

MERIT-BASED COLLEGE SCHOLARSHIPS AND CAR SALES

Christopher Cornwell*
cornwl@terry.uga.edu

and

David B. Mustard
mustard@terry.uga.edu

Department of Economics
University of Georgia
Athens, GA 30602

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Abstract

Since the early 1990s, state governments have distributed billions of dollars in financial aid through merit-based college scholarships, most of which have no means tests. The model for most of these programs is Georgia's "Helping Outstanding Pupils Educationally" (HOPE) Scholarship. Given the high correlation between pre-college academic achievement and family income, the program characteristics raise the question: to what extent are HOPE disbursements simply rent payments to households otherwise inclined to send their children to college? This paper addresses the rent question by examining the effect of HOPE on automobile consumption. The relatively swift passage of the lottery law and establishment of the program created an unanticipated windfall large enough to encourage the financing of consumer durables purchases, such as automobiles, out of household savings targeted for college. First, we compare car registrations in Georgia with those in sets of control group states before and after HOPE. We do not find a statistically significant overall HOPE effect, but allowing the HOPE coefficient to vary by year reveals statistically significant percentage increases in registered vehicles in 1994 and 1995, when the program's income cap was raised and then removed. Next, we examine the relationship between car registrations and HOPE recipients by county. Our results indicate that the number of HOPE recipients attending degree-granting institutions increases car registrations in counties above the 75th percentile in per-capita income; there is no evidence of a relationship in counties below the 25th per-capita income percentile.

1 Introduction

College financial aid programs have traditionally focused on need to increase access to higher education for low-income students and expand college choice by enlarging the set of affordable institutions. Until the late 1980s, a relatively small fraction of total student aid was allocated on the basis of merit, and most of it related to individual institutions' attempts to attract academically proficient students. However, since the early 1990s, state governments have distributed billions of dollars in financial aid through newly established, merit-based college scholarships, most of which have no means tests. A common justification for these actions is to induce the state's best high-school students to remain home for their college educations. The model for these programs is Georgia's "Helping Outstanding Pupils Educationally" (HOPE) Scholarship.¹

Initiated in 1993, Georgia's HOPE Scholarship covers tuition, fees and book expenses for all eligible high-school graduates attending Georgia public, post-secondary institutions. The award value has accounted for more than 40 percent of the total cost of attendance at the state's top public universities, amounting to \$5264 in the 2005-06 academic year. Eligible students who attend in-state private institutions receive a fixed payment of \$3000. To qualify for the scholarship, a high-school student must graduate with a "B" average and be a Georgia resident. In the first year of the program, a household income cap of \$66,000 was imposed, which was raised to \$100,000 the following year and eliminated entirely thereafter. Since 1995, there have been no income restrictions. From September 1993 through November 2006, almost \$3.6 billion in scholarship funds have been disbursed

¹ The list of states that have adopted HOPE-style scholarships has grown to 15, including Georgia's neighbors, Florida, South Carolina and Tennessee. See Cornwell, Leidner, and Mustard (2006) for details.

to over 950,000 students. HOPE is financed through a state lottery established under the Georgia Lottery for Education Act in 1992.

Given the strong correlation between academic merit and household income, we expect that the vast majority of scholarship dollars go to households with students who would attend college even in the absence of HOPE. Support for this contention is provided by Cornwell, Mustard, and Sridhar (2006) (hereafter CMS), who contrast first-time freshmen enrollment rates in Georgia with the other member states of the Southern Regional Education Board (SREB) over the 1988–97 period. Using data from the Integrated Postsecondary Education Data System (IPEDS) administered by the National Center for Education Statistics, CMS find that HOPE increased the overall enrollment in Georgia colleges and universities by almost about 6 percent relative to the rest of the SREB, with the gains concentrated in 4-year schools. Based on the IPEDS residency and migration data on freshmen recently graduated from high school, they estimate that about two-thirds of the HOPE effect on enrollments at 4-year colleges can be attributed to a decrease in residents leaving the state.² The 6-percent overall enrollment effect represents only 15 percent of all freshmen scholarship recipients. Thus, the HOPE program has operated largely as a transfer to students who would have enrolled in college anyway, although its relative price effects have influenced *where* students attend.³

The HOPE rent and the consumption it facilitates motivates this paper. Where do the HOPE Scholarship dollars go? Infra-marginal HOPE payments are obviously available for consumption in general. However, it is certainly plausible that the scholarship leads

² Recent-graduate freshmen—students who graduated high school in the previous twelve months accounted for 78 percent of all first-time freshmen at Georgia’s 4-year institutions.

³ Dynarski (2000) reports qualitatively similar findings based on a similar empirical strategy applied to college attendance data on Current Population Survey respondents. Although she does not examine HOPE’s effect by institution type, she concludes that at least 80 percent of award dollars are allocated to students who would attend college anyway.

to automobile purchases using household savings otherwise targeted for college expenses, because the scholarship accounts for such a large fraction of college costs. This is probably more true in households that benefited from the program in the early years, for whom the swift passage of the lottery law and establishment of the HOPE program was an exogenous, unanticipated event. For those households, HOPE was like a transitory income shock, which often show up in durables consumption, and especially in automobile sales as they account for the largest share of durables spending (Lam (1991)).

For our purposes, an ideal empirical setting would provide individual-level consumption data on households with potential college enrollees. The Consumer Expenditure Survey and the Panel Study of Income Dynamics provide such data, but their coverage is too thin to permit inference about the effect of HOPE. As alternatives, we pursue two empirical strategies: one analyzes state-level differences in differences in car registrations, and another relates county-level automobile registrations to the the number of HOPE recipients in each county. Both sets of results suggest a link between HOPE and automobile consumption.

First, we treat HOPE as a natural experiment, comparing the log of car registrations in Georgia before and after the introduction of the program with those in the member states of the Southern Regional Education Board (SREB), between 1988 and 1997 (the same time period examined by CMS). The estimated overall HOPE effect is .006 or .6 percent, but it is very imprecise. Whether we exclude all but the states that border Georgia or expand the control group to include the entire US, the results are never precise enough to infer statistical significance. There is a more evidence of HOPE's influence on registrations when we allow the scholarship's effect to vary by period. We find that registrations are

higher in 1994 and 1995 (the years coinciding with the elimination of the income cap) than in any pre-HOPE period.

Second, we relate county-level panel data on car registrations to HOPE awards by institution type, covering the 1993–2001 period. Knowing the type of institution award recipients attend allows us to distinguish merit scholarship winners from students receiving the non-merit-based HOPE Grant. Further, we examine the registration-award relationship separately for groups of counties that are above the 75th and below the 25th percentiles in per-capita income. For students from upper-income counties attending state-system and private colleges, we estimate awards elasticities of about .05, although neither is significant at the 5 percent level.

2 Georgia's HOPE Program

Georgia's HOPE Scholarship is the largest state-financed, merit-based aid program in the US. By 1997, total non-need aid awarded by Georgia was greater than that of the other fourteen SREB states combined.⁴ By 1999, the size and scope of the HOPE program exceeded that of the federal Pell Grant in Georgia by about a factor of two. Since 2002, Georgia has distributed more financial aid per full-time equivalent student than any other state.

HOPE awards can be used at 103 institutions in Georgia, each of which can be categorized as either a state-system, private or technical school. There are 34 degree-granting, state-system schools (20 four-year and 14 two-year); 25 degree-granting, private colleges

⁴ See the National Association of State Scholarship and Grant Aid Programs *19th Annual Survey Report, Academic Year 1987-88* and *29th Annual Survey Report, Academic Year 1997-98*. Georgia's total 1998 aid is 55 percent higher than that of the second-ranked state, Florida.

and universities (20 four-year and 5 two-year); and 34 technical schools (all of which are 2- or less-than-two-year) specializing in certificates and diplomas.⁵

2.1 Program Rules and Awards

There are two separate components of the HOPE program, the merit-based scholarship and the HOPE Grant. Eligibility for the former depends on a student's high-school grade-point average, while the latter applies only to non-degree programs at two-year and less-than-two-year schools and has no merit requirements. Thus, the incentives related to merit aid are limited to students with degree objectives. Neither award is restricted by family income.

To qualify for the scholarship, an entering freshman must have graduated from an eligible Georgia high school since 1993 with at least a "B" average and be a Georgia resident.⁶ To retain a HOPE Scholarship a student must maintain a 3.0 GPA at each of three checkpoints.⁷ In contrast, the HOPE Grant is an entitlement and there are no restrictions based on when a student graduated from high school. The grant covers tuition and HOPE-approved mandatory fees for all coursework leading to a certificate or diploma. Because technical school tuition is \$25 per credit hour—just a fraction of that charged by state-system colleges—the value of the grant is considerably smaller than that of the

⁵ "Less-than-two-year" schools only grant certificates and diplomas requiring less than two academic years of coursework. In general, they are "technical" schools, but a few with the "technical" label offer two-year degrees. In addition, 4 two-year, state-system schools offer diplomas and certificates.

⁶ To reduce the number of HOPE Scholars and avoid future funding shortages, the eligibility rules were tightened for students who graduated high school in 2000 to demand a "B" average in "core-curriculum" subjects. Interestingly, the predicted 35 percent drop in HOPE qualifiers did not materialize. The number of HOPE recipients declined only 4.3 percent from the previous year, raising the question of whether grades were inflated in reaction to the stiffer requirements ("Hope Suffers Funding Shortage," *Athens Banner Herald*, 30 Sep 2000).

⁷ The GPA checkpoints occur at the end of one's freshmen, sophomore, and junior years, which correspond to 30, 60, and 90 hours under a semester system. Those who do not qualify for HOPE in high school can become eligible at each checkpoint if their GPAs are at least 3.0.

scholarship. Thus, we do not expect to find that car registrations are related to the number of grant recipients.

2.2 Award Distribution

The Georgia Student Finance Commission reports the number of HOPE awards by the school type HOPE qualifiers attend: state system (two- and four-year public colleges and universities), private (two- and four-year private colleges and universities) and technical (which specialize in diploma and certificate programs). HOPE Scholars populate institutions in the state-system and private categories, while grant recipients enroll in technical schools. The distribution of HOPE recipients and disbursements by award and institution type through 2002 are summarized in Table 1. Over the sample period, state system institutions claimed 41 percent of awards and almost 70 percent of aid dollars. Together, public and private degree-granting colleges and universities accounted for 55 percent of awards and just under 80 percent of disbursements. Given the differences in award value between the scholarship and grant, the overwhelming majority of HOPE aid goes to scholarship winners.

Obscured in the cumulative statistics presented in Table 1 are the trends in scholarship and grant allocations. In terms of both the number of recipients and dollars disbursed, the scholarship grew much more rapidly than the grant through 2002. The primary factor in this growth has been the rise in the fraction of high-school graduates and the percentage who satisfy the merit requirements.

If, as calculated by CMS, upwards of 85 percent of scholarship expenditures is rent, the data in Table 1 indicate a large source of funds for expanding the consumption possibilities of households with HOPE Scholars. In addition, students whose behavior is affected by

the scholarship may share household resources that would have been used to finance out-of-state college costs.

2.3 Award Capitalization

For high-school students entering the 1992-93 academic year, HOPE was almost entirely unanticipated. When then-Governor Zell Miller proposed the scholarship, its lottery funding scheme required an amendment to the state's constitution, which had been voted down in the past. The amendment did pass, but not until November 1992, and the final vote was quite close. Initially, there was an income cap of \$66,000, but it was raised to \$100,000 in 1994 and eliminated in 1995. The removal of the cap caused the number of HOPE Scholars to rise dramatically. Overall, freshmen scholarship recipients almost tripled from 1993 to 1995. Furthermore, the expansion in the program targeted high-income households, which would be much more likely to use HOPE to divert planned educational expenditures into automobile purchases. Thus, if HOPE is capitalized in automobile purchases, the evidence should be relatively strong in 1994 and 1995. The effect of the program should diminish over time, as households come to expect the benefits and factor them into household allocation decisions earlier and in different ways. One obvious possibility is that HOPE may reduce household savings for college. We test this hypothesis with the state-level data by allowing the HOPE effect to vary by year.

HOPE reduces the relative price of remaining in state for college. The influence of this relative price change comes up often in our conversations with Georgia residents who are students at the University of Georgia (UGA), virtually all of whom have entered with the scholarship since the income cap was dropped in 1995. A remarkably common theme is "I chose UGA over my best out-of-state alternative because my parents agreed to buy me

a car.” For parents, the cost of college is reduced substantially, from potentially in excess of \$100,000 over four years to an annual room and board expenditure of roughly \$4000. The intra-family bargain over this difference is likely to occur more frequently in higher income households that have the resources to send their children out of state. In lower income households, HOPE’s effect on the relative price of a 4-year school is probably more important. By lowering the relative price of a 4-year college, HOPE affords a student the opportunity to attend a higher quality 4-year school away from home instead of a 2-year school close by. Such a decision may not entail a diversion of educational expenditures into other consumption, and the diversion may even go the other way. For example, a household may forgo a car purchase (among other things) to facilitate a student’s matriculation at a higher quality institution or a school that is farther from home. Therefore, we expect the relationship between car purchases and HOPE receipt to vary by income. To test this hypothesis, we separately examine the relationship between car registrations and HOPE awards in counties above the 75th and below the 25th percentiles in the per-capita income.

3 Evidence from Cross-State Car Registrations

3.1 Empirical Model

Our first attempt to connect the HOPE rent to automobile consumption exploits the natural experiment aspect of the program’s introduction in 1993. Specifically, we contrast car registrations in Georgia before and after the HOPE “treatment” with those in sets of control-group states. We implement this strategy in a regression framework with the following form:

$$\ln R_{it} = \alpha + \beta_t Y_t + \gamma_{i1} S_i + \gamma_{i2} (S_i \times t) + \delta (S_{GA} \times H_t) + X'_{it} \xi + \epsilon_{it}, \quad (1)$$

where R_{it} is the number of privately registered automobiles in state i in year t ($t = 1988, \dots, 1997$), Y_t is a dummy variable for year t , S_i is a dummy variable for state i , S_{GA} is a dummy variable for Georgia, H_t is a HOPE indicator, equal to 1 when $t \geq 1993$ and 0 otherwise, X_{it} is a vector of covariates, and ϵ_{it} is a random error. The interaction of S_i with t accounts for state-specific trends in registrations. Included in X_{it} are measures of state income, population and employment in the automobile industry (each in logs) to account for time-varying state differences that could be correlated with the establishment of the program.⁸ The motivation for the latter comes from the discounts available to employees of car manufacturers and the opening of several large plants in the southeast during the early and mid-1990s.

Our focus is on the coefficient of the interaction between H_t and S_{GA} , δ , which captures the difference in differences between $\ln R_{it}$ in Georgia and the control-group states over the pre- and post-HOPE periods. We are also interested in the timing of the HOPE effect, expecting its influence to be greater in the years immediately following the removal of the income cap. So, we also estimate a version of (1) that allows the HOPE effect to depend on t :

$$\ln R_{it} = \alpha + \beta_t Y_t + \gamma_{i1} S_i + \gamma_{i2} (S_i \times t) + \delta_{GA,t} (S_{GA} \times Y_t) + X'_{it} \xi + \epsilon_{it}. \quad (2)$$

The pattern exhibited in the estimated $\delta_{GA,t}$ will provide some evidence on whether the overall difference-in-differences estimate can be temporally disaggregated in a manner consistent with the start of the program. We estimate both (1) and (2) by ordinary least squares and report t -ratios that are heteroscedasticity and autocorrelation consistent (following Arellano (1987) and Bertrand, et al. (2004)).

⁸ Preferable to state population would be the number of registered drivers. However, a consistent registered-driver series is not available until 1990. In any event, using registered drivers instead of population has virtually no impact on the HOPE effects estimated over the 1990–97 period.

3.2 Data

Data on motor-vehicle registrations by state are available from the Office of Highway Policy Information of the Federal Highway Administration (FHWA).⁹ As described by the FHWA, these data are organized by major vehicle class (automobiles, buses, trucks, and motorcycles) and ownership (private/commercial or public). We measure R_{it} as total private/commercial, automobile registrations, ignoring the truck category since it is dominated by commercial registrations that are not likely influenced by a HOPE-style intervention.¹⁰ Sources of duplicate registrations, such as transfers, have been eliminated from the vehicle counts to the extent possible. While the annual vehicle registration date varies by state, the information is reported by the FHWA on a calendar-year basis. The Bureau of Economic Analysis (BEA) provided the measures of personal income for state-level auto industry employment. State population data were obtained from the US Census Bureau.

We limit the sample period to 1988-97 for three reasons. One is so we can relate our findings more easily to the enrollment results of CMS. The second is that extending the analysis beyond 1997 severely limits the number of states that can serve as members of a control group, as other HOPE-style programs appeared in the late 1990s.¹¹ Finally, our ability to observe a HOPE effect will likely diminish as the program ages, because households will adjust to factor expected scholarship benefits in consumption decisions

⁹ The data for each year since 1992 can be obtained from <http://www.fhwa.dot.gov/ohim/ohimstat.htm>.

¹⁰ Only since 1993 has the truck category distinguished pickups, vans and sport utility vehicles (SUVs) from truck tractors, farm vehicles and other light trucks, so it is not possible to extract registrations of these vehicle types for the pre-HOPE period.

¹¹ The only such program is Florida's Bright Futures Scholarship, which was modeled directly after HOPE and initiated in last year of our sample. Two years prior to HOPE, Arkansas introduced its Academic Challenge Scholarship. However, its scope is much smaller: the benefits are limited to \$2500 per year and to households with incomes less than \$50,000, while maintaining similar eligibility requirements. Excluding these states from the analysis has virtually no effect on our findings.

earlier and in different ways. Similarly to CMS, we focus our attention on a control group made up of the other member states of the SREB.¹² However, we also consider contrasts with all other US states and the states that border Georgia.

Georgia's automobile registration series is compared to that of each SREB state in Figures 1a–n. Each figure plots log automobile registrations purged of state and time effects; that is, residuals from regressions of log registrations on state and time dummies. In all but a few cases (Virginia and West Virginia), marked differences (especially in 1994 and 1995) appear between Georgia and the comparison state in the post-HOPE period. While the figures are suggestive, they do not account for state-specific trends which could be correlated with the timing of HOPE.

3.3 Results

Table 2 presents the summary statistics for the variables used in our state-level analysis, over pre- and post-HOPE periods for Georgia and the SREB control group. As a preliminary observation, we note that Georgia has outpaced the rest of the SREB states in registration, population and personal income growth over the sample period. We begin the formal analysis by observing the simple percentage difference in differences in automobile registrations between Georgia and the other SREB states taken as a whole is about 9.5. Taken at face value, this suggests that car registrations were almost 10 percent higher in Georgia between 1993 and 1997 because of HOPE. An effect of this magnitude is clearly implausible, as it implies an annual increase of well almost 400,000 registered vehicles, a figure that is difficult to reconcile with the recipient data in Table 1.

¹² There are 16 members of the SREB: Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia and West Virginia. Delaware only recently joined the SREB, and therefore was not included in our sample.

Table 3 reports the estimated HOPE effects from equations (1) and (2), which control for state and year fixed effects, state-specific trends, and the income, population and automobile employment covariates, for three sets of control-group states. The first row provides the overall estimates and the rows beneath the time-varying results (with 1993 set as the base year). Focusing on the SREB case, we find an overall estimated HOPE effect of .006 or about .6 percent. An effect of this magnitude suggests a somewhat more plausible annual registrations increase in the range of 25,000. However, the estimate is very imprecise, with a t ratio of only .22. The results based on the other two control groups are similarly imprecise.

In contrast, the time-varying HOPE effect estimates point to statistically significant percentage increases in registered vehicles in 1994 and 1995, the years when the income cap on the scholarship was raised and then removed. As we pointed out earlier, the elimination of the cap greatly increased the number of HOPE Scholars, with the new recipients coming from high-income households, which would be much more likely to capitalize their awards into car purchases. Still the effects are large enough to invite skepticism. In the SREB case, 1994 and 1995 coefficient estimates are at least 5 percentage points larger than the pre-HOPE $\hat{\delta}_{GA,tS}$, all but one of which is statistically insignificant. After 1995, the estimated HOPE effects diminish and are considerably less precise. This pattern is illustrated in Figure 2, which plots the $\hat{\delta}_{GA,tS}$ and their corresponding 95 percent confidence band. The US and border-state cases repeat the pattern with similar point estimates in each period.

4 Evidence from Georgia Counties

Now we consider the relationship between HOPE incidence and car consumption across Georgia counties. An advantage of the county-level data is the ability to distinguish awards by the type of institution in which a recipient enrolls.

4.1 Empirical Model

Here the empirical strategy does not involve a natural experiment; instead, we examine the county-level relationship between HOPE incidence and registered vehicles since the program's introduction. This is possible, because in Georgia the county of registration is the county of permanent residence. HOPE awards at the county level are recorded in the same way. Thus, a student's car will be registered, and her receipt of a HOPE award recorded, in her home county. Her car will not be registered in the county where she attends college, if it differs from her home county.

The empirical framework for this analysis is a regression model of the form:

$$\ln R_{it} = \alpha_0 + \alpha_t Y_t + \gamma_{i1} C_i + \gamma_{i2} (C_i \times t) + \beta_1 \ln A_{it} + X'_{it} \beta_2 + \epsilon_{it}, \quad (3)$$

where R_{it} is the total number of privately registered automobiles in county i in year t ($t = 1993, \dots, 2001$), Y_t is defined as in (1) and (2), C_i is a dummy variable for county i , A_{it} is the number of HOPE awards (recipients) in a county in a given year, X_{it} is a vector of control variables, and ϵ_{it} is a random error. County trends are accounted for in the interaction of C_i with t . Included in X_{it} are county income and population variables. We estimate equation (3) for each institution class, first for all counties and then for groups of counties that are relatively resource rich and resource poor. Isolating rich and poor counties allows us to roughly distinguish upper-income from lower-income award recipients. Again, we report t -ratios based on standard errors that are robust to heteroscedasticity and autocorrelation. OLS applied to (3) will yield a consistent estimate of the reduced-form effect of award incidence on car registrations as long as A_{it} and the variables in X_{it} are strictly exogenous with respect to ϵ_{it} .¹³

¹³ We actually estimate (3) by applying the fixed-effects estimator to data that have been first-differenced, which allows us to account for county trends without directly estimating 158 extra parameters.

4.2 Data

The Georgia Department of Revenue publishes its annual *Statistical Report* data on motor-vehicle registrations by county, separating vehicles into several categories: cars, trucks, motorcycles, trailers and buses. As in the state-level analysis, we focus on car registrations, recording the number of registered cars in each county from 1993 to 2001.¹⁴

To match the registrations panel, we obtained HOPE award data by county for the academic years 1993–4 to 2001–02 from the Georgia Student Finance Commissions (GSFC). The GSFC breaks down the total number of awards by the school type HOPE qualifiers attend. As described in section 2, state-system institutions include all public, 2- and 4-year, degree-granting schools; the private-school category includes all 2- and 4-year private colleges and universities in the state; and technical schools are 2-year institutions that specialize in diploma and certificate programs. Measures of county-level personal income and population come from the Regional Economic Information System (REIS) published by the BEA. Table 4 presents summary statistics for the registration, award and control-variable data, for all Georgia counties and those above the 75th percentile and below the 25th percentile in per-capita income (PCI).

There are three important facts about the award data. First, over the sample period, the awards to students attending state-system schools rose by a factor of eight, while the numbers flowing to the other two school categories increased much less rapidly. This is consistent with the increasing relative importance of the HOPE Scholarship discussed in section 2. Second, the number of private-college awards fell in the 1996 academic year, when the merit requirements for eligibility were imposed, but its value was raised to \$3000. Prior to 1996, the merit rules did not apply to HOPE awards designated for private schools.

¹⁴ In contrast to the national registration data, the definition of a “car” is uniform across counties and encompasses all passenger vehicles (see <http://www.dmv.ga.gov/motor/stats/stats.asp>).

Third, students from counties above the 75th percentile in per-capita income received 12.5 times more scholarships to state-system institutions and 13.3 times more scholarships to private colleges than their counterparts in counties below the 25th percentile, but only 4.3 times more awards to technical schools. By comparison, the average population of the richer counties is 9.8 times greater and these counties have 11.5 times more registered cars.

4.3 Results

Table 5 presents the results from estimating equation (3) for each institution class using all Georgia counties. Each column reports the estimated award elasticities with those of the population and income controls. Only in the case of private-schools is the elasticity estimate positive (.008), but its t ratio is well below 1. The state-system and technical school estimates are less than .01 in absolute value and even less precise. Thus, there is no evidence of a relationship between HOPE awards car registrations in the sample of all counties.

However, as we have argued, the capitalization of the scholarship into car purchases is more likely in upper-income than lower-income households. We distinguish between these two groups by estimating our empirical model separately for resource-rich and poor counties. We do this by isolating the counties above and below the 75th and 25th percentiles in per-capita income. We define the percentiles to refer to per-capita income in 1993.

First, consider the results for counties with per-capita income above the 75th percentile reported in Table 6. The estimated state-system award elasticity is .045 with a t -ratio of 1.4, indicating statistical significance at the .17 level. The estimate in the private school case is about the same size and has a t ratio of almost 2. In fact, these are the only two coefficient estimates that approach statistical significance in the entire table. The effects

of population and income are partialled out with the county trends. The technical-school estimate is smaller and negative, and not statistically significant at even the .4 level.

The magnitudes of the state-system and private school imply a greater than one-to-one correspondence between awards and registrations, which seems implausible. One possible explanation is feedback from registrations to awards in high per-capita income counties, violating strict exogeneity. However, following Wooldridge (2002), we check the strict exogeneity of log registrations by adding $\ln A_{i,t+1}$ to (3) and testing its significance. In every case, the corresponding t ratio is less than 1. Still this does rule out contemporaneous county factors beyond population and income, and not controlled for through state trends, that explain both awards and registrations.¹⁵

In any event, the story is very different for lower-income counties. Table 7 shows that registrations do not significantly vary with awards of any type in counties below the 25th percentile in per-capita income. No estimated elasticity has a t ratio bigger than 1.1.

At least in a qualitative sense, the county-level findings support the existence of a HOPE rent, accruing to HOPE Scholarship winners from resource-rich counties matriculating at state-system and private colleges and universities. The source of the HOPE effect on car registrations is likely not restricted to car purchases for (or by) HOPE Scholars, since the receipt of a HOPE award may present an opportunity in some households to redistribute savings targeted for college to other household members.

¹⁵ Controlling for the age distribution and racial composition of the population, poverty levels, and unemployment rates has no effect on the estimates.

5 Conclusion

Since the introduction of Georgia’s HOPE program in 1993, state-sponsored merit-based college scholarships have proliferated. This has occurred against the backdrop of a general trend toward merit-based financial aid at the individual institution level. Since household income is an important determinant of a high-school student’s academic achievement, scholarship funding generally flows to those who would have attended college anyway. Analyzing Georgia’s program over the 1993–97 period, Cornwell, Mustard and Sridhar (2006) find enrollment rates in Georgia institutions did rise, mostly due to HOPE’s incentive to remain in state, but at least 85 percent of scholarship expenditures were rent.

In this paper, we investigated where the HOPE rent goes—in particular, whether it is capitalized in car purchases. We focused on automobile demand because it is sensitive to transitory income changes, like HOPE generated, especially in the early years of the program. The value of the scholarship makes it plausible that its receipt could induce a reallocation of college savings to the purchase of a car. This is particularly true for higher income households.

Our findings provide some qualified support for the capitalization story. First, using state-level panel data on car registrations between 1988 and 1997, we treated HOPE as a natural experiment, contrasting registrations in Georgia before and after the introduction of the program with those in sets of control-group states. Although we do not find a statistically significant overall HOPE effect, allowing the HOPE coefficient to vary by year reveals statistically significant percentage increases in registered vehicles in 1994 and 1995, when the income cap was raised and then removed. After 1995, the estimated coefficients decrease in magnitude and become statistically insignificant, as we might expect.

Second, we related county-level car ownership to HOPE incidence by institution type, exploiting panel data on county registrations and HOPE awards over the 1993–2001 period. Distinguishing HOPE recipients by the type of institution they attend allowed us to separately examine the influence of the scholarship from that of the grant. We show that registrations increase with the number of HOPE recipients in counties above the 75th percentile in per-capita income attending state-system and private schools. The estimated awards elasticity is about .05 in both cases. We never find a statistically significant effect for HOPE recipients attending technical school, consistent with the low value of the HOPE Grant and the characteristics of non-degree students.

Finally, the evidence we present should be interpreted cautiously. Where the data point to a scholarship effect, the implied increase in car registrations is too large to be accounted for simply by car purchases for college students.

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Table 1
HOPE Awards
Recipients and Aid Amounts by Institution Type, 1993–2002

Institution Category	Recipients (% of total)	Aid in \$millions (% of total)
Overall HOPE Program	1,217,172	1564.3
<i>State System</i>	498,814 (41.0)	1077.57 (68.9)
Four-year	389,452 (32.0)	840.09 (53.7)
Two-year	109,362 (9.0)	237.48 (15.2)
<i>Private</i>	171,280 (14.0)	143.86 (9.2)
Four-year	136,581 (11.2)	101.91 (6.5)
Two-year	34,699 (2.8)	41.95 (2.7)
<i>Technical Schools</i>	547,078 (44.9)	342.86 (21.9)

Note: The listing of technical schools in the breakdown of the HOPE Scholarship totals reflects the fact that 13 of the 34 technical schools offer associate’s degrees. In addition, a few, state-system, 2- and 4-year schools award diplomas and certificates.

Table 2
Means and Standard Deviations of State Variables
Georgia vs SREB States, Pre- and Post-HOPE

State(s)	Pre-HOPE	Post-HOPE
<i>Georgia</i>		
Registrations	38.51 (1.82)	39.54 (2.25)
Population	65.23 (1.74)	71.89 (2.33)
Personal Income	115.04 (11.76)	160.89 (18.00)
Auto Employment	14.86 (2.53)	15.32 (1.52)
<i>SREB</i>		
Registrations	31.38 (23.70)	29.26 (22.00)
Population	55.76 (41.82)	59.50 (46.28)
Personal Income	97.68 (79.73)	129.71 (108.48)
Auto Employment	10.40 (7.32)	13.62 (10.78)

Note: Registrations and population are reported in 100,000s; auto employment in thousands. Personal income is measured in billions.

Table 3
Estimated HOPE Effects on State
Car Registrations, 1988–97

HOPE Effect	US	SREB	Border States
$\hat{\delta}_{GA}$	-0.007 (-0.607)	0.006 (0.217)	0.009 (0.200)
se	0.050	0.047	0.048
$\hat{\delta}_{GA,89}$	0.001 (0.150)	-0.008 (-0.583)	0.000 (0.005)
$\hat{\delta}_{GA,90}$	0.016 (2.222)	0.010 (0.470)	0.002 (0.049)
$\hat{\delta}_{GA,91}$	0.066 (7.463)	0.035 (1.491)	0.025 (0.552)
$\hat{\delta}_{GA,92}$	0.076 (12.320)	0.056 (3.581)	0.070 (2.272)
$\hat{\delta}_{GA,94}$	0.138 (10.159)	0.113 (3.574)	0.109 (1.850)
$\hat{\delta}_{GA,95}$	0.113 (6.267)	0.107 (2.588)	0.085 (0.835)
$\hat{\delta}_{GA,96}$	0.060 (2.699)	0.062 (1.124)	0.041 (0.365)
$\hat{\delta}_{GA,97}$	0.009 (0.352)	0.019 (0.301)	-0.012 (-0.091)
se	0.049	0.046	0.045
<i>NT</i>	510	150	60

Note: Estimated HOPE effects are conditional on state-level differences in personal income, population, automobile industry employment, state and year fixed effects, and state-specific trends. Robust *t*-ratios are given in parentheses. Note that 1993 is the base year for the time-varying HOPE effect estimates and “se” denotes the standard error of the regression.

Table 4
Variable Means and Standard Deviations
Georgia Counties, 1993–2001

Variable	Overall	Above 75th PCI Percentile	Below 25th PCI Percentile
Car Registrations	27.88 (101.58)	77.91 (57.07)	6.71 (5.51)
State System Awards	331.98 (775.75)	930.06 (1361.71)	74.44 (87.01)
Private College Awards	114.30 (277.24)	333.98 (482.32)	25.44 (31.93)
Tech College Awards	374.59 (537.45)	762.29 (848.61)	176.45 (204.22)
Population	48.36 (101.58)	131.39 (176.13)	13.42 (11.49)
Personal Income	1180.44 (3369.16)	3597.34 (6088.67)	213.84 (187.36)
Number of counties	159	40	40

Note: Car registrations and population are in thousands and personal income in millions. The HOPE awards are reported in their actual levels.

Table 5
Car Registrations and HOPE Awards
Fixed-effects Results, 1993–2001
All Counties

Variable	State System	Private	Technical
HOPE Awards	–0.012 (–0.695)	0.008 (0.785)	–0.003 (–0.197)
Population	0.527 (1.208)	0.524 (1.190)	0.529 (1.205)
Income	–0.264 (–1.699)	–0.270 (–1.733)	–0.262 (–1.695)
se	0.112	0.112	0.112
<i>N</i>	1272	1272	1272

Notes: Variables measured in logs. Results are conditional on county and year fixed effects and county-specific trends. Robust asymptotic *t*-ratios in parentheses and “se” denotes the standard error of the regression

Table 6
Car Registrations and HOPE Awards
Fixed-effects Results, 1993–2001
Counties Above 75th Percentile in Per Capita Income

Variable	State System	Private	Technical
HOPE Awards	0.045 (1.390)	0.055 (1.966)	-0.021 (-0.827)
Population	0.473 (0.808)	0.596 (1.092)	0.662 (1.161)
Income	-0.336 (-0.822)	-0.332 (-0.791)	-0.319 (-0.783)
se	0.089	0.089	0.089
<i>N</i>	320	320	320

Notes: Variables measured in logs. Results are conditional on county and year fixed effects and county-specific trends. Robust asymptotic *t*-ratios in parentheses and “se” denotes the standard error of the regression

Table 7
Car Registrations and HOPE Awards
Fixed-effects Results, 1993–2001
Counties Below 25th Percentile in Per Capita Income

Variable	State System	Private	Technical
HOPE Awards	–0.030 (–1.083)	–0.002 (–0.135)	0.020 (0.841)
Population	–0.224 (–0.444)	–0.189 (–0.353)	–0.183 (–0.341)
Income	–0.084 (–0.252)	–0.090 (–0.274)	–0.096 (–0.292)
se	0.126	0.126	0.126
<i>N</i>	320	320	320

Notes: Variables measured in logs. Results are conditional on county and year fixed effects and county-specific trends. Robust asymptotic *t*-ratios in parentheses and “se” denotes the standard error of the regression

Figure 1
Car Registrations of Georgia compared to SREB States

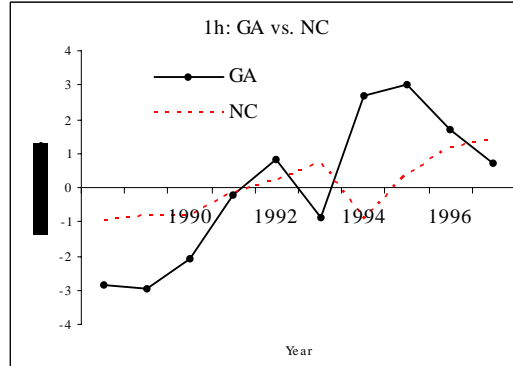
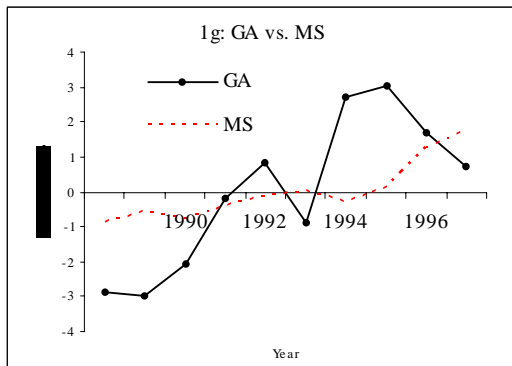
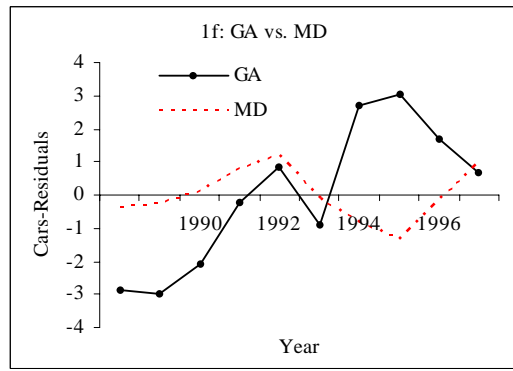
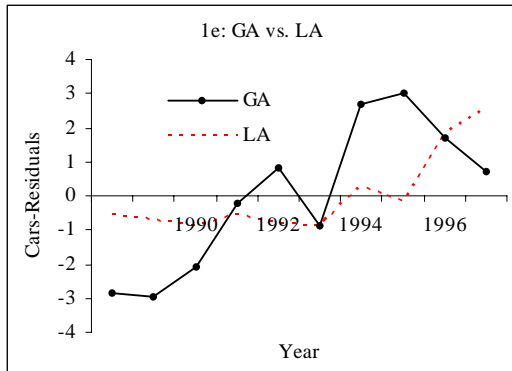
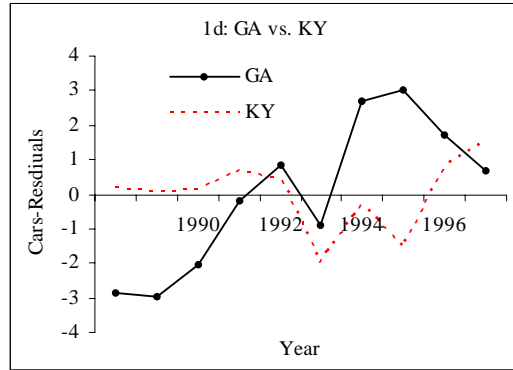
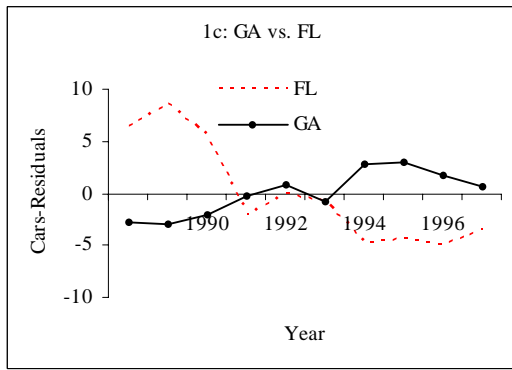
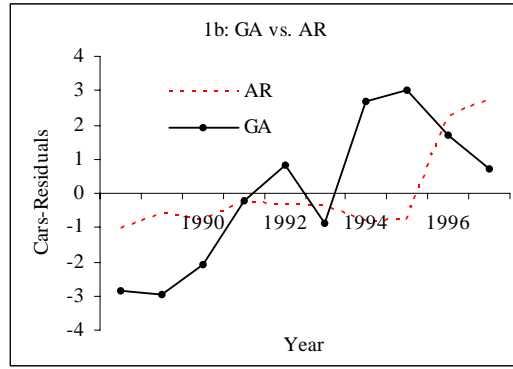
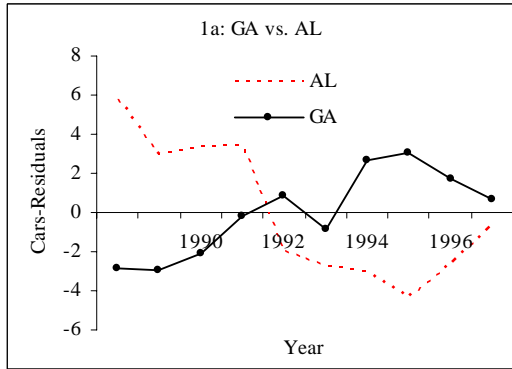
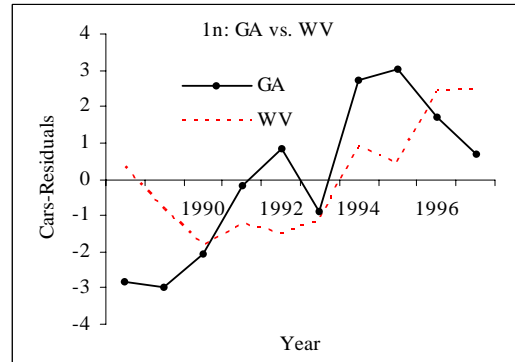
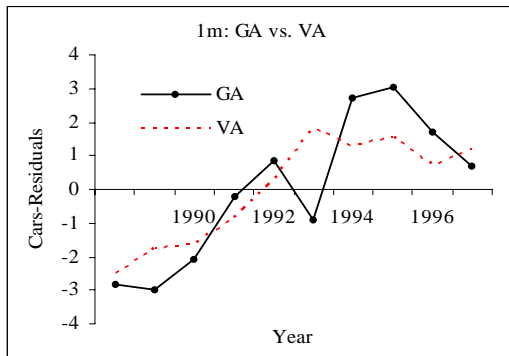
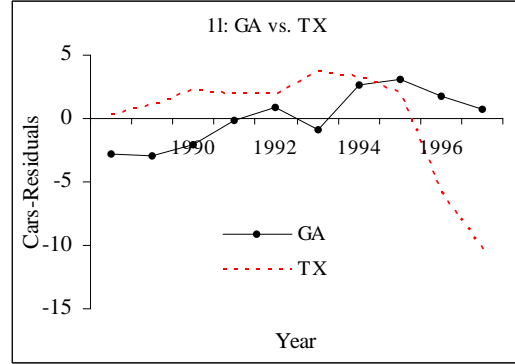
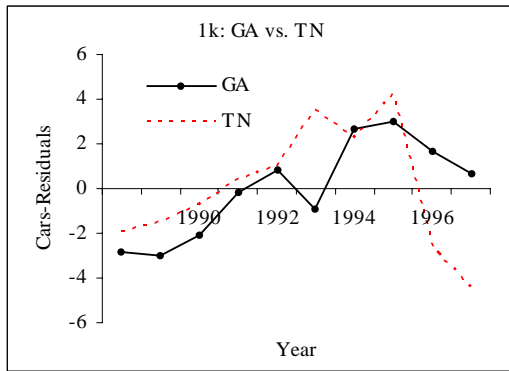
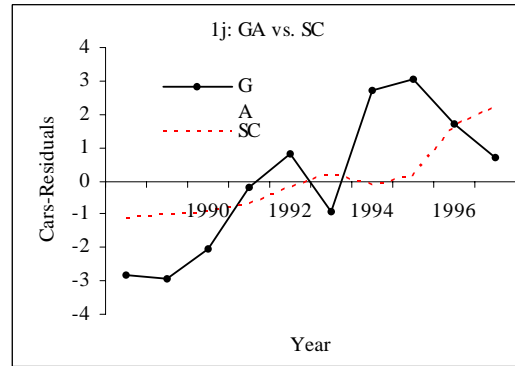
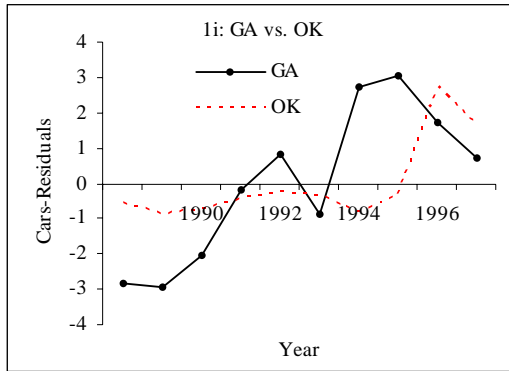
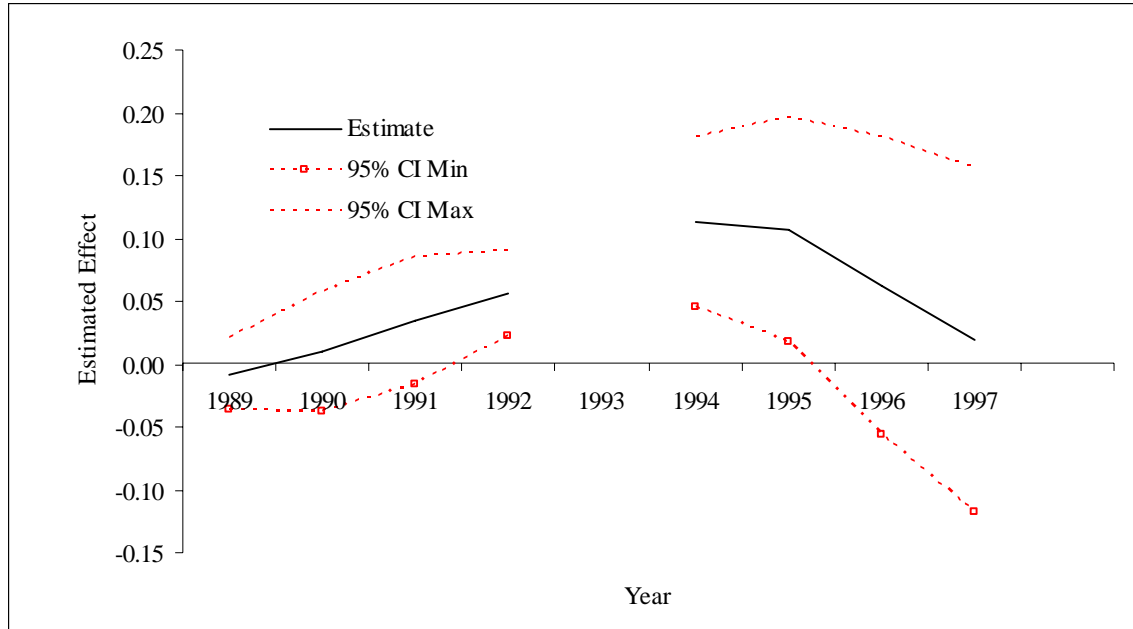


Figure 1 (continued)
 Car Registrations of Georgia compared to SREB States



Note: Each figure plots log automobile registrations purged of state and time effects (the residuals from regressions of log registrations on state and time dummies).

Figure 2
Estimated Yearly HOPE Effects on Log Car Registrations
With 95% Confidence Intervals



Note: 1993 is base year and thus is omitted.