COMPARING THE QUALITY OF EDUCATION IN PRE- AND POST-REVOLUTIONARY CUBA USING U.S. LABOR MARKET OUTCOMES

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I said this to President Castro in Cuba. I said, look, you've made great progress in educating young people.

—Barack Obama

He managed to bring…good quality education to all the people of Cuba.

—Jeremy Corbyn

A legendary revolutionary and orator, Mr. Castro made significant improvements to the education…of his island nation.

—Justin Trudeau

As the opening quotations by prominent politicians imply, post-Revolutionary Cuba has long been praised for its achievements in education. Average years of schooling have indeed risen sharply since the Revolution. For 15 - 64 year olds, years of education went from 4.2 years in 1960 to 9.8 in 2000, for an increase of 134%.[1] When looked at in the context of what happened to schooling in Latin America over this period, however, the increase does not appear as impressive. Consider two other countries—Chile and Costa Rica—that are often compared to Cuba. In 1960 their average years of schooling, 5.2 and 3.9 years, respectively, bracketed Cuba's figure. By 2000, years of schooling in these two countries had increased to 9.1 and 8.0 years, or increases of 74% and 103%. Their increases are not as large as Cuba's, but

Table 1.   Growth in Average Years of Schooling

Countries	Growth 1960 - 2000	Average Years of Schooling 1960
Argentina	0.54	5.67
Barbados	0.71	5.16
Belize	0.19	7.56
Bolivia	1.67	3.10
Brazil	2.17	2.05
Chile	0.74	5.22
Colombia	1.25	3.07
Costa Rica	1.03	3.93
Cuba	1.34	4.17
Dominican Rep.	1.37	2.77
Ecuador	1.25	3.22
El Salvador	2.34	1.97
Guatemala	1.85	1.45
Guyana	0.65	4.89
Haiti	4.39	0.82
Honduras	2.13	1.96
Jamaica	1.36	3.84
Mexico	1.75	2.77
Nicaragua	1.45	2.21
Panama	0.90	4.59
Paraguay	0.82	3.43
Peru	1.36	3.49
Trinidad and Tobago	0.59	5.63
Uruguay	0.67	4.84
Venezuela	0.88	3.12

Source: All data from Barro and Lee (2013).

in the right ballpark. Table 1 shows the data for all countries in Latin America and the Caribbean.

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1. Data on schooling is from Barro and Lee (2013). There are differences across various data sets in terms of years of schooling. The broad results continue to hold for all datasets.

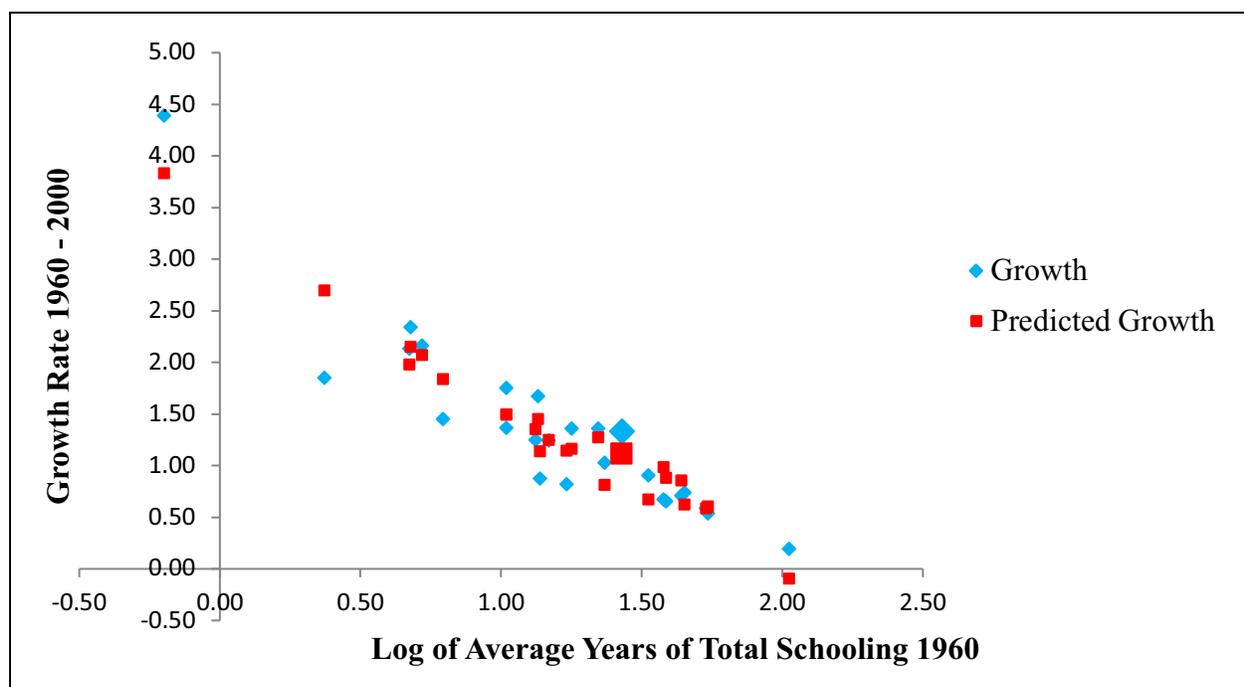**Figure 1.   Growth Rate of Average Years of Total Schooling 1960 - 2000**

Table 2.   Regression of Growth in Average Total Schooling 1960 - 2000

Variable	Coefficient	t - statistic
Intercept	3.74	14.37
Log Average Total Schooling 1960	-1.69	12.67
Population Growth 1960 - 2000	-0.23	2.58
R^2 - 0.88, # observations 25		

Figure 1 shows the results from a regression of the growth rate from 1960 to 2000 of average years of total schooling on the log of average years of total schooling in 1960 and the population growth rate over this period for the countries in Table 1.[2] For those interested, the statistical results are shown on Table 2. The actual growth rate of schooling by country is shown as diamonds, while the fitted, or predicted, values appear as squares. The symbols corresponding to Cuba are enlarged to make identification easier. As can be seen, Cuba's growth rate for years of schooling is somewhat higher than one would expect—134% actual increase versus the 112% predicted increase—for a difference of just under a year of education, but well within one standard error of the predicted value. Four other countries are further above their predicted values than Cuba. So in the 40 years following the Revolution, schooling in Cuba may have grown somewhat more than expected, but within the experience of other countries in Latin America and the Caribbean.[3]

QUALITY OF EDUCATION

Years of schooling is the most widely used measure of human capital in the comparative growth literature. The common assumption made is that a year of schooling raises human capital by the same amount equally across all countries. In other words, education quality does not vary across the world. Those who praise the Cuban educational system do so not only based on increases in years of schooling, but also on what they perceive to be high quality education. Carnoy (2007), for example, states:

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2. Population growth was included as a proxy for large proportion of young people, which would make it costlier to increase educational attainment.

3. Extending the same analysis to 2010 has Cuba even closer to its predicted value. Seven countries are now further above their predicted growth levels than Cuba.

Table 3.   Summary Statistics

Variable	Schooling Completed Before 1962/3 (1980 & 1990 Censuses)	Schooling Started After 1958 (1990 & 2000 Censuses)
1980 Census	0.42	N/A
2000 Census	N/A	0.68
Ft. Lauderdale SMSA	0.30	0.28
W. Palm Beach SMSA	0.24	0.25
U.S. Born, Cuban Ancestry	0.003	0.05
Immigrated < 1959	0.003	0.0005
Immigrated 1959 - 69	0.12	0.04
Immigrated 1970s	0.02	0.007
Immigrated 1980+	0.01	0.02
Cuban Ancestry, Total	0.16	0.12
Does Not Speak English Very Well	0.10	0.028
Potential Work Experience	31.94	14.11
Potential Cuban Work Experience	2.32	0.14
Years of Schooling	13.0	13.8
Years of Cuban Schooling	1.33	0.21
Sample Size	11,777	29,841

We found that Cuban children excel academically for fairly straightforward reasons: they attend schools intensely focused on instruction, staffed by well-trained, regularly supervised teachers in a social environment that is dedicated to high achievement for all. The Cuban system combines quality teaching, high academic expectations and a tightly controlled school management hierarchy with well-defined goals and responsibilities — a combination that distinguishes Cuban education from other systems in Latin America.

While many such assessments appear to be based on evaluations of inputs to education, they are backed up by some output measures such as international test scores. UNESCO (2008) reports that Cuba had—by considerable margins—the highest third and sixth grade math and reading scores of any country in Latin America and the Caribbean. High test scores, like high inputs into education, are not direct measures of human capital.

Schoellman (2011) implements a procedure that in principle should provide direct measures of quality of education by country. He estimates the returns to schooling by country to workers in a common labor market—that of the US. He finds that the return to Cuban schooling is only 2.8% as compared to 11.1% for US schooling, see Table A.1 page 412.[4]

COMPARING THE RETURNS TO PRE- AND POST-REVOLUTIONARY SCHOOLING

In this paper we carry out a version of Schoellman's procedure to compare in the US labor market the return to Cuban schooling obtained before and after the Revolution. Comparing the returns to schooling from two different time periods using data from a given point in time (as we do) is not as simple as it may at first seem. Our data come from the US Censuses of 1980, 1990 and 2000. Take the Census of 1990: Individuals who completed their schooling prior to the Revolution would have done so nearly 30 to 50 years before 1990. Those who were educated in post-Revolutionary Cuba would have completed their schooling much more recently. To the extent that education changes over time in response to changing informational and technological demands of the times, a direct comparison of the returns to schooling of the two periods would be inappropriate. It could reflect changes in educational content independent of quality. Consequently, we compare pre and post-Revolutionary Cuban education with American education of the corresponding time periods. The difference in returns between Cuban and American education within a time period is our measure of the quality of Cuban education for that period.

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4. We have issues with Schoellman's procedure, but we do not think they are important for our application here.

Our empirical analysis is limited to men who were born in the US or have been in the US for at least five years prior to the US censuses, and who speak English well, very well, or exclusively. The pre-Revolutionary period is defined as ending in 1962 for schooling in Cuba and 1963 for schooling in the US.[5] The post-Revolutionary period is defined as starting in 1959. Each of these periods contained three demographic groups: (1) Cubans who obtained *all* their schooling in Cuba; (2) white, non-Hispanic Americans who obtained *all* their schooling in the US; and (3) Cuban-Americans who obtained *all* their schooling in the US. Those of Cuban ancestry who began their schooling in Cuba and completed it in the US *were excluded*. So were any men, of Cuban or non-Cuban ancestry, who began their schooling before 1959 but completed it after 1962/63.

Our procedure then was to estimate the differences in return to schooling in Cuba and the US for each time period. Our measure of the quality of Cuban education, like Schoellman's, is thus relative to that of US education.

Our sample was further restricted to men 25–65 years of age who worked at least 40 weeks, whose wage income was at least 80% of their earned income, and whose weekly earnings were at least $200/week in 1989 dollars.[6] Finally, to make our data set more manageable we limited our sample to men who worked in the metropolitan areas from West Palm Beach south to Miami.

RESULTS

Table 3 shows summary statistics for the two samples. The first sample consists of men who completed their schooling by 1962/63, while the second sample consists of those who started their schooling after 1958. In both samples all schooling took place in Cuba or the US, but not in both. The first sample was taken from the 1980 (42%) and 1990 (58%) US Censuses, while those in the second came from the 1990 (32%) and 2000 (68%) US Censuses. The men in the first sample are on average quite a bit older than those in the second sample, averaging 50.9 vs. 33.9 years of age. In the first sample 16% are of Cuban ancestry, with the vast majority (76%) of those from the 1959–1969 immigration cohort. In the second sample 12% are of Cuban ancestry, with most of those being US born (42%) or from the 1959–1969 immigration cohort (32%).[7]

The first sample has lower average schooling (13.0 vs. 13.8 years of schooling). Schooling is also slightly lower in the first sample for those educated in Cuba (not shown in Table 3). The respective levels for the two samples are 8.6 and 8.9 years of schooling.

Table 4 shows the results of the earnings regressions. The dependent variable in both regressions is the log of weekly wage earnings for the year prior to the corresponding census. Let us turn first to the variables of most interest. The return to a year of schooling is 0.064 (6.4%) and 0.12 (12%) for the two samples, respectively. This means that for those who completed their schooling in the US prior to 1963, an additional year of schooling on average raised yearly income by 6.4%. For those who started their schooling after 1958, the return is almost twice as large at 12%. While this is consistent with the finding of other researchers that the return to education has been rising over time, the difference we find is significantly larger. We suspect this is due to education having been acquired over different periods in the two samples.[8]

For the first sample—those who completed their education by 1962/63—the coefficient on Cuban schooling is -0.006, and it is statistically significant at the 1% level. This means that the return to schooling for those educated in Cuba is 0.6% percentage points lower than those educated in the US. For those who

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5. The difference of one year approximately reflects the difference in the average amount of schooling between those educated completely in Cuba and those educated completely in the US.

6. All earnings data corresponds to the year prior to the census year. The age limits apply to the census year.

7. The proportion of those from the 1959–69 cohort who obtained their education in Cuba declines over time.

8. This raises the interesting question of whether the results of traditional earning regression studies are misattributing a certain amount of educational obsolescence to other factors.

Table 4.   Earnings Regressions Dependent Variable: Log Average Weekly Earnings

	Coefficients	
Variable	Schooling Completed Before 1962/3 (1980 & 1990 Censuses)	Schooling Started After 1958 (1990 & 2000 Censuses)
Intercept	5.55***	4.14***
1980 Census	-0.59***	N/A
2000 Census	N/A	0.24***
Ft. Lauderdale SMSA	-0.12***	0.092***
W. Palm Beach SMSA	-0.083***	0.080***
Cuban Ancestry (Immigrated 1959–69)	-0.12***	0.097***
US Born, Cuban Ancestry	-0.27***	-0.046**
Immigrated < 1959	0.054	0.056
Immigrated 1970s	-0.0001	-0.074*
Immigrated 1980+	-0.14***	-0.16**
Does Not Speak English Very Well	-0.084***	-0.064***
Potential Work Experience	0.023***	0.063***
Potential Work Experience Squared	-0.0005***	-0.001***
Potential Cuban Work Experience	-0.004**	-0.014***
Years of Schooling	0.064***	0.12***
Years of Cuban Schooling	-0.006**	-0.003
R²	0.315	0.293
# of Observations	11,777	29,841

* Statistically significant at the 10% level.
** Statistically significant at the 5% level.
*** Statistically significant at the 1% level.

started their schooling after 1958, Cuban schooling has a return of -0.3 (coefficient of -0.003) percentage points lower than US schooling, and it is measured imprecisely. Table 5 gives a sense of what this difference of 0.003 percentage points means. A man with only six years of schooling obtained in Cuba before 1962 would, on average, earn 3.3% less than if the man had received his schooling in the US. If the man's schooling had instead started after 1958, he would earn 1.6% less than if he had studied in the US. Thus, the (small) handicap of having studied in Cuba is cut in half after the Revolution. For those with a a college education, the difference between pre- and post Revolution schooling is about 4.6 percentage points. Because of the imprecision of the coefficient of post Revolution Cuban schooling, however, these differences are not statistically significant at any conventional level.

While several of the other estimates in Table 4 may be interesting, the only one that is related to our interests in this paper are the estimates of the differential impact of Cuban potential work experience. The coefficient of -0.004 for Cuban potential work experience for the first group in Table 4, for example,

Table 5.   Simulated Differences in Returns to US and Cuban Schooling

	Differences in Earnings Between US and Cuban Schooling	
Years of Schooling	Completed Schooling by 1962	Started Schooling After 1958
6	-3.3%	-1.6%
9	-4.4%	-2.4%
12	-6.7%	-3.2%
16	-8.9%	-4.3%

means that whatever the effect on earnings of an additional year of US work experience, earnings would be 0.4% lower if the work experience had been acquired in Cuba instead of the US. For the second sample the effect is much larger (more negative) with a coefficient of -0.014 (-1.4%). A similar analysis to what we did with education is presented in Table 6 for Cuban work experience. With five years of Cuban work experience, for example, earnings in the first sample would be reduced on average by only 2.0%, but in the second sample by 6.8%. By 15 years of Cuban work experience the gap has increased to more than 14 percentage points. Since the coefficients of Cuban work experience for both samples

were estimated with good precision, the differences in Table 6 are both economically and statistically significant. Keep in mind that the samples are constructed to identify pre- and post-Revolutionary schooling, not work experience. Consequently, not all Cuban work experience in the first sample was acquired in the pre-Revolutionary period. In future research we may be able to measure more precisely the differential impact of Cuban work experience before and after the Revolution.

Table 6.   Simulated Differences in Earnings Between US and Cuban Potential Work Experience

Years of Cuban Work Experience	Differences in Earnings Between US and Cuban Work Experience	
	Completed Schooling by 1962	Started Schooling After 1958
1	-0.4%	-1.4%
5	-2.0%	-6.8%
10	-4.0%	-13.6%
15	-8.0%	-20.3%

CONCLUSIONS

The following are our tentative conclusions. The change in the handicap of Cuban education falls after the revolution, but the decline is small and not statistically significant at conventional levels. Still, the point estimates do imply a slight improvement in the quality of education after the revolution measured in terms of generating earnings (human capital) in the US. This conclusion is similar to our conclusion concerning the effect of the Revolution on years of schooling in Cuba: an improvement that is more than expected, but not large, and not statistically significant.

Our results are quite different when it comes to Cuban work experience. The handicap from Cuban, as opposed to American, work experience, is much larger and statistically significant for those who completed their education in Cuba after 1962, than before.

Many lines for further research suggest themselves: from adding other labor markets in the US, to investigating whether the fields Cuban immigrants trained for and work in have changed with the Revolution.[9] We also need to examine more closely the apparent difference across the two periods in on-the-job accumulation of human capital, and how it may impact on our estimates of the returns to schooling.

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9. Locay (2003) found that the distribution of university majors in Cuba differs considerably from other countries in Latin America and the Caribbean.