. 269–91. Brookings.

Katz, Eliakim, and Oded Stark. 1987. "International Migration under Asymmetric Information." *Economic Journal* 97, no. 3: 718–26.

Katz, Lawrence F. 2004. "Comments on Inequality in America." In *Inequality in America: What Role for Human Capital Policies?* edited by Benjamin Friedman, pp. 269–79. MIT Press.

Katz, Lawrence F., and David H. Autor. 1999. "Changes in the Wage Structure and Earnings Inequality." In *Handbook of Labor Economics,* edited by Orley Ashenfelter and David Card, 3A:1463–1555. Amsterdam: North Holland.

Krueger, Alan. 1999. "Experimental Estimates of Education Production Functions." *Quarterly Journal of Economics* 114, no. 2: 497–532.

———. 2004. "Inequality in America: Too Much of a Good Thing." In *Inequality in America: What Role for Human Capital Policies?* edited by Benjamin Friedman, pp. 1–75. MIT Press.

Krueger, Alan B., and Mikael Lindahl. 2001. "Education for Growth: Why and for Whom?" *Journal of Economic Literature* 39, no. 4: 1101–36.

Ladd, Helen F. 2004. "Policy Brief on Accountability." In *Education Finance and Organizational Structure in New York State Schools: Symposium Proceedings,* edited by David H. Monk and James Wyckoff, pp. 151–76. Albany, N.Y.: Education Finance Research Consortium.

Ladd, Helen F., and Janet Hansen, eds. 1999. *Making Money Matter: Financing America's Schools.* Washington: National Academy Press

Linn, Robert. 2006 (forthcoming). "Scientific Evidence in Educational Policy and Practice: Implications for Adequate Yearly Progress." In *Measurement and Research in the Accountability Era,* edited by Carol Ann Dwyer, pp. 28–52. Mahwah, N.J.: Lawrence Erlbaum.

Lopez Yustos, Alfonso. 1992. *A Documentary History of Education in Puerto Rico.* San Juan: Publicaciones Puertorriqueñas.

Lucas, Robert E. 1993. "Making a Miracle." *Econometrica* 61, no. 2: 251–72.

Marco, Gary L. 2004a. "Future Research Related to the Score Declines in Puerto Rico College Admissions Test Scores." Research report. San Juan: College Board, Office of Puerto Rico and Latin America.

———. 2004b. "Test and Item Statistics and Their Relationship to Puerto Rico Admissions Test Scores." Research report. San Juan: College Board, Office of Puerto Rico and Latin America.

Martí-Vazquez, Lillian. 2000. "The Impact of Decentralization and School-Based Management in Puerto Rico: A Case Study." Ph.D. dissertation, Teachers College, Columbia University.

Martinez, Marialba. 2002. "UPR Invests $26.3 Million in Three Biotechnology Centers: Research Aimed to Benefit Puerto Rico's Pharmaceutical Industry." *Caribbean Business,* March 21, p. 1.

Murphy, Kevin, and Finis Welch. 2001. "Wage Differentials in the 1990s: Is the Glass Half-Full or Half-Empty?" In *The Causes and Consequences of Increasing Inequality,* edited by Finis Welch, pp. 341–64. University of Chicago Press.

National Assessment of Educational Progress (NAEP). 2000. *Trends in Academic Progress: Three Decades of Student Performance.* U.S. Department of Education.

———. 2004. *The Nation's Report Card: Mathematics 2003.* U.S. Department of Education, Institute of Education Sciences.

National Center for Education Statistics (NCES). 2003. *Digest of Education Statistics 2002.* U.S. Department of Education.

———. 2004a. *Digest of Education Statistics 2003.* U.S. Department of Education (October).

———. 2004b. *National Public School Database, School Year 2002–2003.* U.S. Department of Education.

———. 2004c. *Revenues and Expenditures for Public Elementary and Secondary Education, School Year 2001–2002.* U.S. Department of Education (June).

Nelson, F. Howard, Rachel Drown, and Jewell C. Gould. 2001. *Survey and Analysis of Teacher Salary Trends 2000.* Washington: American Federation of Teachers.

Organization for Economic Cooperation and Development (OECD). 2003. *Financing Education: Investments and Returns, An Analysis of World Education Indicators.* Paris: UNESCO Institute for Statistics.

———. 2004. *Learning for Tomorrow's World: First Results from PISA 2003.* Paris.

Ortiz, Vilma. 1986. "Changes in the Characteristics of Puerto Rican Migrants from 1955 to 1980." *International Migration Review* 20, no. 3: 612–28.

Osuna, Juan José. 1923. *Education in Porto Rico.* Teachers College Press.

Patrinos, Harry, and George Psacharopoulos. 2004. "Returns to Investment in Education: A Further Update." *Education Economics* 12, no. 2: 111–34.

Pavcnik, Nina. 2003. "What Explains Skill Upgrading in Less Developed Countries?" *Journal of Development Economics* 71, no. 2: 311–28.

Psacharopoulos, George. 1994. "Returns to Investment in Education: A Global Update." *World Development* 22, no. 9: 1325–43.

Quintero, Ana Helvia. 2006. *Many Reforms, Few Changes.* San Juan: Publicaciones Puertorriqueñas Editores.

Rivera-Batiz, Francisco L. 1989. "The Characteristics of Recent Puerto Rican Migrants." *Migration World* 17, no. 2: 7–13.

———. 1993. *Study of the Budget of the Department of Education of Puerto Rico.* San Juan: General Council of Education.

———. 1995a. *Financing Public Education in Puerto Rico.* San Juan: General Council of Education.

———, ed. 1995b. *Shifting Gears: Teacher Preparation and Education Reform in Puerto Rico.* San Juan: General Council of Education.

———. 2002. "Democracy, Governance, and Economic Growth: Theory and Evidence." *Review of Development Economics* 6, no. 2: 225–47.

———. 2003. "The Impact of School-to-Work Programs on Minority Youth." In *The School-to-Work Movement: Origins and Destinations,* edited by William J. Stull and Nicholas M. Sanders, pp. 169–88. Westport, Conn.: Praeger.

Rivera-Batiz, Francisco L., and Carlos E. Santiago. 1996. *Island Paradox: Puerto Rico in the 1990s.* New York: Russell Sage Foundation.

Rodríguez Bou, Ismael. 1947. *Education Problems in Puerto Rico.* San Juan: University of Puerto Rico.

Romer, Paul M. 1990. "Endogenous Technological Change." *Journal of Political Economy* 98, no. 5, pt. 2: S71–S102.

Rothstein, Richard. 1998. *The Way We Were? The Myths and Realities of America's Student Achievement.* New York: The Century Foundation–Twentieth Century Fund Report.

———. 2004. *Class and Schools: Using Social, Economic, and Educational Reform to Close the Black-White Achievement Gap.* Washington: Economic Policy Institute.

Sanders, William L., and June C. Rivers. 1996. "Cumulative and Residual Effects of Teachers on Future Student Academic Achievement." Value-Added Research and Assessment Center, University of Tennessee, Knoxville.

Sebring, Penny B., and others. 1996. *Charting Reform in Chicago: The Students Speak.* Chicago: Consortium on Chicago Schools Research.

Skinner, Ronald A. 2005. "State of the States." *Education Week* 24, no. 17: 77–80.

Smith, Adam. 1937. *An Inquiry into the Nature and Causes of the Wealth of Nations.* New York: Random House, Modern Library edition. (Orig. published 1776.)

Task Force on Higher Education and Society. 2002. *Higher Education in Developing Countries: Peril and Promise.* Washington: World Bank.

United Nations Educational, Scientific, and Cultural Organization (UNESCO). 2003. *Global Education Digest.* Montreal: UNESCO Institute for Statistics.

U.S. Department of Commerce. 1974. *1970 U.S. Census of Population and Housing, Public Use Microdata Samples for Puerto Rico.* U.S. Bureau of the Census.

———. 1983. *1980 U.S. Census of Population and Housing, 5% Public Use Microdata Samples.* U.S. Bureau of the Census.

———. 1994. *1990 U.S. Census of Population and Housing, 5% Public Use Microdata Samples.* U.S. Bureau of the Census.

———. 2003. *2000 U.S. Census of Population and Housing, 5% Public Use Microdata Samples.* U.S. Bureau of the Census.

———. 2004. *Statistical Abstract of the United States.* U.S. Government Printing Office.

University of Puerto Rico at Río Piedras. 2005. *Self-study Report to the Middle States Commission on Higher Education.*

Vázquez-Calzada, José L. 1988. *La poblatión de Puerto Rico y su trayectoría histórica.* Río Piedras: Raga.

World Bank. 1995. *Priorities and Strategies for Education.* Washington.

———. 2004. *World Development Indicators.* Washington.

Chapter 5—Author Queries

1. publisher?
2. publisher?