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Refugio I. Rochin
Steve Hampton, University of Arizona
Javier Ekboir

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Hispanic Journal of Behavioral Sciences 1995; 17; 480
DOI: 10.1177/07399863950174005

The online version of this article can be found at: http://hjb.sagepub.com/cgi/content/abstract/17/4/480

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The Performance of Latinos in Rural Public Schools: A Comparative Analysis of Test Scores in Grades 3, 6, and 12

Steve Hampton
Javier M. Ekboir
University of California, Davis
Refugio I. Rochin
Michigan State University

Over the last few decades, California's rural communities have experienced a sociodemographic transformation as the percentage of Latinos in these towns increased dramatically. These high concentrations of Latinos are correlated with poverty and low educational achievement. Using multiple regression analysis, this study examines how socioeconomic status, school funding, English proficiency, and Latino concentration affect test scores. This study's major findings are: (a) that the socioeconomic status of parents in rural communities is the primary predictor of academic performance; and (b) that the academic performance of both rural Latinos and Whites improves as Latino concentration increases. This last result is in contrast to previous studies, which have relied on pairwise correlations and focused on primarily urban populations.

An impressive demographic transformation has occurred within California's rural communities in the last 40 years. Typically, these towns have doubled in size and have seen their majority populations change from White to Latino. At the same time, the educational performance of Latino children throughout California remains well below average. This situation implies a poor future for these communities, as education is a critical factor for improving employ-

AUTHORS' NOTE: We acknowledge the assistance and suggestions of Rachel Beatty, Karen Polk, and Elias Lopez, as well as the financial support of the University of California, Mexico United States Program, the Julian Samora Research Institute at Michigan State University, and the U.S. Department of Agriculture National Research Grant for the study of Demographic and Economic Transformations of Rural Communities of the Southwest (USDA Agreement No. 94-37401-1266). The authors may be contacted via Rochin at the Julian Samora Research Institute, Michigan State University, E. Lansing, MI 48824 (E-mail: jsamorai@msu.edu).

Hispanic Journal of Behavioral Sciences, Vol. 17 No. 4, November 1995 480-498
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ment and income among Latinos (Bean & Tienda, 1987; Coleman, 1966; Perez & De La Rosa Salazar, 1993).

This article seeks to explore the determinants of educational achievement for both Latino and White children in California’s rural communities. Special emphasis is given to examining the effects of high Latino concentration on academic performance. A background section examines some sociodemographic and educational data about the general trends affecting over 100 rural communities. The second section reviews some of the recent literature regarding Latino academic performance and outlines some theories that explain high or low academic performance in ethnic enclaves. The third section presents the data, methodology, and results of an analysis of primary and secondary school performance in school districts encompassing these rural communities. A discussion section concludes the article with some implications for government policies and public schools.

Background

In their analysis of data from 148 California communities, Rochin and Castillo (1993) documented several demographic transformations sweeping rural places. The Latino population grew in absolute and relative terms. The Latino presence ranged from less than 1% to 23% of population in 1950 and from 15% to 98% in these same communities in 1980. In 1980, 49 of these communities had a majority of Latinos. By 1990, 68 of these communities contained majority Latino populations. Meanwhile, the average population level increased from 2,987 in 1950 to 5,507 in 1980.

In the 1950s and 1960s, the highest concentrations of Latinos were along the U.S./Mexican border. By the 1980s, the highest concentrations had shifted to rural communities in the Central Valley, in particular Kern, Fresno, and Tulare counties. These counties also had the state’s highest rates of urban and rural poverty during the 1980s.

From 1980 to 1990, virtually all of the rural communities in Rochin and Castillo’s study experienced dramatic growth in Latino settlers. What was particularly noticeable during the 1980s was that most rural communities grew in population while the proportion and absolute number of non-Latinos (mostly White) declined significantly. Conversely, the Latino population increased by large amounts in most rural areas.

Following the precedent of Rochin and Castillo (1993), we have labeled communities with majority populations of Latinos colonias. The term is derived from the fact that such places are markedly different from places with fewer Latinos. For example, their cross-sectional regression analysis reveals
that communities with high and increasing proportions of Latinos are relatively poorer and younger and have larger households, higher unemployment, lower educational attainment, and a deteriorating tax base of economic support. More homogenous than urban Latino enclaves, the colonias consist mainly of agricultural workers of Mexican decent. Due to the seasonal nature of farm work, these communities have high seasonal unemployment. Because rural Latinos are relatively younger than rural non-Latinos in California, the school-age population in these communities is disproportionately Latino. Figure 1 illustrates the lower educational attainment levels; it plots the proportion of adults (25 years of age and older) who have completed high school against Latino concentration for 100 rural communities.

Educational attainment levels in the colonias fall significantly below both noncolonia rural communities and the state of California as a whole, using many criteria. In 1990, the average number of school years completed was 9.4 years for those ages 25 or older in the colonias and 12.6 years for those in other rural towns; the overall state average was 12.7 years. In the colonias,
27% had high school diplomas, compared to 61% in the noncolonias and 74% in California as a whole. With respect to the percentage completing 4 years of college, only 3% in the colonias had done so, compared to 9% in other rural towns and a statewide total of 20%.

Rural communities are distinguished by a number of unique characteristics: geographic isolation, dispersion, and relative homogeneity. Due to the isolated nature and dispersion of the colonias, public schools have an added significance. Unlike students in metropolitan school districts, rural students have few alternative schools to attend, and it is rarely possible to bus or transfer students to districts with better resources. Rural communities in California are more homogenous than metropolitan areas with respect to both ethnicity and income levels. Most areas have large proportions of Whites and Latinos, whereas other ethnic groups are scarcely represented. Incomes in rural areas are lower than in metropolitan regions and have less variance.

**Latinos in Public Schools**

*Literature Review*

Although several studies have examined the educational determinants of primarily urban Latinos, few have focused on the distinctive issue of Latino educational performance in rural communities. Fratoe (1981) reported that rural Latinos trail both urban Latinos and Whites in high school and college completion, as well as functional literacy. More recently, Rochin and Castillo (1993) found similar results, as described earlier. These findings, however, are insufficient to draw policy implications unless we can answer further questions about the sources of this poor educational performance. What causes low academic achievement among Latinos? Using primarily urban samples, many previous studies have noted strong negative correlations between the percentage of Latino students and measures of academic performance. In a study using data similar to this one, Espinosa and Ochoa (1986) reported that, in California as a whole, school district average test scores fell as Latino concentration increased. Their analysis, however, used only pairwise correlations (such as the correlation between test scores and Latino concentration in the school district) and did not use multiple regression analysis, which would factor out the biasing effects of other variables (such as poverty, limited English proficiency, and school funding). Jaeger (1987) reported similar findings when focusing on Los Angeles. Orfield (1988) reported an inverse correlation between Black and Latino concentration (combined) and graduation rates. Chapa and Valencia (1993) provided an
analysis of 1990 census data, concluding: "The linkages between school segregation and adverse learning/achievement outcomes are strong. Observed correlations between segregation and educational outcomes are negative and robust" (p. 181). These correlations are not in doubt, as the data speak clearly and consistently. Test scores do fall when Latino concentration increases. However, all of these studies rely on simple pairwise correlations to draw conclusions and thus do not isolate the influence of Latino concentration by holding other variables constant. This method results in specification bias, whereby the effects of other nonincluded variables bias the effect of the included one. Using multiple regression analysis, this study will factor out the competing explanatory variables to educational performance in order to isolate the true influence of Latino concentration and other factors. This will enable us to more accurately answer the question: to what degree can we attribute these low levels of educational performance in rural communities to poverty, to a lack of school resources, to limited English proficiency, and/or to high levels of Latino concentration?

Theories

When adjusted for limited English proficiency, relative poverty, and other factors, the question may be raised as to why high Latino concentration, in and of itself, would affect educational performance. There are numerous theories that provide an answer, hypothesizing either beneficial or deleterious effects of ethnic concentration on education. These theories can be divided into three basic types:

1. Cultural deficiency theories, in which the culture of a subgroup in society inhibits the educational achievements of the members of that subgroup
2. Institutional deficiency theories, where the educational institution inhibits the education of a subgroup
3. Cultural conflict theories, where a conflict in ways of interacting between two subgroups presents an obstacle to members of the less dominant subgroup.

The "culture of poverty" theory, first introduced by Oscar Lewis in 1959, holds that the poor in certain societies may develop their own culture, which has the effect of keeping them poor. Lewis maintained that the poor develop a "sense of resignation and fatalism" (p. clviii) that leads them not to participate in social institutions, such as education.

More recently, William Julius Wilson (1987) added that the underclass, in rejecting the values, attitudes, and beliefs of the larger society, has become increasingly socially isolated. These effects become exacerbated as contact with the middle class diminishes, leaving neighborhoods of only poor fami-
lies. In describing this concentration effect, Wilson stated that "a vicious cycle is perpetuated through the family, through the community, and through the schools" (p. 57).

Thus, if Latinos in the colonias had this culture of poverty, we would expect that a high concentration of Latinos in a school district would cause the average performance level to fall, even when adjusted for the direct effects of poverty. Furthermore, if the few White students in colonias were affected by this culture around them, we might also expect their performance to decline. If this were the case, one possible solution would be to end the de facto segregation and immerse colonia students (both Latino and White) in a predominantly White environment, thus giving them the opportunity to absorb new cultural values.

The "institutional bias" theory attributes lower academic performance to institutional discrimination. Minorities may be discriminated against in schools through such avenues as academic tracking (e.g., placement into honors or remedial classes) or disciplinary procedures (such as suspension or expulsion). Meier, Stewart, and England (1989) provided insight into the obstacles that such discrimination may cause for minority students. Focusing on African American students, their study found that a high percentage of minority teachers was the most important variable in reducing discrimination.

This theory yields ambiguous results with regard to the effect of high Latino concentrations on the average academic performance in a school district. If the institution (in this case, the school district) has predominately White teachers and administrators, we would expect the discrimination to hinder the education of Latinos, while leaving the education of Whites unimpeded. On the other hand, if the school district is dominated by local Latino influences, we would expect the opposite results.

The "cultural capital theory" states that schools use particular linguistic structures, authority patterns, and types of curricula and that cultural experiences in the home facilitate the children's adjustment to school and academic achievement (Lareau, 1987, p. 74). Such social capital is independent of economic class (McGraw, 1992). This theory is often employed in the context of White students only, with cultural capital associated with a child's familiarity with classical music or literature (DiMaggio, 1982). It is argued that teachers will give more attention and favorable treatment to students exhibiting this capital.

In the context of rural colonias, however, cultural capital may be associated with specific attributes of the Latino community. Thus students familiar with the authority patterns and expectations of the Latino subculture will be more successful than students who are unfamiliar with it. These students
would then be victims of a cultural clash, which would be an obstacle to their education. Under this theory, cultural clash would decrease as Latino concentration increased. Thus, we would expect a high concentration of Latinos, like the situation in colonias, to benefit Latino students but to cause cultural clash problems for White students. The reverse would be true in schools that are predominantly White.

A Conceptual Framework

Conceptually, we can model these hypothesized relationships with the equation below:

\[
\text{EDUCATIONAL ACHIEVEMENT} = f(\text{CP, IB, CC, OTHER})
\]

where CP = culture of poverty effect, IB = institutional bias effect, CC = cultural capital effect, and OTHER = other effects (such as socioeconomic background, English proficiency, and school funding). We can now hypothesize about the effects of the variables on educational achievement. For Latino students, we would expect CP and IB to negatively affect their achievement (assuming the institution is White-dominated and biased against Latinos; the effect of IB would be positive if the institution was Latino-dominated). Because these variables are related to Latino concentration, CP and IB would have greater effects with increased segregation. CC would have a negative impact with low concentrations of Latinos, when culture clash would impede the education of Latino students, but it might have a positive impact with high concentrations. For White students, we would expect the opposite signs, except for CP, which would also be negative when Latino concentrations are high, as the White students would fall under the sway of the dominant culture.

In practice, measuring CP, IB, and CC is highly subjective. This study does not attempt to directly measure such things as cultural capital or discrimination. However, because all of these effects are related to and affected by Latino concentration (%LAT), we can demonstrate support for a theory by measuring the qualitative effect of %LAT on academic achievement. That is, whether %LAT positively or negatively affects Latino or White educational performance will either lend support to or build evidence against each of the theories. Thus we can now check each theory using variables that are relatively easily measured. We begin by dividing our equation into two simplified and objective equations:

\[
\text{LATINO EDUCATIONAL ACHIEVEMENT} = f(\%\text{LAT, OTHER})
\]

\[
\text{WHITE EDUCATION ACHIEVEMENT} = g(\%\text{LAT, OTHER})
\]
Table 1. Hypotheses of Various Theories: The Effects of Increased Latino Concentration on Academic Performance

<table>
<thead>
<tr>
<th>Student Group</th>
<th>Culture of Poverty Theory</th>
<th>Institutional Bias Theory (White dominated)</th>
<th>Institutional Bias Theory (Latino dominated)</th>
<th>Cultural Capital Theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latinos</td>
<td>–</td>
<td>–</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Whites</td>
<td>–</td>
<td>+</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

+ Positive effect (high concentrations of Latinos lead to increased academic performance). 
– Negative effect (high concentrations of Latinos lead to decreased academic performance).

For example, if %LAT has a positive impact on Latino students and a negative impact on White students (i.e. the academic performance of Latino students improves as Latino concentration increases, but the performance of White students declines), the cultural capital theory provides a reasonable explanation (assuming Latino-dominated culture). Table 1 summarizes this two-equation model by stating the hypothesized effect of a high concentration of Latino students on Latino and White academic performance, according to each theory.

The Study

Data

Our conceptual model suggests that educational performance is a function of a host of objective and subjective variables: cultural values, discrimination, cultural capital, and other factors (socioeconomic status, language proficiency, and educational resources). Our operational model replaces the more subjective variables with Latino concentration, which will allow us to either support or refute the theories, as described above. This leaves us with four fairly objective explanatory variables: Latino concentration, socioeconomic status, language proficiency, and educational resources. Even here, however, our analysis is limited by the available data, which serves as a proxy for these variables.

In order to compare the academic performances of both Latino and White primary and secondary school students, CAP reading and math scores were used. These are the results of a standardized test (administered by the California Assessment Program, a division of the state Department of Education) given to all California public school students in Grades 3, 6, and 12.
(California State Department of Education, 1990). The test is administered in English only and seeks to examine reading and math skills. The test uses a scaled score system ranging from 100 to 400, with a statewide average score of 250. The results used in this study were districtwide averages, as individual scores were not public information. However, as Espinosa and Ochoa (1986) demonstrated, CAP data are a rich source of information. The scores can be categorized by ethnic group, enabling us to collect data on the average reading and math scores for each ethnic group at each grade level in each school district.

Moreover, the CAP scores contain data on most of our explanatory variables, and may be categorized according to them. Socioeconomic status (SES) is indirectly recorded in the data and measured in different ways depending on the grade level. In Grades 3 and 6, it is measured by the teacher rating of parental occupation on a scale of 1 to 3. In the 12th grade, it is based on student reports of their parents’ level of education on a scale of 1-5. English-language proficiency is measured by the percentage of test takers who are identified by the teacher as “of limited English proficiency” (LEP). Cultural values, discrimination, and cultural capital are all analyzed using the hypotheses above regarding the objective qualitative changes in Latino and White CAP scores with regard to the percentage of Latino students in each school district (%LAT), as outlined in Table 1. For example, if %LAT is found to have a negative effect on both Latino and White test scores, the culture of poverty theory will have been validated.

Educational resources are examined using expenditures per student ($EXP) for each school district. School district expenditures were obtained from the Annual Report of Financial Transactions Concerning School Districts in California. Average expenditure per student was calculated by dividing the total expenditures from each school district’s General Fund by the average daily attendance.

The CAP scores and expenditure data are from the school year 1988-1989, whereas the data for socioeconomic status, English proficiency, and percentage of Latino students are from 1989-1990.

Because of the need for complete data, the sample was limited to 47 school districts for Grades 3 and 6 and 66 school districts for Grade 12. The districts are scattered throughout the state. The number of test takers within each district ranged from 5 to 1,525.

The means and standard deviations of the variables are presented in Table 2. The most interesting fact highlighted here is the gap between White and Latino test scores. Recalling that the statewide average score is 250, almost all the Latino scores are below the state average, whereas the White scores
Table 2. Means and Standard Deviations

<table>
<thead>
<tr>
<th>Variable</th>
<th>Grade 3 (n = 47)</th>
<th>Grade 6 (n = 47)</th>
<th>Grade 12 (n = 66)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>CAP-LR</td>
<td>233.9</td>
<td>25.7</td>
<td>217.3</td>
</tr>
<tr>
<td>CAP-LM</td>
<td>251.1</td>
<td>25.8</td>
<td>229.8</td>
</tr>
<tr>
<td>CAP-WR</td>
<td>275.3</td>
<td>45.5</td>
<td>267.2</td>
</tr>
<tr>
<td>CAP-WM</td>
<td>286.5</td>
<td>29.4</td>
<td>272.9</td>
</tr>
<tr>
<td>SES</td>
<td>1.8</td>
<td>0.3</td>
<td>1.8</td>
</tr>
<tr>
<td>LEP</td>
<td>16.8</td>
<td>16.7</td>
<td>13.5</td>
</tr>
<tr>
<td>%LAT</td>
<td>51.7</td>
<td>23.9</td>
<td>51.6</td>
</tr>
<tr>
<td>$EXP</td>
<td>3808.6</td>
<td>766.5</td>
<td>3802.7</td>
</tr>
</tbody>
</table>


are above it. Valencia and Aburto (1991) provided an overview of cultural bias in standardized tests, as this is one possible explanation for the discrepancy between the scores. Note also that the gap between the scores widens over time. The White mean math score exceeds the Latino score by 35.4 points in Grade 3 and by 57.7 points in Grade 12. For reading scores, the gap is 41.4 points in Grade 3 and 68.9 points in Grade 12. This phenomenon is reported by Gandara (1989). Another interesting observation is that all the test scores fall with time, implying that the academic performance of rural students falls relative to that of urban students as the students get older. A final observation is that the standard deviations of the test scores tend to increase with grade level, whereas the standard deviations of the dependent variables decrease with grade level. Thus, the test scores vary more at higher grades, even though the students become more homogenous. Although these data come from a cross section of students and do not follow the same students as they grow older, they support the notion that other factors influence students in the higher grades. Because these other factors are not specified in our model, our ability to test hypotheses decreases.

Methodology

Because we were able to separate the data into two academic subjects (reading and math) and three grade levels, 12 regressions were estimated according to the following model:

\[ \text{CAP}_{ijk} = \beta_0 + \beta_1 \text{SES} + \beta_2 \text{LEP} + \beta_3 \% \text{LAT} + \beta_4 \$ \text{EXP} + \epsilon \]
(where \(i = \text{ethnic group}, j = \text{academic subject}, k = \text{grade level}\)). The hypothesized signs of the coefficients are \(\beta_1 > 0, \beta_2 < 0, \text{and} \beta_4 > 0\), whereas the hypothesized sign of \(\beta_3\) is ambiguous, due to the conflicting theories presented earlier.

It is important to note a few inherent biases in the data. In reality, the socioeconomic status of members in a community is a continuous variable with a wide range. When measured by a few ordinal categories (such as a scale of 1 to 3 or 1 to 5), its variance is artificially reduced and an arbitrary scaling is imposed. For example, if a student has a parent who is a doctor, SES would be reported as 3 (using the scale for Grades 3 and 6), whereas if the parent was a farm worker, SES would be reported as 1. However, the doctor may receive well in excess of three times the wages of the farm worker. If this is the case in general, then the SES averages used in the regressions are biased downward and, more important, do not reflect the true variation in SES among communities.

Another limitation of the data is that SES and LEP are not disaggregated by ethnic group. Thus the same districtwide average of these variables is used in all CAP regressions, regardless of the ethnicity of the students. Thus, if few Whites are of limited English proficiency but a large number of Latinos are, the overall average LEP will be used in the regressions regarding both Latino and White CAP scores. In this case, LEP would be biased upward in the White regressions and downward in the Latino regressions. In general, we expect this to be the case. Furthermore, if White students have a higher SES than Latino students in their district, SES would be biased downward in the White regressions and upward in the Latino regressions. It is also important to note that dropout rates are not included. Thus the CAP scores are inherently biased upward (particularly in Grade 12) because the worst students are no longer attending school, and thus do not participate in the test. Due to the fact that the data points are group averages from groups of differing sizes (depending on the number of students in each school district), the errors in the regressions are heteroskedastic, which leads to a biased estimate of the covariance matrix and incorrect inferences. This problem was corrected by the standard procedure of multiplying all data by the square root of the dependent variable (Green, 1990).

A second problem of estimating a regression from group averages as opposed to the individual data is that the estimates are inefficient; that is, they have a larger variance (Green, 1990). The consequence is an increase in the probability of a Type I error, rejecting a hypothesis when it is true. The magnitude of the inefficiency depends on the size of the intragroup variances relative to the intergroup variances. Note, however, that the variables \%LAT
Table 3. Correlations of Dependent Variables

<table>
<thead>
<tr>
<th></th>
<th>Grade 3</th>
<th>Grade 6</th>
<th>Grade 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAP-LR, CAP-LM</td>
<td>.65</td>
<td>.92</td>
<td>.51</td>
</tr>
<tr>
<td>CAP-LR, CAP-WR</td>
<td>.45</td>
<td>.24</td>
<td>.17</td>
</tr>
<tr>
<td>CAP-LR, CAP-WM</td>
<td>.25</td>
<td>.25</td>
<td>.06</td>
</tr>
<tr>
<td>CAP-WR, CAP-WM</td>
<td>.11</td>
<td>.44</td>
<td>.85</td>
</tr>
<tr>
<td>CAP-WR, CAP-LM</td>
<td>.36</td>
<td>.22</td>
<td>.17</td>
</tr>
<tr>
<td>CAP-LM, CAP-WM</td>
<td>.43</td>
<td>.29</td>
<td>.24</td>
</tr>
</tbody>
</table>


and $\$EXP$ are the same for all observations in each school district and grade level. As a consequence, there is no loss in efficiency from these variables in estimating the regression using the averages (because the intragroup variance is equal to zero). The sources of inefficiency are the grouping of the variables SES and LEP. The only way in which the grouping can affect the variances of the other variables' coefficients is through their covariances; but again, because those two variables are constant for each observation in each group, their intragroup covariances with SES and LEP are zero.

The inefficiency does not affect our conclusions with respect to the significant variables; they will remain significant even when individual data are used in estimation. It may affect, however, the hypothesis testing with respect to the nonsignificant variables. As a result of a smaller variance, they may become significant. Two reasons lead us to think, however, that this is not the case: (a) the intragroup variances of SES, LEP, and the other variables are zero; b) apart from the constants, all the variables that were nonsignificant have very low $t$-statistics. In order to become significant, in most cases their variances would have to fall to less than half of their estimated value. We attach a very low probability to this event. Multicollinearity is also a problem in some of the regressions. The presence of strong multicollinearity between these variables increases their variances, inhibiting hypothesis testing. The problem was solved using the standard principal components method and the test proposed by Mundlak (1981) to determine the number of principal components to be retained in the regression.

Table 3 shows the correlations between the dependent variables at each grade level. With the exception of Grade 3, the strongest correlations are between math and reading scores from the same ethnic group (i.e., Latino math and reading scores are highly correlated, as are White math and reading scores), indicating that test scores are more affected by ethnicity than subject matter.
<table>
<thead>
<tr>
<th>Grade 3</th>
<th>CAP-LR</th>
<th>CAP-LM</th>
<th>CAP-WR</th>
<th>CAP-WM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>(t-statistic)</td>
<td>Coefficient</td>
<td>(t-statistic)</td>
</tr>
<tr>
<td>SES</td>
<td>80.7</td>
<td>.60</td>
<td>77.6</td>
<td>.54</td>
</tr>
<tr>
<td></td>
<td>(7.4)</td>
<td>(6.0)</td>
<td>(7.2)</td>
<td>(5.4)</td>
</tr>
<tr>
<td>LEP</td>
<td>-.13</td>
<td>-.01</td>
<td>-.33</td>
<td>-.02</td>
</tr>
<tr>
<td></td>
<td>(-.7)</td>
<td>(-1.5)</td>
<td>(12.5)</td>
<td>(9.7)</td>
</tr>
<tr>
<td>%LAT</td>
<td>1.20</td>
<td>.28</td>
<td>1.57</td>
<td>.34</td>
</tr>
<tr>
<td></td>
<td>(6.2)</td>
<td>(6.9)</td>
<td>(7.0)</td>
<td>(5.4)</td>
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<td>$EXP</td>
<td>.01</td>
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<td>.16</td>
</tr>
<tr>
<td></td>
<td>(2.5)</td>
<td>(2.3)</td>
<td>(3.9)</td>
<td>(3.1)</td>
</tr>
<tr>
<td>Constant</td>
<td>-48.2</td>
<td>-.02</td>
<td>-32.7</td>
<td>-.01</td>
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<td></td>
<td>(-6.6)</td>
<td>(-4.4)</td>
<td>(-2.6)</td>
<td>(-1.3)</td>
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<td>$L^2$</td>
<td>.97</td>
<td>.96</td>
<td>.97</td>
<td>.98</td>
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<tr>
<td>Statistical rank</td>
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<td>4</td>
<td>2</td>
<td>2</td>
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<table>
<thead>
<tr>
<th>Grade 6</th>
<th>CAP-LR</th>
<th>CAP-LM</th>
<th>CAP-WR</th>
<th>CAP-WM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>(t-statistic)</td>
<td>Coefficient</td>
<td>(t-statistic)</td>
</tr>
<tr>
<td>SES</td>
<td>89.5</td>
<td>.69</td>
<td>96.3</td>
<td>.71</td>
</tr>
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Results

The results of all 12 regressions are provided in Table 4. The coefficients of the estimated equations record the absolute change in the dependent variable (at the top of each column) induced by a one-unit increase of the independent variable, holding all other variables constant. Due to the correction for multicollinearity, the reported coefficients represent the net effect of each variable. The t-statistics are given in parentheses. This is the closest to a controlled experiment that can be achieved in most socioeconomic analyses. For example, the first column of Table 4 for Grade 3 says that an increase of one unit of SES led to an increase in the Latino reading score of 80.7 points; that LEP had no effect on the reading score (because the t-statistic is too small); that an increase of 1% in the proportion of Latino students in the classroom led to a 1.2-point increase in reading scores; and that an additional dollar of funding led to a .01-point increase. Note that the size of the coefficients is affected by the measurement units of the variables and, therefore, cannot be interpreted as an indication of the relative importance of each variable. A more accurate measure of the relative importance of each variable is the elasticity at the mean, as it is independent of the units of measurement.5

In general, SES was the most significant and dominant predictor of high CAP scores; %LAT was also correlated with high CAP scores (for both Latinos and Whites), although its effect was much smaller. LEP and $EXP had insignificant or negligible effects on the test scores.

Discussion

The most striking result is the large and significant positive influence of SES in all 12 regressions. Recalling that SES measures parental occupation for Grades 3 and 6 and parental education for Grade 12, it appears that parents who have themselves invested heavily in human capital will cause similar behavior in their children. This finding is in keeping with a wealth of economic and sociological literature supporting the notion that parents will promote academic achievement in both active and passive ways, both through participation in school and cultural activities and as a role model (Becker, 1991; Lareau, 1987; Rumberger, Ghatak, Paulos, Ritter, & Dornbusch, 1990).

LEP had little or no effect on CAP scores. In cases where the t-statistic is significant, the elasticity is so small that the effect is minuscule. For instance, the coefficients of about 0.4 for the Grade 6 regressions imply that a 10% increase in the percentage of students with limited English proficiency was associated with a 4-point increase in CAP scores. We can only speculate as
to why the coefficients, small as they are, are positive. Perhaps students in school districts with lots of limited-English speakers receive extra attention. On the other hand, students with limited English skills may be excluded from the test, thus biasing the scores. A further study more closely examining students on an individual level is required to clarify this question.

Orfield (1992) reported that Latinos were the most segregated ethnic group in the nation’s schools. Here, high concentration of Latinos (%LAT) had a significant and positive effect on both White and Latino test scores. For all grades and subjects, a 10% increase in the percentage of Latino students was associated with a 6- to 12-point increase in CAP scores. Comparing the coefficients across equations, %LAT seems to benefit Latinos more than Whites in Grade 3; and, surprisingly, it benefits White students more by Grade 12.

Now that our regression analysis has determined the qualitative effect of %LAT on Latino and White test scores, with the effects of SES, LEP, and $EXP weeded out, we can return to Table 1 and ask which of the various theories is validated by the results. However, the result that %LAT had a positive effect on both Latino and White test scores was not predicted by any of the theories outlined in Table 1. We can only speculate about the reasons for this unexpected result. Previous studies have almost always found %LAT to have a negative influence on at least Latino academic performance. Those studies differed from this one in two ways:

1. They relied on simple pairwise correlations rather than multiple regression analysis, and thus did not weed out the effects of other variables.
2. They used primarily urban schools in their samples.

Further study examining the effects of Latino concentration is clearly needed. We recommend subjecting the urban samples to more rigorous statistical analysis and examining the rural enclaves of this study at a more detailed level, such as individual student performances (as opposed to districtwide averages).

For now, we can only speculate as to the causes for the results from this rural sample. One possibility is that Latino students perform better in more segregated enclaves due to cultural capital but that the few White students in these enclaves also perform better due to preferential treatment from teachers (the majority of whom are White). Another possibility is that a different culture is operative in the colonias, where the communities have unusually high Latino concentrations. Turning the culture of poverty theory around, it may be that the Latino culture exerts a positive influence to excel in school, despite the relatively lower incomes of Latinos. Jones (1993, p. 247) posited a culture of achievement among the poor and described parents who at-
tempted to instill attitudes in their children that would encourage them to succeed despite social and political constraints.

Expenditures per student ($\text{EXP}$) exerted a significant and small positive influence for all students in Grade 3, although its coefficient was stronger for Whites. In Grade 6, $\text{EXP}$ was significant only for White students. By Grade 12, the $t$-statistics were not significant and $\text{EXP}$ had no effect. The result implies that the marginal productivity of resources invested in public education (as measured by CAP scores) is zero in Grade 12 but positive in early school life. This result may arise from diminishing returns of expenditure in the learning process. At Grade 3, students have been exposed to very little formal education, and the marginal productivity of additional resources is very high. In Grade 12, the students are well advanced in their studies, and the marginal productivity is very low. Another interpretation may be that additional resources in high school are spent funding programs that enhance students’ learning experience in other ways (e.g., music, art, athletics), ways not reflected in CAP scores. A final interpretation is that by Grade 12, students are more involved in the job market, and outside influences predominantly affect their test scores. It is also important to note that expenditures benefited White students more than Latino students. This may be a result of discrimination or perhaps an ability of wealthier students to take greater advantage of additional resources. Even where $\text{EXP}$ was significant, however, the elasticities were very small, implying that additional funding at these expenditure levels does little to improve CAP scores.

To the extent that CAP scores are an accurate measure of academic performance, the results of this study have some implications for education policy. Due to the strength of the SES coefficients, we can say with confidence that the education level and income of parents is the most important determinant of educational performance. Thus any government policy seeking to improve student achievement level must focus on the welfare of the community at large and not just the schools.

Policy recommendations with regard to LEP or %LAT would be premature at this point. Limited English proficiency seems to have no effect on academic performance. However, for reasons mentioned above, this result requires further study. Likewise, the unusual result that high Latino concentrations are associated with improved test scores in rural towns requires further study, as specified above. At the most, we can no longer assume that high Latino concentration is detrimental to learning in rural areas.

The results also show that additional school funding has a negligible effect on education (when measured by CAP scores). This is not to say that additional funding for extracurricular activities would not be beneficial, as we may want to measure education by criteria other than test scores. Further-
more, we cannot conclude that expenditure cuts would not have a detrimental impact. Note that the elasticities reported are only applicable for the sample mean. At low levels of funding, the elasticity of $\text{EXP}$ may be substantially higher. Thus we cannot say that decreased funding would not hurt education; instead, we can only say that increased funding would not be likely to increase test scores.

In conclusion, this study raises more questions than it answers with regard to the effect of Latino concentration on academic performance, as none of the usual theories regarding ethnic enclaves were validated by the results. This study does demonstrate, however, that the most important route to improved academic performance for both White and Latino students in rural California is through measures that improve the socioeconomic status of parents.

Notes

1. Thus the SES regression coefficients reported for the Grade 3 and 6 scores cannot be directly compared to the SES Grade 12 coefficients. They can be compared, however, when converted to elasticities. This and other issues regarding SES will be discussed in the methodology and results sections.

2. In a personal conversation, experts at the California State Department of Education indicated that these variables changed very little from year to year and, also, that their variations are small relative to the variations between school districts.

3. Recall that the $t$-statistic is calculated as $t = \hat{\beta}/\sigma$, where $\hat{\beta}$ is the estimated coefficient and $\sigma$ is its estimated variance.

4. The basic idea is to diagonalize the matrix of regressors by pre- and postmultiplying it by the matrix of eigenvectors. Then the dependent variable is regressed on the diagonalized matrix containing the eigenvalues on its main diagonal. The coefficients thus obtained are independent from each other and consequently, their statistics are not affected by the set of variables included. This allows us to conduct sequential tests on the estimates without affecting their significance level. In this way, it is possible to identify the coefficients of the modified regression that are statistically not different from zero. The next step is to delete the columns from the matrix of eigenvectors corresponding to nonsignificant eigenvalues and multiply this reduced matrix by the vector of modified coefficients to retrieve the coefficients of the original regressors freed of the multicollinearity problems.

5. The elasticity is defined as the percentage change in the dependent variable associated with a 1% increase in the independent variable, holding all other variables constant. These elasticities are valid only at the mean values, as the elasticities will change over the sample range.

References


Steve Hampton is a Ph.D. student in agricultural economics at the University of California at Davis. His work has included poverty issues relating to minority groups in California, as well as development and natural resource use in developing nations. He and Rochin have recently co-authored a working paper analyzing Mexican American entrepreneurship in rural California.

Javier M. Ekboir is a postdoctoral researcher at the Department of Agricultural Economics at UC Davis. His work is related to investment in physical and human capital under uncertainty, development, and technical change.

Refugio I. Rochin, Professor Emeritus of agricultural economics and chicanos studies at UC Davis, is also Director of the Julian Samora Research Institute and professor of agricultural economics and sociology at Michigan State University. He also serves the national Board of Economists of Hispanic Business magazine. His most recent publications are “Rural Latinos: Evolving Conditions and Issues” in The American Countryside and, with Monica Castillo, “Immigration and ‘Colonia’ Formation in Rural California” in Immigration Reform and U.S. Agriculture.