

Issues Paper:
Evidence from a Study of Vouchers for Private Schooling in Colombia*

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Colombia's PACES program provided over 125,000 pupils from poor neighborhoods with vouchers that covered approximately half the cost of private secondary school. Vouchers were renewable annually based on satisfactory performance. Since many vouchers were allocated by lottery, we use differences in outcomes between lottery winners and losers to assess program effects. Three years into the program, lottery winners were 15 percentage points more likely to have attended private school, had completed .1 more years of schooling, and were about 10 percentage points more likely to have finished 8th grade, primarily because they were less likely to repeat grades. The program did not significantly affect dropout rates. Lottery winners scored .2 standard deviations higher on standardized tests. There is some evidence that winners worked less than losers and were less likely to marry or cohabit as teenagers. On average, lottery winners increased their educational expenditure by about 70% of the value of the voucher. Since winners also worked less, they devoted more total resources to education. Compared to an equivalent expansion of the public education system, the voucher program increased annual government educational expenditure by about \$24 per winner. But the costs to the government and to participants were probably much less than the increase in winners' earnings due to greater educational attainment.

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Background

The Colombian government established the PACES program in late 1991 as part of a wider decentralization effort and in an attempt to expand private provision of public services (King *et al*, 1997). The program was also motivated as an effort to quickly expand school capacity and to raise secondary school enrollment rates (King, Orazem, and Wolgemuth, 1998). The PACES program targeted low-income families by offering vouchers only to children residing in neighborhoods classified as falling into the two lowest socioeconomic strata (out of 6 possible strata). Studies by Morales-Cobo (1993) and Ribero and Tenjo (1997) suggests that the targeting was largely effective in Bogota.

PACES vouchers were worth only about US\$190 at the time of our survey. The maximum voucher value was set initially to correspond to the average tuition of low-to-middle cost private schools in Colombia's three largest cities. Schools charging less than the vouchers' face value received only their usual tuition. PACES vouchers became less generous over time because they did not keep up with inflation. Our survey data show matriculation and monthly fees for private schools attended by voucher applicants in 1998 averaged about \$340, so most voucher recipients supplemented the voucher with private funds. By way of comparison, the average annual per-pupil public expenditure in Colombia's public secondary school system in 1995 was just over \$350 (DNP, 1999), and public school parents in our sample typically paid tuition or fees of roughly \$58. Per capita GNP in Colombia is now around \$2,280 (World Bank, 1999).

To qualify for a voucher, applicants must have been entering the Colombian secondary school cycle which begins with grade 6, and be aged 15 or under. Prior to applying, students must already have been admitted to a participating secondary school (i.e., one that would accept the voucher).³ Just under half of private schools in the 10 largest cities accepted vouchers in 1993. Participating schools tended to serve lower-income pupils, and to have lower tuition than non-participating private schools. Relatively elite private schools appeared to opt-out of the PACES program. The number of vouchers in use in any one year peaked at roughly 90,000 in 1994 and 1995.

Vouchers could be renewed as long as students maintained satisfactory academic performance and were

³Background information in this section is taken from King *et al* (1997), Calderon (1996), and unpublished ICETEX documents.

not required to repeat a grade. Since vouchers were awarded by lottery when the number of applicants exceeded the number of vouchers, we use a quasi-experimental research design comparing educational and other outcomes of lottery winners and losers. Subject to a variety of caveats, the resulting estimates provide evidence on program effects on participants that are similar to those arising from a randomized trial.

Impact on Scholarship Use, School Choice, and Schooling

There is little evidence of any association between win/loss status and the individual characteristics measured in our data, which provides reassurance that vouchers were indeed awarded randomly.

The survey of the three applicant cohorts shows no significant differences between lottery winners and losers in enrollment three years after application, with most pupils in both the winner and loser groups still in school. At the time of the survey, enrollment rates were .83 for losers and .85 for winners in the Bogota-95 sample, an insignificant difference. Most PACES applicants entered 6th grade in a private secondary school, and most finished 6th grade whether or not they won a voucher. But lottery winners were 6-7 percentage points more likely than losers to have begun 6th grade in private school, and 15-16 percentage points more likely to be in private school at the time of our survey. The effect of winning the PACES lottery on the probability of private school attendance was even larger in 7th grade, probably because losers were more likely to have left private school by then.

These results suggest the decision between public and private school was sensitive to variation in the price of private school induced by the program, while the decision whether to attend school was not. This is consistent with a model in which those households most willing and able to pay for education attend private school; a middle group attends public school; and those least willing or able to pay do not attend at all. In this case, no one is on the private school/no school margin, and so small subsidies to private education do not directly increase overall enrollment. However, since many public schools in Colombia were turning away applicants due to overcrowding, PACES is likely to have opened up places in public school for other pupils by reducing public-school queuing.

Lottery winners completed more schooling than losers, and were less likely to repeat grades. For example, lottery losers had completed 7.5 years of schooling at the time of our survey, but winners in the 1995 Bogota sample completed an additional .12-16 years (.8 years in the full sample). Moreover, lottery winners were about 10 percentage points more likely than losers to have completed 8th grade, primarily because they repeated fewer grades. The effect on years of schooling and the lack of an effect on enrollment is primarily the result of a reduced probability of grade repetition for winners. The probability of grade repetition was reduced by 5-6 percentage points for lottery winners. Figures from Calderon (1996) show that, on average, 77% of recipients renewed their vouchers, and estimates from our data are similar. By way of comparison, the national high school promotion rate was about 70%.

Separate results by sex show moderately larger effects on educational attainment for girls. It should also be noted that while effects for boys are almost entirely due to grade repetition, the effects for girls appear to come from both reduced grade repetition and additional time spent in school.

The greater probability of 8th grade completion and lower repetition rates for lottery winners seem like desirable outcomes. In fact, high rates of grade repetition in Latin America are widely seen as symptomatic of poorly functioning public schools.¹³ But the interpretation of these effects is complicated by the fact that pupils who failed a grade were supposed to forfeit PACES vouchers. Private schools may therefore have had an incentive to promote pupils with vouchers even if their performance did not meet normal promotional standards. To explore this possibility, we look at effects on test scores and non-educational outcomes.

Effects on Test Scores and Non-Educational Outcomes

We administered achievement tests to a subset of the pupils surveyed. We tested children from the 1995 applicant cohort in three Bogota neighborhoods. The tests were administered in 1999, approximately one year after our household survey and three years after the children applied for the program. The test sample was drawn from applicants for whom we had survey data. Of the 473 invited, 283 were tested, an overall response

¹³ For example, Psacharopoulos and Velez (1993) and Harbison and Hanushek (1992) use repetition rates as a measure of school quality in Colombia and Brazil.

rate of about 60%. The test-response rate is about 5% higher for winners, but the difference in response rates by voucher status is not statistically significant. The personal characteristics of those tested are generally similar to those of the full Bogota 95 sample. Our evaluation used *La Prueba de Realizacion*, a grade-specific multiple-choice achievement test for native Spanish speakers.

Lottery winners scored just over .2 standard deviations more than lottery losers, though this difference is (not surprisingly, given the small test sample) only marginally significant. According to US norms for *La Prueba*, 2/10 of a standard deviation is roughly the score gain associated with one additional school year (Cole *et al*, 1993). This effect should probably therefore be seen as large, since subjects were tested three years after applying to the program. The effect on girls is larger and more precisely estimated than the effect on boys.

Earlier we noted that reduced grade repetition among lottery winners could theoretically have been caused by a reduction in promotion standards for lottery winners, as well as by increased learning or a change in school quality. Comparing the test scores of winners and losers who were promoted provides evidence that the grade repetition results are not due solely to schools' lowering the bar for promotion of winners. If the program itself did not affect achievement, but did lead schools to relax promotions standards for winners, then average test scores for lottery winners who were promoted should be lower than average test scores for lottery losers who were promoted. In fact, the composite test scores of winners who were promoted are about .14 standard deviations *greater* than the scores of promoted losers, although the difference is not significant.

Another possible channel through which the program could have reduced grade repetition is increased effort by voucher recipients in order to avoid failing a grade and losing their vouchers. In this scenario, the program would have been just as successful if it had made payment to students conditional on satisfactory academic performance, with no element of school choice. This would imply that the primary incentive effect should be on those who are near the margin for passing on to the next grade. However, quantile regression estimates (not reported here) suggest that the increase in test scores is not confined to low quantiles of the test score distribution.

In addition to increased educational attainment and academic achievement, there is also some evidence that the voucher program affected non-educational outcomes. In particular, lottery winners were less likely to be

married or cohabiting and worked about 1.2 fewer hours per week (again, mostly a difference for girls). The reduction in work may be due to income effects for the household, the greater time demands of private school relative to public school, or increased incentives for lottery winners to spend time studying so as to avoid failing a grade and losing the PACES voucher. Both of these results suggest an increased focus on schooling among lottery winners.

Impact on Household and Government Expenditure

Most lottery winners would have attended private school anyway, at least for a few years, and therefore reduced their educational expenditure in response to the program. On the other hand, voucher winners who were induced to switch from public to private schools greatly increased their educational expenditure, since the voucher covered only about half the cost of private school. On balance, winners' gross school fees exceeded those of losers by about 70% of the amount they received from the voucher. Winners paid greater fees because they were more likely to go to private schools, and because some winners who would have gone to private schools anyway switched to more expensive private schools. Moreover, lottery winners worked less, so that, on balance, households winning the lottery actually devoted more resources to education than the voucher face value.

Winning households' additional net resource contribution to education was \$52 (additional school fees) + \$41 (reduced earnings) - \$74 (voucher) = \$19. . We also estimate that the voucher program cost the government about \$24 more per winner than the cost of creating a public school placement. This implies that the society-wide additional educational resource cost per lottery winner was approximately \$24 (government) + \$19 (households) = \$43. The comparison of costs and benefits should take account of the fact that three years of costs were incurred prior to our survey. The total cost of the program can therefore be estimated by multiplying the annual resource cost times the roughly 3 years winners received vouchers, for a total of about $3 \times 24 = \$72$ in additional public educational expenditure and $3 \times \$43 = \129 in total societal resource cost. Actual costs are probably somewhat higher, however, since voucher take-up rates declined over time, with 88% of winners having ever used a voucher, and only 49% using it in the survey year. Multiplying costs by 88%/49% for the first and second years yields an upper bound on the three-year cost of the program of about \$195 using the \$43/year figure for

social costs.

These costs are very likely small relative to the benefits for participants. Although lottery winners gave up current earnings, they completed an additional .12 to .16 grades and scored approximately .2 standard deviations higher on tests, which may account for an achievement gain from winning the lottery as large as that associated with a full year of schooling. Our estimates using a recent Colombian labor force survey show returns to schooling of about 10%. If the gain from the program is only the economic return to an additional 0.12 years of schooling, the program raised winners' wages by 1.2% per year, whereas if it is equal to that from a full year of schooling it raised wages by 10%. Annual earnings of parents in our sample were about \$2,400 per worker, and PACES applicants should be able to earn more, since the average parent had only 5.9 years of education while the average applicant had already completed 7.5 years and was still in school at the time of our survey. We therefore assume the expected earnings of applicants are \$3000. Thus, PACES seems very likely to raise lottery winners' wages by \$36 per year, and might raise wages by as much as \$300 per year if higher test scores have a grade-equivalent payoff. Discounted over applicants working lives, these benefits easily outweigh the social costs of providing additional school places through the PACES voucher system. These costs to participants and the government are likely to have been more than outweighed by the benefits of the voucher to participants -- in the form of the economic return to increased educational attainment and test scores.

A more complete cost-benefit analysis would take into account the program's effects on non-participants. Pupils left behind in public schools may have been hurt by the departure of motivated classmates for private schools, as argued by Hsieh and Urqiola (2001), or alternatively, public schools may have responded positively to increased competition, a possibility considered by Hoxby (2000) and Bettinger (2001). Such general equilibrium effects cannot be assessed by comparing lottery winners and losers. But since the cost-benefit analysis for participants is clear-cut, and since only 15% of winners moved from public to private schools, any negative external effects on non-participants would have to have been extraordinarily large to outweigh program benefits.

Conclusions

Governments in many developing countries are increasingly willing to experiment with demand-side subsidies and public-private partnerships to meet basic education needs. The impact of these programs and policy innovations is an open question. Colombia's PACES program provides an unusual opportunity to assess the effect of demand-side education financing in a Latin American country where private schools educate a substantial fraction of pupils. The PACES program is of special interest because many vouchers were assigned by lottery, so program effects can be reliably assessed. Our results suggest that lottery winners benefited from higher educational attainment, primarily as a consequence of reduced grade repetition, as well as from higher test scores and a lower probability of teen cohabitation or employment. Our estimates of the economic benefits to participants far exceed the estimated costs. Most of the results suggest PACES vouchers had a stronger effect on the education of girls than on the education of boys.

Our findings suggest that demand-side programs like PACES can be a cost-effective way to increase educational attainment and academic achievement, at least in countries like Colombia with a weak public school infrastructure and a well-developed private education sector. A number of channels could account for the impact of PACES vouchers. First, lottery winners were more likely to have attended participating private schools, and these schools may be better than public schools. Second, vouchers allowed some pupils who would have attended private schools anyway to attend more expensive schools. Finally, because voucher recipients who failed a grade risked losing vouchers, lottery winners had an incentive to devote more effort to school. The net effect is such that the benefit of voucher awards were more than enough to offset the costs. In work in progress, we are assessing longer term consequences of voucher receipt. Preliminary results indicate that the program increased secondary school completion rates, and that college-entrance test scores were higher for lottery winners than losers. These results also show test score increases in the upper tail of the test score distribution, suggesting the effects reflect greater learning by high-achieving pupils and are not due solely to greater incentives for PACES recipients to avoid grade repetition.

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