Draft College Costs chapter for Robin Hood volume

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I. Introduction

College-going has risen substantially over the past forty years. In 1968, 36 percent of 23-year-olds had gone to college, while by 2005, that figure had grown to 58 percent.[1] But these gains have been uneven. African-Americans are about half as likely as non-Hispanic whites to earn a bachelor's degree (19 percent vs. 37 percent) and Hispanics less than one-third as likely (11 percent).[2] Females are about twelve percentage points more likely to have attended college by age 23 (64 versus 52 percent), and about seven percentage points more likely to have completed a BA (32 versus 25 percent.)

Some of these differences trace back to performance gaps in elementary school and high school. But even among those who do well on achievement tests, socioeconomic inequalities remain: 74 percent of high-scorers who grew up in upper-income families complete college, compared to only 29 percent of those who grew up in low-income families (U.S. Department of Education, 2005).

These gaps in college attendance and completion are especially troubling given the increasing importance of college for financial well-being. While thirty years ago a high school degree was a sufficient credential for financial security, it is now a college degree that is the key to a middle-class lifestyle. Since the 1970s, high school dropouts and graduates have lost ground, with their real earnings dropping substantially (Figure 1, from College Board, 2005). Typical earnings for a full-time, male high school graduate in 1972 were $45,000. That figure had

[1] Authors' calculations from October Current Population Survey.
[2] Authors' calculation of BA completion rates for 25-26 year olds in the 2005 CPS.

dropped by a third ($30,000) by 2005.[3] By contrast, real earnings for the college-educated have held steady; among women, they have risen.

These two sets of trends - steady earnings for those with a college education, plunging earnings for those without - mean that college is increasingly important to financial well-being. In 1972, men with a bachelor's degree typically earned 22 percent more than those with a high school degree. By 2003, this return had nearly tripled, to 60 percent.

In light of the rising importance of a college degree, policymakers have focused on increasing college enrollment as an important tool for mitigating poverty. This chapter reviews the evidence on a key tool available to policymakers – reducing college costs. Section II briefly outlines the policy context; Section III reviews the evidence from experimental and high-quality quasi-experimental studies of college cost reduction; Section IV discusses the broad lessons derived from these studies and concludes.

II. Policy context

Colleges, state and federal government and private organizations spend billions to subsidize college costs. In this section, we describe the major programs.

Two federal programs provide the bulk of aid to college students: the Pell Grant and the Stafford Loan. Pell Grants flow almost exclusively to families with incomes below $40,000 (Stedman, 2003). During the 2004-05 academic year, $13.6 billion in Pell Grants was delivered to over five million students (College Board, 2005). During the same year, $55 billion in loans was delivered to undergraduates through the Stafford Loan program.

States hold down college costs by subsidizing public universities, which in turn charge much lower tuition prices than their private counterparts. The vast majority of students attend

[3] Over the same period, earnings among male, high school dropouts plunged from $40,000 to $22,000.

public colleges, so this is a important channel through which government subsdizes college costs. States have recently offered innovative new aid programs. Beginning in the early 1990s, more than a dozen states established broad-based merit aid programs. These programs typically award full tuition and fees at state public universities (or in some cases, an equivalent voucher to attend a private school) to residents who maintain a minimum high school grade point average. Many require a grade point average of 3.0, not a particularly high threshold – Dynarski (2004) calculates that in 1999, 40 percent of high school seniors met this standard.

In recent years, the tax code has also been used as a vehicle for subsidizing college costs. The Hope and Lifetime Learning tax credits and the deduction for college tuition and fees help families pay for current college costs. Parents can also claim children under 24 as dependents if they are enrolled in college. The federal Coverdell Education Savings Account and the state 529 savings plans help families pay for college in the future by increasing their after-tax returns on savings. With a total cost of $10.5 billion, the education tax incentives approach spending on the Pell Grant, historically the cornerstone of federal aid for college students (College Board, 2005). All of these programs primarily benefit upper income families (Dynarski, 2004; Dynarski and Scott-Clayton, 2006a), and so are not instruments for reducing poverty.

Another source of student aid comes from colleges themselves.Colleges provide scholarships as well as low-interest loans (**put in dollar amounts). In recent years, some elite private universities have moved from offering low-income students a package of loans and grants to an entirely grant-based award These programs have been shown to affect students' choice of college (Avery et al, 2006; Linsenmeier et al 2006; Rothstein and Rouse 2007, van der Klaauw 2002). However, programs at elite schools are unlikely that they have an affect on

poverty *per se*, since eligible sudents are choosing between Harvard and Princeton, not between college and no college.

Similarly, private organizations offer scholarships to high-performing students. Programs such as the Gates Millenium Scholars, the I Have a Dream foundation, and Kalamazoo Promise fully sponsor college attendance (or "top up" the difference between government grants and estimated need) for low-income and/or minority students. Although these programs are small in scale compared to the federal and state aid programs discussed above, they are highly visible and so will be discussed in the chapter.

III. Evidence

Economic theory (and common sense) predict that lowering the price of college will increase college attendance. While the theoretical prediction is clear, it is an empirical question how much a given dollar changes behavior. Answering this empirical question is a challenge, since eligibility for subsidies is certainly not random and is likely correlated with unobserved determinants of schooling. As a result, estimates based on the cross-sectional correlation of aid with schooling are subject to multiple sources of bias.

A long empirical literature examines the effect of college costs on schooling decisions. Leslie and Brinkman (1988) review more than seventy of these studies. Heller (1997) updates this review with studies done after Leslie and Brinkman (1988.) With few exceptions, discussed below, this long literature suffers from a key flaw: the response of schooling to price is poorly identified. That is, the variation in schooling prices that identifies their effect on schooling is likely to be correlated with the unobserved determinants of schooling. More formally, the

relationship between financial aid and schooling decisions can be expressed with the following equation:

$$(1) \qquad S_i = \alpha + \beta Aid_i + \varepsilon_i$$

Here, S_i is some measure of an individual's schooling, such as college attendance or completed years of college, Aid_i is the amount of student aid (expressed in dollars) for which an individual is eligible, and the error term ε_i represents the unobserved determinants of schooling. If aid is uncorrelated with ε_i, then β can be interpreted as the effect of an additional dollar of aid on college attendance or completed education.

If financial aid was randomly assigned in an experimental setting, Aid_i would certainly be uncorrelated with ε_i. In nearly all nonexperimental studies, however, aid is offered to students on the basis of characteristics that independently affect the probability of college attendance. For example, the federal government uses the Pell Grant to increase the college attendance of low-income youth. If these students are relatively unlikely to attend college, perhaps because of low levels of parental education or poor secondary schooling, then estimates of β based on this source of variation in aid will be biased downward. Conversely, since many colleges use merit scholarships to attract high-achieving students, β could be biased upward.

One can attempt to correct for this bias by controlling for observed determinants of schooling such as parental income or academic achievement in a vector of regressors X_i:

$$(2) \qquad S_i = \alpha + \beta Aid_i + \delta X_i + \varepsilon_i$$

If X_i is sufficiently rich that it captures all other sources of variation in individual schooling decisions and schooling costs, then β will be unbiased. However, under plausible conditions this approach will fail, for two reasons:

- First, complete data on relevant characteristics is rarely available. For example, parental wealth affects schooling decisions, both directly and through eligibility for aid, but comprehensive measures of parental (and extended family) wealth are not generally present in survey data, especially among adults who have completed their education.

- Second, even if complete data is available, we may not be properly modeling the schooling decision. This could occur either because we are improperly omitting relevant variables from Equation (2) or we are including them but in the wrong functional form. Theory provides little guidance as to which attributes should be held constant in estimating Equation (2). This is particularly problematic because point estimates in this literature are often quite fragile, even changing sign with small changes in specification. As a practical example, the effect of income on Pell Grant eligibility is highly nonlinear – thus unless we perfectly specify the functional form of the relationship between income and schooling, our estimate will be biased.

B. Quasi-experimental studies

We now discuss analyses of natural (or quasi-) experiments, in which a discrete shift in aid policy affects one group of individuals but not others. Beginning with Hansen (1983), who examined the introduction of the Pell Grant in the early 1970s, a small but growing number of studies have used the natural experiment approach to estimate the effect of schooling costs on college-going. We summarize the main results of these studies in Table I.

Federal Programs

Most of these studies examine the effect of grant aid. Studies which examine the Pell Grant, currently the largest source of federal grant aid, produce mixed results: Hansen (1983) and Kane (1995) found no effect of the introduction of the Pell on the college enrollment rate of low-income recent high school graduates, but Seftor and Turner (2002) found a positive effect on the schooling of older "non-traditional" students. Bettinger (2004) uses a regression-discontinuity approach to look at the effect of the Pell Grant on persistence using a sample of college students; his estimates are extremely sensitive to specification.

While loans are the dominant form of federal aid today, we know little about how they affect behavior. Reyes (1995) examines the effect of relative changes in loan eligibility across income groups in the early eighties, and concludes that loan access increases attendance and completed schooling. Dynarski (2005) addresses this question using variation in loan eligibility induced by the Higher Education Amendments of 1992, which removed home equity from the set of assets "taxed" by the federal aid formula. She finds a small effect of loan eligibility on college attendance and a larger effect on the choice of college.

Veterans' educational benefits have historically been one of the largest sources of grant aid for college in the US. Sincechildren from poor families are more likely than others to enroll in the military, programs that increase veterans' education have the potential to reduce poverty. Multiple studies of the post-World-War-II GI Bills (Angrist, 1993; Stanley, 2003; Turner and Bound, 2003; Bound and Turner, 2003) have found these benefits to have raised schooling levels substantially.

Evaluating another federal program, Dynarski (2003) uses variation in grant eligibility induced by the elimination of the Social Security student benefit program, which paid the college costs of the children of deceased, disabled or retired Social Security beneficiaries. She uses the death of a parent during a person's childhood as a proxy for Social Security beneficiary status, and finds that college attendance of the affected group dropped by more than a third, and schooling by two-thirds of a year. These estimates imply that an additional $1000 in aid increases college attendance by about four percentage points.

State Programs

Subsidized public tuitions, which vary considerably by state, are one of the largest sources of education subsidies. Estimates based on cross-sectional variation in tuition may be biased, since states with a preference for education may have both low tuition prices and high college attendance rates. The solution of Kane (1995) is to use state fixed effects; his identifying assumption is that within-state changes in tuition prices are uncorrelated with changes in a state's taste for college. He concludes that a $1,000 drop in public tuition produces about a four percentage point increase in college attendance rates of recent high school graduates.

Several studies have used the introduction of state merit scholarship programs as a source of variation in schooling costs. Dynarski (2000) and Cornwell et al. (2006) conclude that the Georgia HOPE scholarship increase college attendance by 4-6 percentage points per $1000 in grant aid; Dynarski (2004) finds that other states' scholarship programs have had similar, but slightly smaller effects. Kane (2003) uses a regression discontinuity approach to examine the CalGrant, and finds similarly sized impacts on college entry for students who had already applied for financial aid. Abraham and Clark (2006) and Kane (2007) evaluate the DC Tuition

Assistance Grant program, which allowed DC residents to pay in-state tuition at public schools across the country. They find that the fraction of DC residents that attended Maryland and Virginia schools more than doubled, and estimate an impact on overall enrollment of 3-4 percentage points per $1000 of effective tuition reduction. Dynarski (2008) finds that the Georgia and Arkansas merit scholarship programs have also increased degree *completion*, by around 3-4 percentage points.

Other Programs

Two recent studies have produced well-identified estimates of the effect of a school's aid offers on its yield rate, e.g., the probability that admitted students will enroll. van der Klaauw (2002) exploits idiosyncrasies in one school's aid formula that cause applicants with only slightly different standardized test scores to receive very different aid offers. He finds that the elasticity of enrollment with respect to institutional aid is near one for low-income students and near zero for other students. Linsenmeier, Rosen and Rouse (2006) use variation across time in one school's mix of grants and loans to identify the effect of aid on the yield rate among low-income students. They find a weak impact overall but stronger enrollment effects for minority applicants.

DesJardins and McCall (2007) study the impact of the Gates Millenium Scholarship (GMS) using a regression discontinuity design. GMS "tops up" the difference between need-based grants and unmet financial need for eligible minority applicants. Scholars are selected on the basis of high school record and a scored application process, which generates discontinuous changes in the probability of receiving an award. Although the evaluation is still ongoing, they

find weak impacts on overall retention but strong evidence of decreased loan debt and work hours.

Table 1 summarizes the findings from the quasi-experimental studies discussed above. The studies in this table are those which we consider as estimating causal impacts of the effect of schooling costs on schooling decisions. Subsidies to post-secondary schooling do appear to affect schooling decisions. The best estimates suggest that eligibility for $1,000 of subsidy increases college attendance rates by roughly four percent. Aid eligibility also appears to increase completed schooling and shift students toward four-year schools, but the evidence is comparatively thin on these outcomes.

C. Experimental Evaluations

One straightforward way to assess the causal impact of financial aid on college enrollment and persistence is to randomly allocate scarce funds to an eligible population. We know of no such study. Several studies, however, combine a financial award with mentoring or other kinds of services. A key evaluation issue is to what extent services, and the cost of providing them, are more effective than direct monetary transfers.

Furthermore, most randomized trials in higher education examine the effect of aid or services on grades, credit accumulation and/or persistence past the first year, *conditional on enrollment*. The reasons for this are largely practical – school-based interventions are more administratively feasible than tracking high school students to their chosen colleges around the country. To our knowledge, only one randomized trial looks directly at the enrollment margin.

Upward Bound

Upward Bound is a federal and nationwide program designed to "help economically disadvantaged students prepare for, enter and succeed in college" (Myers et al, 2004.) The program provides comprehensive precollege services to participants, including supplemental college-preparatory coursework in math, science, English; tutoring; counseling; and activities such as attendance at museums and plays. Students typically enter the program in ninth or tenth grade and may remain until the summer following twelfth grade; the mean length of participation is about 19 months. With 52,000 students participating in 727 sites across the country, Upward Bound is one of the largest programs of its kind. The average cost per student per year of Upward Bound is about $4,800 (Myers et al, 2004)

Mathematica Policy Research conducted a randomized trial of Upward Bound from 1992 to 1994, following participants for several years. They found weak impacts of Upward Bound on performance in high school courses (Myers and Schirm, 1999.) A more recent evaluation finds no statistically insignificant impact on college enrollment (Myers et al, 2004) though there is some evidence of substitution from 2 to 4-year colleges.[4] There is no impact on total college credits earned.[5]

Experimental Effects of College Persistence Programs

About one in five students who enroll at a 4-year college leaves within one year. About two in five fail to obtain a degree within six years (College Board, 2005.) Attrition is even more prevalent at non-selective schools, where the majority of students commute from home and work

[4] The treatment group was 5 to 6 percentage points *more* likely to have attended a 4-year college and 3 to 5 percentage points *less* likely to have attended a 2-year college than the control group.

[5] The evaluation does report much larger results for students with low (versus high) "educational expectations." Among students who did not expect to earn a bachelor's degree, the treatment group was about 20 percentage points more likely to attend a 4-year college than the control group, although the overall enrollment effect was still not significant. However, since this evaluation does not actually measure degree receipt, this result is difficult to interpret. Other results by subgroup are available in Myers et al (2004.) Notably, results by gender are nearly identical.

while enrolled in school. Since these students are more weakly attached to their institutions, policies have focused on creating a stronger connection with the college experience via more extensive mentoring, counseling, and collaborative "learning communities" (Bloom and Sommo, 2005.) Two randomized trials have evaluated the effect of such programs; we discuss them below.

STAR

STAR (Student Achievement and Retention Project) was a large-scale randomized trial launched in 2005 at the urban campus of a major Canadian public university (Angrist et al, 2007.) Participants in the STAR experiment were similar to students at non-selective universities in the U.S. About eighty percent of the sample lived with their parents and commuted to school, and the majority planned to work part-time while enrolled. Many of the students were first- or second-generation immigrants.

Incoming freshman were randomly assigned to one of four groups. The first was offered enhanced services, in the form of peer advising and organized study groups. The second was offered a financial incentive of $5,000 to complete a full course load with a grade point average of 3.0 or higher (the payment was $1,000 for a GPA of at least 2.3). A third group was offered both services and a financial incentive, while a fourth group formed a control group and was offered the college's typical services.

The largest impacts were found for the group offered both services and a financial incentive. GPA increased 0.21 SDs, and students were about four percentage points more likely than the control group to be eligible for both the $5,000 and the $1,000 scholarship. They were

four to five percentage points more likely to reenroll for a second year.[6] Impacts for the aid-only group were generally positive, but smaller and not statistically significant, while impacts for the services-only group were near zero. Benefits were concentrated almost entirely among females.

Opening Doors

Opening Doors is a large-scale randomized trial at six community colleges in four states run by Manpower Research Development Corporation (MDRC). Preliminary results are currently available for five of the six sites. The intervention at each site consists of "learning communities" (in which entering students take blocks of classes together and are offered extra tutoring); supplementary financial aid; and enhanced student services (extra counseling and monitoring).

The first Opening Doors evaluation occurred at Kingsborough Community College in Brooklyn, NY in the fall of 2003 (Bloom and Sommo, 2005.) The intervention targeted approximately 750 entering freshman, who were ethnically and racially diverse; many were recent immigrants that needed training in remedial English. Treatment group members were place in learning communities of about 25 students each and received textbook vouchers. Three semesters after the Opening Doors program, the treatment group was 5.6 percentage points more likely to be enrolled in any college (Scrivener et al, 2008.). Treatment group members earned an average of 2.4 more credits and were in school about 0.1 more semesters. They were more likely to attempt and pass standardized reading and writing assessments. The effect sizes for these

[6] This is perhaps unsurprising, since the students were required to reenroll for a 2nd year before receiving the scholarship.

various assessments were around 0.1 standard deviations, but were closer to 0.2 SDs for students whose initial English skills were worse at baseline.[7]

Two Opening Doors demonstrations took place at community colleges in New Orleans in 2004 (Brock and Ritchburg-Hayes, 2006.) In addition to the learning communities, the treatment group was offered $1000 per semester for half-time enrollment and a C average. First year impacts were substantial. Opening Doors participants were about nine percentage points more likely to be enrolled full-time, and earned on average 1.1 additional credits in the first semester. They were about twelve percentage points more likely to pass and about seven percentage points less likely to withdraw from an attempted course. These effects persisted into the second and third semesters. The treatment group was about eighteen percentage points more likely to remain enrolled into the second semester and about eleven percentage points more likely to enroll for a third semester. The pass rate for enrolled courses also remained significantly higher, and there was some evidence of small grade point average increases as well. The cumulative effect of the program was a large and statistically significant increase of 3.3 credits earned, and an average gain of 0.3 semesters worth of enrollment.

A third set of Opening Doors demonstrations took place in northern Ohio (Scrivener and Au, 2007; Scrivener and Pih, 2007.) Students were given regular appointments with an Opening Doors counselor and given a $150 per semester scholarship that if they attended these meetings. Results were weak. There was no increase in credits attempted or earned in the initial semester, nor any impact on pass rate or grade point average. However, there was an effect on retention of 5 to 10 percentage points and a small effect on earned credits. These impacts faded to insignificance by the first post-program semester.

[7] For more detail on the assessments and subgroup effect sizes, see Scrivener et al (2008.)

Several themes emerge from these experimental evaluations. First, the effect of aid appears to be greater than that of of services. Interventions that offered services alone generally had weak impacts, whereas aid typically generated positive effects on enrollment and persistence. Second, aid has a larger impact when combined with services. In the STAR experiment, the only sustained gains were found in the treatment group that combined aid and services. The impact of Opening Doors (which combined aid and services) was proportionally larger than quasi-experimental estimates of aid alone from the studies reviewed in Section III.B.

IV. Discussion

The effects of the financial aid programs we have discussed appear to depend critically on form taken by the intervention. Program design matters. In particular, and as we next discuss, there appears to be an important tradeoff between targeting and program effectiveness. Highly-targeted programs such as the Pell focus their dollars on poorer students, but impose substantial paperwork burdens in order to identify the neediest. This may reduce the efficacy of the programs, if these burdens drive the target population out of the programs. This is consistent with the pattern in Table 1, in which the Pell and Stafford have small to zero effects while simpler, less-targeted programs have substantial effects.

The paperwork requirements of the federal, need-based aid programs are quite high. For the typical household, the aid application (the Free Application for Federal Student Aid, or FAFSA) is longer and more complicated than the federal tax return. The aid process is also highly uncertain, with definitive information about freshman-year aid not revealed until the spring of the senior year in high school. (Dynarski and Scott-Clayton 2006). This process may be particularly daunting for low-income families. Many low-income families cannot benefit from

learning-by-doing, since the parents are unlikely to have gone to college and applied for aid themselves. They have fewer guidance counselors to guide them through the process. They are less likely to have Internet access at home and more likely to speak English as a second language.As a result, need-based aid -- which requires gathering extensive information about income and expenses -- may have a smaller effect on this population than less-targeted forms of subsidy with fewer application requirements and lower transaction costs.

By contrast, Georgia's HOPE scholarship requires only that high school students maintain a 3.0 GPA in order to have their tuition and fees paid at any public college in Georgia. High schools proactively send transcript data to the state in order to identify scholarship winners. For most students, the HOPE application consists of a half- page of basic biographical information. High school students are knowledgeable about HOPE. More than seventy percent of Georgia high-school freshmen surveyed were able to name the program without prompting. Fifty-nine percent, when asked to list some requirements of HOPE, volunteered that a high school GPA of 3.0 is necessary (Henry, et al, 1998). The compliance costs of the Social Security student benefit program were also minimal.

In sum, the best evidence for effective financial aid on educational attainment comes from simple, broad-based programs. Given that most students in these programs are inframarginal, the benefits of simplicity versus targeting are an empirical question. Still, the evidence suggests that even broad-based programs may pass a social cost-benefit test. Dynarski (2008) estimates that state merit aid programs in Georgia and Arkansas pass a cost-benefit test if the return to schooling is between 7 and 9 percent.[8] This is on the low end of instrumental

[8] These figures are derived assuming that the scholarship is a cost. Treating it as a transfer lowers the breakeven rate of return to 5-7 percent.

variable rates of return to schooling, and is well below the rate of return estimated for recent cohorts (Angrist and Krueger 1991; Kane and Rouse 1995; Oreopoulos 2005.)

Thus it appears that even with a low "effective" increase in enrollment due to subsidization of inframarginal students, state merit aid programs increase social welfare. Furthermore, given the low rates of BA completion discussed in Section I and the high rate of attrition observed in studies of college persistence, it is possible for aid to increase retention and completion even among inframarginal college enrollees. Indeed, the results from STAR and Opening Doors suggest that this is the case. Finally, to the extent that an existing or proposed aid program can be made simpler, and its eligibility and benefit formulas made more transparent, potentially large additional returns could be achieved at minimal cost.

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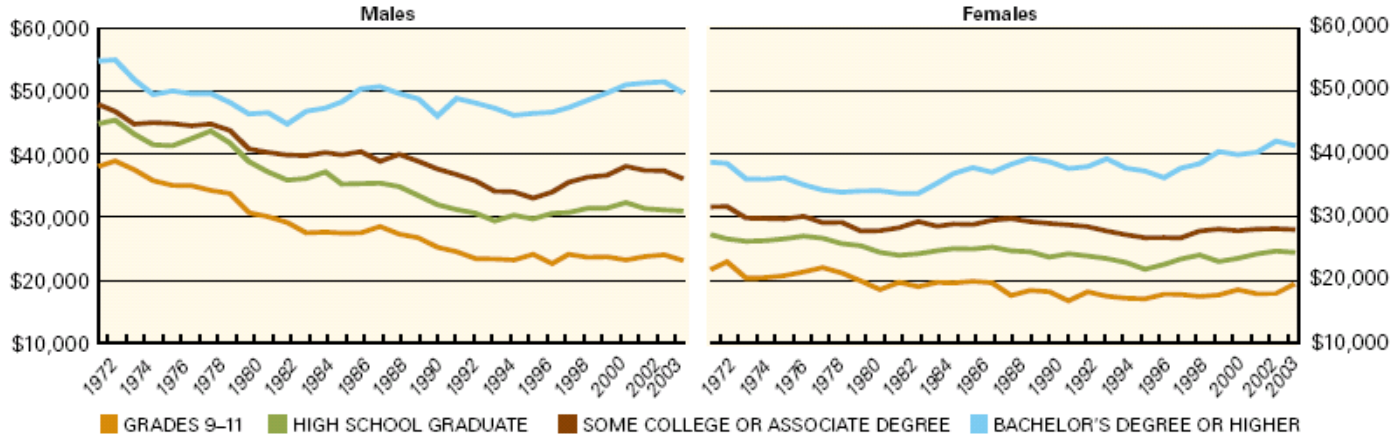
Table 1: Summary of College Costs Studies

Study	Sample	Intervention/Method	Financial Award	Evaluation Design	Outcomes	Effects
Experimental						
Upward Bound (Myers et al, 2004)	~2800 entering 9th graders at UB sites across the country; mostly low-income and/or 1st gen. college	Intensive mentoring and services program during school year, plus 6 week summer program on college campus; lasts through grade 12	no	randomized experiment	College enrollment and type (2 or 4 year); persistence	no impact on overall enrollment; 5-6 percentage point increase in 4-year (versus 2-year) enrollment; no effect on persistence or total credits earned
STAR – Canada (Angrist et al, 2007)	~1600 entering freshman at a public university in Canada, satellite campus	3 treatment groups - 1) peer advising and organized study group; 2) a merit scholarship for above-avg. grades; 3) both	yes - $5000 for a 3.0 avg., $1000 for a 2.3 avg.	randomized experiment	grades, retention	no effect for services only group; for aid groups, 0.1-0.2 SD increase in grades; 4-5 percentage point increase in retention in combined group only
Opening Doors - New York (Bloom and Sommo, 2005; Scrivener et al 2008)	~750 Community College Attendees, mixed races, mostly immigrant	Learning Communities - organized cohort of entering students into same classes; improved counseling and monitoring; instructors work together	no - (except textbook voucher)	randomized experiment	Credits taken and earned; pass rate and GPA; retention	8 percentage points less likely to withdraw and 10 point increase in pass rate; cumulative impact of 2.4 credits and 0.1 semesters; 5 percentage point increase in enrollment post-program
Opening Doors - Louisiana (Brock and Richburg-Hayes, 2006)	~500 Community College Attendees, mostly female and African-American	Financial Aid; Improved counseling and monitoring	yes - $1000 per semester for 1/2 time enrollment and 2.0 GPA	randomized experiment	Credits taken and earned; pass rate and GPA; retention	7 percentage points less likely to withdraw and 12 point increase in pass rate; cumulative increase of 3.3 credits and 0.3 semesters; 11 percentage point increase in post-program enrollment
Opening Doors - Ohio (Scrivener and Au 2007; Scrivener and Pih 2007)	~1000 Community College Attendees, mostly female and mixed race	Multiple mandatory meetings with counselors; aid award given for attendance	yes - $150 per semester	randomized experiment	Credits taken and earned; pass rate and GPA; retention	no effect on withdrawal or pass rate; cumulative increase of 0.8/1.0 credits and 0.1/0.2 semesters; 5.6/10.5 percentage point increase in post-program enrollment
Quasi-Experimental						
Introduction of Pell Grant Program (Hansen 1983; Kane 1995)	October Current Population Survey; 1970-1977	Compare enrollment of eligible to non-eligible population, before and after 1973 when the Pell Grant was established	yes - maximum of $3544 in 1991 dollars	non-experimental (differences-in-differences)	College enrollment and type	no effect

Change/discontinuity in Pell Grant eligibility (Seftor and Turner 2002; Bettinger 2004)	October Current Population Survey; 1969-1977 and 1984-1990 - "nontraditional" older students only	Same as Kane (1995), plus a before/after comparison when independent student definition changed; Student Aid Index that determines eligibility is estimated directly from data	yes - maximum of $3544 in 1991 dollars	non-experimental (differences-in-differences)	Enrollment	~1.5 percentage point increase for initial Pell introduction; ~4 percentage points for 2nd change
Tuition Changes (Kane 1995)	CPS; NLSY-79; High School and Beyond	Between and within-state variation in public subsidization of college	changes in tuition sticker price	non-experimental - state fixed effects	Enrollment	~4 percentage points per $1000 drop in tuition
Expansion of Stafford Loan eligibility (Reyes 1995; Dynarski 2005)	October CPS 1984-2000 and the Survey of Income and Program Participation (SIPP) 1986-1996	Before/after 1992 legal change - home equity no longer "taxed" in the federal student aid formula	yes - reduced expected contribution by $2400 for family with median equity	non-experimental (differences-in-differences)	Enrollment	5.1 percentage points per $1000 of loan subsidy in the CPS; imprecise/no effect in SIPP; Reyes - 1.5 percentage points per $1000
GI Bill (Angrist 1993; Stanley 2000; Bound and Turner 2003; Turner and Bound 2003)	Survey of Occupational Change in a Generation, 1973; US Census	Compare enrollment of military enlistees before/during/after eligibility periods	yes - fully subsidized college attendance plus living stipend	non-experimental (between/within cohorts)	total years of educational attainment	~0.25 years of education, or a 5-6 percentage point increase in attendance due to Korean War and WW II GI Bills
Social Security Student Benefits (Dynarski 2003)	National Longitudinal Survey of Youth-1979	Elimination of the program in 1981 - compared those with deceased father before and after	yes - average annual payment was $6700 in 1980 dollars	non-experimental (differences-in-differences)	Enrollment	3.6 percentage points per $1000 of grant aid
State Merit Aid Programs - Georgia HOPE scholarship (Dynarski 2000; Cornwell et al 2006)	CPS and Integrated Postsecondary Education Data System (IPEDS) 1988-1997	Before/after institution of a statewide merit (3.0 GPA minimum) scholarship in 1993	yes - tuition and required fees at public institutions in GA	non-experimental (differences-in-differences)	enrollment; college choice	4-6 percentage points per $1000 of grant aid; increase in enrollment in GA schools

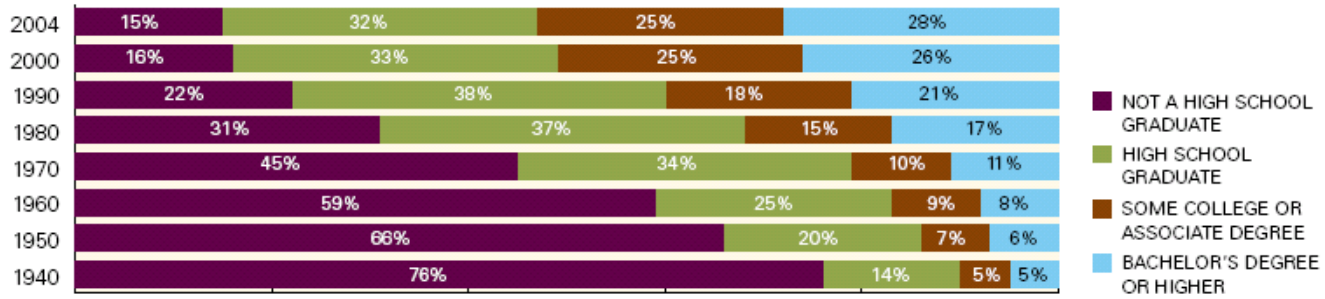
State Merit Aid Program - CAL Grant (Kane 2003)	Administrative Data from California and the National Student Clearninghouse	Discontinuous changes in the eligibility formula for Cal Grants	yes - tuition and required fees at public institutions or a private school grant of ~$9k	regression discontinuity	Enrollment	3-4 percentage point increase (among those who applied for financial aid) for those eligible for Cal Grant A
DC Tuition Assistance Grant (Kane 2004; Abraham and Clark 2006)	IPEDS; Department of Ed. FAFSA data; DCTAG administrative records; SAT data	Allowed DC residents to attend public schools in other states and pay in-state tuition	yes - difference between out and in-state tuition (up to $10k)	non-experimental (differences-in-differences)	enrollment; college location and type	~3-4 percentage point increase per $1000 effective tuition reduction; fraction of DC residents at MA and VA colleges more than doubled
State Merit Aid Program - Multiple/Other (Dynarski 2004; Dynarski 2008)	Current Population Survey	Merit Aid programs in GA and other states - before/after creation of each program	varies - usually tuition and fees at a state public school or equivalent voucher for private	non-experimental (differences-in-differences)	enrollment; college type; completion	~5-7 average percentage point increase in enrollment due to state programs; shift away from 2 and toward 4-year schools; ~ 3-4 percentage point increase in degree completion
Effect of School Aid on Yield Rate (van der Klauww 2002; Linsenmeier et al 2006)	Administrative Data from anonymous colleges, 1989-1993 and 1998	Discontinuous changes in the formula for aid allocation; before/after shift from loan/grant mix to grants only	merit grants for students of higher ability ~$2000 on average; full tuition	regression discontinuity; differences-in-differences	Enrollment	~4 percentage points per $1000 in grant aid; no impact on enrollment overall, but 8-10 percentage points for minorities
Gates Millenium Scholars (DesJardins and McCall 2007)	National Opinion Research Center survey of program participants	Discontinuous change in eligibility based on an application "cut score"	"tops up" diff between need-based aid and price of college	regression discontinuity	retention; loan debt; hours worked	no impact on retention; 60% less debt; 35% fewer hours worked

Figure 2a: Median Annual Earnings of Males and Females Ages 25–34 by Education Level, 1972–2003 (Constant 2003 Dollars)



Note: Includes full-time, full-year workers.
Sources: National Center for Education Statistics (NCES), 2005a, Indicator 14 (based on U.S. Census Bureau, *Current Population Survey*, March Supplement, 1972–2003) and unpublished data.

Figure 2b: Years of Schooling Completed by People 25 and Older, 1940–2004



Note: Percents may not sum to 100 percent due to rounding.
Source: U.S. Census Bureau, 2005, Table A-1.