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Keywords
community college, higher education, tuition, cost

Comments

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Using the Community College to Control College Costs: How Much Cheaper Is It?

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Abstract

Data from NCES indicate that it is two to three times more expensive to educate a student at a public four-year college than at a community college. These figures exaggerate the difference between the two when you calculate the costs of the first two years of education for students working on a bachelor's degree. Using modified IPEDS data from the recently released Delta Project, this study shows that the cost per FTE and the public subsidy per FTE are lower at public master's level colleges than at the community college. Trend data from 1987-2005 are examined along with appropriate cautions for interpreting the results.

Using the Community College to Control College Costs: How Much Cheaper Is It?

Introduction

A college degree has become the arbiter of opportunity for entry into the American middle class (Carnevale, 2008); and, since most of the high wage jobs in the future will require a bachelor's degree or higher (Dohm & Shniper, 2007), the inability to pay for it has the potential for causing a deep social divide within the country. In his February 2009 address to Congress, President Obama called attention to the problems of higher education and promised a policy agenda to restore the U.S. to its leadership role in student access and completion rates. For those within the higher education community, however, the rising cost of obtaining a bachelor's degree and the widening gap between opportunities for the rich and poor have long been important topics of concern (for recent perspectives see, Ehrenberg, 2000; Vedder, 2004; Bowen, et al, 2005; Martin, 2005; Archibald & Feldman, 2008; and Wellman, 2008). In 2006, the highly publicized report from the Commission on the Future of Higher Education (better known as the Spellings Commission) focused the nation's attention on the high costs and low accountability of postsecondary education (U.S. Department of Education, 2006).

Among the solutions mentioned for lowering the cost of obtaining a bachelor's degree is greater use of local community colleges for the freshman and sophomore years (Dickeson, 2004; U.S. Department of Education, 2006; Advisory, 2008; Cellini, 2009). The question of just how much this option might save is the focus of this article.

Cost, price and subsidies

Comparing the costs of going to a community college versus a four-year college is not a simple matter. It is probably easiest when considered from a student perspective, although the calculation would be different for each individual student. Outcomes aside, it is generally considered to be less expensive for a student to attend a public two-year college (Baum & Ma, 2008). However, our purpose here is not to explore cost, or price, from a student perspective, nor to assess the costs and benefits that a student might consider in making such a college choice. Rather, our purpose is to examine what it costs a college to educate a student and what public subsidies are paid to underwrite that cost.

The three research questions that are the focus of this article are 1) whether it is less expensive to educate a student at a public community college than it is at a public four-year college for the first two years of college; 2) whether the public subsidy necessary to educate that student differs; and 3) whether any cost and subsidy differences we discover hold over time.

Throughout this article we will define cost, price and subsidies in the traditional way. When we use the word cost we do not mean tuition only, but rather the full cost of educating a student, no matter who is paying it. Cost is defined and measured by what a college spends per student per year; price, on the other hand, refers to the proportion of cost covered by tuition and fees, which, from a student perspective, may or may not be covered by financial aid; and subsidy is the difference between cost and price, which, in the case of public institutions, is mostly paid for by public appropriations (Delta, 2008). We will not differentiate between federal, state, and local appropriations but will lump them all under the heading of public subsidies.

When we say that the public is worried about the rising cost of higher education we almost always mean the price paid by the student and not the real or full cost of educating that student. In the research community, there is a general consensus that "in public higher education, prices are increasing, costs are remaining fairly steady, and subsidies are declining" (Delta, 2008, no page number).

Previous studies

Very little research has been done comparing the costs and subsidies at the community college level with those of lower division undergraduates at public four-year colleges. An early, often-cited, study of college finance by economist Estelle James found that, when looking at data from California and other selected colleges, it appears that "community college students cost more, pay less, and hence receive a greater annual financial subsidy than do lower division university students" (James, 1978, p.178). Working with data from the 1950's and 60's she estimated that, within public higher education, the lowest cost and public subsidies were at public research universities and that the subsidies paid to the community college per full-time equivalent student (FTE) were about one and one-half times the amount given to educate lower division undergraduates at the four-year level (James, 1978, p. 176 Table 6).

In their seminal study on community college finance, Breneman and Nelson (1981) reviewed the relevant research and concluded that "in general, the level of resources and subsidies spent on community college students does not differ widely from that spent on their lower division counterparts at senior public institutions" (p.118).

A more recent study of the cost difference between the two-year public college and the four-year public college was done by Cecilia Rouse, a member of President Obama's

Council of Economic Advisors, using 1992-93 data from the National Center for Education Statistics (NCES) on mean costs per FTE student (Rouse, 1998). Excluding capital costs, she estimated that, on the surface, it appeared to be almost twice as expensive at the public four-year college (a $3117 difference in 1994 dollars). However, after adjusting the four-year college figure to take into account the more expensive upper-division courses and a minimal number of graduate students, the cost advantage of the two-year college was reduced to $935 per FTE student. Since the tuition at the two-year college is usually lower than at the four-year college, she surmised that the public subsidy to the two-year college per FTE student might be greater. Aware of her data limitations, however, she concluded that conservative estimates suggest that it more likely costs the public sector "about the same or less" to educate a student for the first two years at a community college (Rouse, 1998, p. 614).

The most recent national study which presents data on the cost differences between two-year and four-year colleges is the Delta Cost Project on college costs (Wellman, Desrochers, & Lenihan, 2008). It does not do the same kind of analysis as Rouse (1998) but it does provide the data necessary to do so. Using the improved data from the Delta Project, this article will reexamine Rouse's findings and test to see whether her cross-sectional results hold over a period of years. In addition, we will introduce several additional considerations not addressed in the literature.

Data sources

NCES/IPEDS

In her keynote address at the annual meeting of the American Council on Education in February 2008, and later in her popular textbook (Mellow & Heelan, 2008), Gail O.

Mellow argued that community colleges suffer from inadequate financial support. In support of her argument, she stated that "per capita spending at public community colleges is $9,183—compared to $27,973 for four-year college students" (figures for 2000-01, reported on Inside Higher Education, Feb. 11, 2008). These figures are from the National Center for Education Statistics (NCES), as reported in the Digest of Education Statistics (2005, Table 341), and are presented in summary form in Table 1 below.

Table 1 here

The figures are accurate as far as they go and refer to the average (mean) cost per full-time equivalent student (FTE) rather than the per capita figures quoted from her speech and book. In fact, NCES figures such as these, showing operating costs at the four-year college as double or triple those at the two-year college, are frequently used by researchers and in the media (for a recent example which uses the exact same figures as Mellow, see Doyle, 2009, p.199) . However, they most surely exaggerate the difference between the costs, or spending, per student for the following reasons.

First, as seen in Table 1, the figures for the four-year colleges referenced by both Mellow and Doyle include expenditures by all public colleges and universities including the most expensive research, medical and engineering colleges. If public policy, or simply high costs, were to divert some students from four to two-year colleges, it is likely that most of them would not come from the most expensive research and graduate institutions. They would likely come from less selective colleges that are classified as bachelor's or master's institutions. At these predominantly undergraduate colleges the average operating expenditures per FTE student for 2000-01 was $12,309 and $13,886

for baccalaureate and master's institutions respectively (see Table 1). This is less than half of the $27,973 figure cited above.

Second, the double or triple cost difference exaggerates the spread between the four and the two-year college because it measures the average cost of educating a student at the four-year college over a typical four-year, or more, degree program. It is more expensive to educate upper division undergraduates than freshmen and sophomores, largely because the classes are smaller and perhaps because more specialized equipment is necessary for some upper division classes. To be more accurate, we should consider what it would cost each type of college to educate a student for the first two years only.

Third, the cost difference would be narrowed if we used the median, rather than the mean, average cost. When considering national data and using mean expenditures, the highest cost colleges bring the average up. The more typical college would be represented by the median. This point is emphasized in the Delta Cost study which shows that the difference between the mean and the median for public research universities is 25%, while for the two-year college, the mean is only 7% higher than the median (Wellman, Desrochers & Lenihan 2008, p. 48).

NCES expenditure data come mainly from figures submitted to the U.S. Department of Education each year by colleges in their IPEDS (Integrated Postsecondary Education Data System) report. One of the problems in using data from IPEDS is that they are not always compatible when measuring costs over a multiyear period. This is because the IPEDS survey of colleges has changed over time. "During the 1987 to 2005 year period, [for instance], there have been three changes in IPEDS reporting formats" (Wellman, Desrochers & Lenihan, 2008, p.45). These changes have limited researchers' ability to

conduct cost studies over multiyear periods using NCES/IPEDS data (as an example, see Archibald & Feldman, 2008, p. 293, note 8). The data presented in the Delta Cost Project study are an improvement.

Delta Cost Project

The Delta Cost Project (its full name is the Delta Project on Postsecondary Education Costs, Productivity and Accountability) has received major funding from the Lumina Foundation. It has calculated data on spending into aggregate measures of costs per student and costs per degree/certificate produced.

The Delta Project data uses institutional data reported to IPEDS. In addition, it imputes small amounts of missing data and supplements IPEDS with other national data where necessary. This data set meets the three criteria set out above for comparative studies. That is, it uses, or can be used, to calculate the median costs per FTE, and the difference in educating students for the first two years of college only. It also separates research universities from those that are predominantly undergraduate in nature. And, importantly for our trend analysis, it adjusts the IPEDS data for changes in accounting procedures which make multiyear comparisons of costs more accurate.

The Delta expenditure (cost) data is separated by type of institution and control according to their Carnegie classification. This includes public research, public masters, public associates, private research, private masters and private baccalaureate colleges and universities in all states. For purposes of comparison, we have selected public associate and public master's colleges. Public master's colleges have been selected over public baccalaureate colleges because they are more typical of the colleges that community college students would transfer to or be diverted from. The Carnegie public baccalaureate

list for 2000, for instance, is very short and includes only one college from Florida and one from California. Many states have no public baccalaureate institutions listed.

As it stands, the adjusted IPEDS expenditure data from the Delta Cost Project is an improvement over the data used in previous studies and forms the basis of the calculations used in this study.

What's does the data show?

Costs

Table 2 uses current college expenditure data per FTE student from the Delta Cost Project and employs Rouse's (1998) method of presenting that data. The category of "educational and general" expenditures, which excludes most capital costs, is used to calculate costs and "is a category that existed in IPEDS prior to accounting changes introduced in the late 1990's" (Wellman, Desrochers & Lenihan, 2008, p.23). Rather than using total college spending, the narrower category of "educational and general" spending is generally used in studies of this type because it gets us closer to what is actually spent on educating a student (see Appendix A for more detailed definitions).

Table 2 uses figures for 2005 for purposes of illustration, but the same analysis is later performed for the years 1987 to 2005 for our trend analysis.

Table 2 here

The first two figures in column 1 show the national average (median) total educational and general expenditure per FTE student for two-year and four-year colleges ($9,291 vs. $11,581). These expenditures exclude capital costs and spending for self-supporting activities such as bookstores and dormitories. The figures in column 1 indicate that it cost $2290 less to educate an FTE student at the two-year college (this is labeled the

unadjusted difference). But, as we have suggested, these cost figures are not strictly comparable since the four-year college will have upper-division and graduate students who would be more expensive to educate. Following Rouse, and adjusting the four-year figures for these factors, gives us an estimate of costs at the two-year level compared with those at the lower-division level at the four-year college (this is labeled the adjusted difference). Looking at median average costs in this way, we can see that it is less expensive to educate students for the first two years of a bachelor's degree at the 4-year level ($9291 vs $7638). A further explanation of the calculations used for this adjustment is below and in Appendix A.

Estimating marginal costs

Columns 2 and 3 in Table 2 subtract out various costs of operation in an attempt to narrow down the figures so that an estimation of the marginal (additional) cost of educating a student at each level can be calculated. We stick with Rouse's assumption that FTE costs can be used to approximate marginal costs (Rouse, 1998, p. 614; on this point also see James, 1978 and Winston, 1999). For column 2 we follow Rouse and subtract research and public service expenditures, getting us closer to the marginal cost figure and increasing the cost advantage of the lower-division master's level college over the public community colleges from $1653 per FTE to $1792. In column 3 we reduce that amount by the fixed costs of administration and the operation and maintenance of the plant thus reducing the cost advantage of the four-year college to $1384. Both columns 2 and 3 will be useful in our calculation of public subsidies.

The treatment of fixed costs deserves some attention. Fixed costs should be those costs which do not vary with the level of output. In this case we would need to look at the

number of students rather than any output measure. Typically, fixed costs would include some measure of the cost of capital, but we have excluded most capital costs from our analysis for reasons mentioned later. Following Rouse, we are left with a fixed cost figure which includes academic and institutional support and the portion of capital costs in the operating budget represented by the operation and maintenance of the plant.

Both columns 2 and 3 show that the two-year college has lower costs than the four-year college. But again, if we adjust the cost for the four-year college to reflect lower-division study, we get a different picture. This downward adjustment swings the cost advantage to the four-year college. At the bottom of column 2 the four-year college shows a $1792 per FTE student cost advantage, and with fixed costs eliminated, a $1384 cost advantage over the two-year college. So, in answer to our first research question, on a rough marginal cost basis, it appears to cost between $1400 and $1800 less per year to educate a lower-division student at a public master's level college, if we ignore most capital costs.

Adjusting for lower-division costs

The method used above in adjusting the master's level data for lower-division students is a key part of our analysis and deserves further explanation. Similar attempts to get at lower-division costs were made by James (1978), Breneman and Nelson (1981) and Rouse (1998). In its most recent presentation, Rouse estimates the costs of lower division undergraduates by dividing the unadjusted costs by 1.455. In Table 2 we have used a divisor of 1.5162. In her calculations, Rouse assumes that 90 percent of students in non-research universities are undergraduate students, with 60 percent of undergraduate FTEs lower-division and 40 percent upper-division. Rouse also assumes that upper-division

undergraduates cost 1.5 times as much to educate as lower-division students, with graduate students costing 3.75 times as much (Rouse (1998, p.615, Table 7; for the studies which form the basis of these estimates see Breneman & Nelson, 1981, pp 113-121).

The proportions and weights used by Rouse are difficult to calculate precisely and are not readily available in national data sets. We were able to use IPEDS to calculate the proportion of undergraduate students in master's level colleges at 87.6 percent and used that in our calculations. Changes in the other proportions and weights are more difficult to verify using any national data set. However, three recent state studies indicate that the weights and proportions used by Rouse are still good approximations and, if anything, err on the conservative side.

Looking at the state of California, a Rand corporation study uses an education simulation model which tracks the flow of students from high school through post-secondary education. The purpose of the study is to do a cost/benefit analysis of closing the educational attainment gap "between non-Hispanic whites and lagging minorities, primarily Hispanics and blacks" (Vernez, Krop,Rydell, 1999, p.xx). In doing so, they calculate that at a public 4-year college in California, it costs about three times as much to educate an upper-division student as it does a lower-division student and about 4.6 times as much to educate a graduate student (Vernez, Krop,Rydell, 1999, Table G.1, p. 179). These are well above the cost weights in our study and would make the spread between lower-division and community college students even greater than we have estimated.

In another study done for the Delta cost project, using administrative data from the state of Florida, Johnson (2009) calculates the cost of different majors and separates upper and lower-division undergraduate and graduate costs. For the year 2006-07, he finds that upper-division undergraduate expenditures averaged about 1.46 times more than lower-division expenditures and that master's level costs had a 2.85 weight with respect to lower-division undergraduates (p.7). These are slightly lower than our weights, but Johnson admits that his cost figures are lower than the IPEDS numbers that we are using by about 15-25 percent. Making this adjustment would put his upper-lower division cost weights above those used in our study.

In 2009 the State Higher Education Executive Officers (SHEEO) published a meta analysis of college costs from the four states which had data available by disciplines (Florida, Illinois, New York/SUNY, and Ohio). The study separates upper from lower division and graduate costs and enrollments. They find that lower-division credits make up 43 percent of the undergraduate total in Florida, 43 percent in Ohio and 41 percent in Illinois. The percentage in New York was 59 but the method used in that calculation was different from those of the other three states (Conger, Bell & Stanley, 2009, p. 4). On the cost weights, the SHEEO study found upper division undergraduates were "1.5 times more expensive" (p.7) relative to lower-division students; and graduates were between three and thirteen times more expensive depending upon the state and level of graduate education.

Based on these studies of large statewide systems, it appears that any small changes we would choose to make to our calculations would only strengthen the arguments made in this paper. Thus, erring on the conservative side, we use the 87.6 and 60/40 proportions

along with the cost weights of 1.0 for lower-division undergraduates, 1.5 for upper-division undergraduates and 3.75 for graduate students. This results in dividing the unadjusted 4-year college costs by 1.5162 to get the adjusted four-year colleges costs presented in Table 2 (see Appendix A for the calculation and further discussion).

Subsidies

Columns 5 and 6 in Table 2 present different estimates of the level of public subsidy necessary to cover the cost of educating an FTE. Subsidies are calculated by subtracting the average student tuition and fee revenue per FTE from the costs we have calculated. Typically, as with Rouse, we would use the sticker price for full-time, in-state students to represent the tuition and fee payments. However, for our purposes, it would be more accurate to use the tuition and fee revenue per FTE actually received by the college. This would be the revenue from this source, less any discounts, that the college actually records in its budget. For public institutions, state and local subsidies, and the small private grants (less than two percent for each type of college in our study) they receive, would make up the difference. Federal subsidies to the institutions in our study come mainly in the form of grants to students and this amount would be reflected in our tuition revenue figures.

For 2005, the median revenue from tuition and fees was $2698 for the public two-year college and $5003 for the public four-year college (Wellman, Desrochers & Lenihan, 2008, Table B4). Column 5 (subsidy-1) uses Rouse's method for calculating this public subsidy. It shows subsidies going to four-year colleges ranging from $2110 to minus $312 per FTE, compared to the $3377 per year that goes to the two-year college. The last two figures in column 5 show the differences. The negative subsidy of $312

shows that the four-year college collects more in revenue than the lower division student costs to educate. This negative subsidy was only found for the year 2005 and not for any of the other years (1987-2004) for which we have data. In the likely case that tuition continues to rise faster than public subsidies, freshmen and sophomore students at the four-year college will be even more profitable to enroll.

However, it seems that column 6 (subsidy-2) incorporates a more realistic measure of costs than those used by Rouse. These subsidies are based on the median expenditure figures listed in column 2, which include the fixed costs of administration and the operation and maintenance of the plant. Excluding fixed costs is the typical procedure when estimating marginal costs. It is justified when talking about the short run where, for instance, the diversion of students from the four-year to the two-year college would be considered temporary. But, if a state's master plan does not see this diversion as temporary, we really should be looking at the long run, where all costs must be covered. As Gordon Winston has argued, "marginal cost looks a whole lot like average cost in higher education" (Winston, 1999, p. 33). If we include fixed costs as part of the median FTE cost, the cost advantage for the two-year college of $1985, shown at the bottom of column 2, turns into a $1792 advantage for the four-year college once we adjust it for lower division students. Since the community college has $2305 less in tuition and fee revenue per FTE than the four-year college the subsidy to the latter is $4097 lower than that given to educate students at the two-year college. Once we start talking about the long run we should also include capital costs in our calculations. Following Rouse, capital costs were excluded from all of the figures in Table 2 because the existence of excess capacity was assumed. This is not a good assumption for the long run. Capital

costs are assumed to be higher for the four-year than for the two-year college. We don't have a good estimate of capital costs per FTE student, but including them, even after considering the fact that many community colleges are now building dormitories, would probably reduce the advantage that the four-year college has over the two-year college, both in terms of a lower FTE cost and subsidy.

Average annual subsidies per FTE

The argument that community colleges receive higher subsidies than do public master's level colleges might be countered by looking at the payments made to each type of college in a state budget which might show the reverse. Our argument that the four-year college costs less and receives lower subsidies only appears once we adjust the four-year data for lower division students. This subsidy figure can't be found in state budgets as subsidies may be only loosely connected with costs. Thus, our estimates of the subsidies for lower division students is only a calculation of the subsidy necessary to cover costs, not of the actual average subsidy paid which would usually be higher. This suggests, again, that lower division students are the relative "cash cows" of higher education, providing the college with excess revenue which is used to support more expensive upper division and graduate education. As James suggested some time ago, "undergraduate institutions can survive very well without graduate students, [but] graduate institutions cannot exist without a large undergraduate base" (James, 1978, p. 181).

It is also important to remember that our definition of subsidy includes both state and local budget allocations. This would not affect master's level colleges but it has important policy implications for community colleges in most states. In this study we are attempting

to account for all of the public subsidies, beyond those given directly to students (such as most federal financial aid), whatever the source. Nationally about 20 percent of the community college budget is supported by local governments. A given state may look at its allocation to support the community college and find that it is less than that going to master's level colleges. This gives it an incentive to support the community college even though the total public subsidy (state plus local) is much higher.

From this analysis, we offer the tentative conclusion to our second research question that the shift of bachelor-degree-seeking freshmen and sophomores from a public master's level colleges to a community college would cost the public sector about $4000 per year more per FTE in 2005 dollars. If additional funding could not be found, colleges would be pressured to reduce costs by employing more contingent faculty, increasing class size, reducing student services and/or employing the host of belt-tightening procedures so prevalent in recent years. Of course, these are national averages. All states have different costs, tuition levels and degree of public subsidies. Likewise, individual colleges within a state will have different cost and subsidy levels depending on their program mix and missions.

We now turn our attention to our third research question and examine whether the cost and subsidy differences shown in our cross-sectional analysis hold over a period of time.

Trend analysis

The analysis profiled in Table 2 was carried out for the years 1987 to 2005. Figures 1-3 show some of the results with cost figures per FTE shown for selected years to allow for easier reading. All figures are adjusted for inflation using the consumer price index. As Figure 1 shows, when looking at unadjusted data, the two-year college maintains a cost

advantage over the master's level colleges throughout this period. Costs generally rise from 1987 to 2001 but fall after that period. However, after we adjust the four-year college data to account for only the freshman and sophomore years, we find that the costs per FTE student per year are higher at the two-year level for the entire 1987-2005 period.

Figure 1 here

Rouse (1998) calculated the level of public subsidy for the 1992-93 year and speculated that it might be higher for the two-year college than for the first two years at the four-year college. Using her method we have calculated the same subsidy (subsidy-1) for the period 1987-2005. The results are shown in Figure 2. In it, using our improved data set, we can see that she was right and that the same can be said for the entire 1987-2005 period. In addition, by the year 1997 the unadjusted subsidy going to the two-year college was even higher than the unadjusted subsidy going to the four-year college. Bear in mind that the subsidy calculated in Figures 2 and 3 for lower division students attending the four-year college represents only the amount that is necessary to cover costs and not the actual average subsidy that is paid.

Building on Rouse, we calculate a subsidy level (subsidy-2) which covers fixed costs. As shown in Table 3, the subsidy to the two-year college is higher than it is to the four-year college on an adjusted basis over the entire 1987-2005 period. Looking at the unadjusted data, which include all students at the master's level colleges, we find that, before 2004, their subsidy is higher than that going to the two-year college, but after that it falls below it. Considering the entire 1987-2005 period, the two-year subsidy has fallen from $6706 per year per FTE student in 1987 to $6412 in 2005, a decline of 4.4 percent

in constant dollars. On the other hand, the decline for the four-year college was 18.3 percent based on the unadjusted data and 43.7 percent for the adjusted data. This seems to reflect the relative favoring of the two-year college and, at the master's level colleges, of upper-division and graduate education over education for the first two years of college.

Figure 2 here
Figure 3 here

In summary, our trend analysis shows that, for the 1987-2005 period, the two-year college gets more per FTE student per year, using both the subsidy-1 and the subsidy-2 measures, than the master's level colleges once we adjust the four-year college data for lower-division study only. But, even when we don't adjust the data, we find that both measures of the subsidy show that, by 2004, it was cheaper to support students at the four-year college. It is worth stating that our purpose here is not to speculate on what might account for these changes but simply to show what has happened.

Additional considerations

It is worth remembering that our calculations use the best available national data. All states have different costs, tuition levels and degrees of public subsidies. Cost data for the individual states were not available from the Delta Project at the time of this writing; but, looking at national data, our analysis has led us to the conclusion that it may cost quite a bit less to educate a lower division student at a public four-year college than it does at a public community college and that the public subsidy is also less at the four-year level owing to both lower costs and higher tuition. In this section we speculate on some of the possible explanations for our findings and highlight some of the shortcomings and biases of our data. All of these suggest areas of interest for further research.

Capital costs

Ideally all capital costs would be included in our figures but, as stated, only the small proportion that may be part of the operating budget are included. It is typically assumed that total capital costs are higher at the four- than at the two-year college and, if so, this would give a downward bias to our cost and subsidy estimates for the public master's level colleges. (The conceptual and practical problems of computing the annual FTE costs of capital are covered in Winston, 1998). On the other hand, students in vocational programs at the community college probably have higher space and equipment costs during their two years of college, than do history majors in their first two years of college at the four-year level. Calculating the true capital cost per FTE for our two- and four-year college comparisons would depend on the program mix that students are enrolled in and where the student shifts occur should the higher out-of-pocket costs push more students to the two-year college.

Community colleges

At the community college we might speculate that the cost per FTE could be lower than at the master's level colleges because full-time faculty teach more classes and their salaries are lower. The difference in both salary and total compensation is about $10,000 for all ranks combined whether you look at AAUP or NCES data (AAUP, 2008; U.S. Department of Education, 2007). In addition, more than two thirds of the faculty are part-timers at the community college, compared with 28 percent at public four-year colleges, lowering costs even more (U.S. Department of Education, 2007; Phillippe & Sullivan, 2005).

On the other hand, reasons can be found for the expectation of high costs at the community college. Some of these have to do with the nature of the student body at these colleges. It is well documented that the level of academic preparation of students entering the community college is generally lower than that at most four-year colleges. This necessitates the greater use of remedial education which not only raises the student's costs of obtaining a degree but may also raises a college's average costs of instruction, due to the smaller size of the classes that are customary for remedial students and the greater need to offer them student support services. Just as poorly prepared, and probably lower income students, impose a higher cost on the community college, so might the higher proportion of part-time students do the same. An FTE at the four-year college is mostly made up of full-time students while an FTE at a community college is not. Two half-time students may cost more than one full-time student in terms of administrative and student support services.

It is also the nature of the community college to have a high student turnover rate due, in part, to the fact that it offers only a two-year degree and also to the fact that it has a low retention rate. It is likely that students with poor study habits and less of an attachment to higher education need a lot of support during the first semester or year of college. This is probably less the case at the four-year level and perhaps for juniors and seniors who have learned to navigate the system and are less in need of such services. Thus, if student support costs are front-loaded, it raises the average costs at the community colleges. Compared with the four-year college, therefore, the community college has a higher proportion of high-cost, first-year students.

Aside from the nature of the student body, the program mix at the community college also impacts costs. In our analysis, we have considered the average cost of educating students without regard to their program of study. The first two years of vocational and technical programs have higher costs than do humanities and social science programs. At one college in upstate New York, Romano, Losinger & Millard (2010) showed that the cost per credit hour and per degree granted for a student in the health science and technical areas is three to four times higher than it is for a typical liberal arts student. In any case, if a community college, or those in a state system, had a program mix that was weighted toward vocational and technical occupations, then we might expect the cost per FTE to be high. If the colleges were more oriented toward transfer and had fewer expensive vocational programs, average costs would be lower and at some point the cost advantage of the four-year college might disappear.

Reflecting back on our analysis, it would be safer to conclude that costs and subsidies are lower for the first two years at master's level colleges than at community colleges, given the current distribution of students by program. If students are diverted from the 4-year to the 2-year college we cannot be sure how the program mix would change.

Four-year colleges

We might speculate that the costs of educating freshmen and sophomores are lower at the four-year college because many introductory level courses have larger classes and some of the teaching might be done by graduate students. But, countering this, some of the costs of educating graduate students would have to be put back into the equation since the graduate students would not be present without the programs and research to support them. This would raise costs of the lower-division students beyond those that we have

calculated. This underscores the fact that "undergraduate education is jointly produced with research and graduate education," making costs difficult to calculate (Breneman & Nelson, 1981, p. 120). If we were able to make these upward cost adjustments it would narrow the difference in costs between the two- and four-year colleges. In addition, by using average tuition revenues for the four-year college, we have masked the policy in many states to charge a higher tuition for upper division students. The lower tuition paid by lower-division undergraduates would raise the public subsidy needed to educate these students and again help to narrow the gap between the two- and four-year college.

Starting a bachelor's degree at a community college might also raise student costs unless all of the courses taken were transferable toward a four-year degree. Lengthening the time of study at the four-year level would increase the total public subsidy necessary to produce a degree.

So?

The discussion above suggests that the cost and subsidy figures we have calculated have both upward and downward biases. It is not clear how these additional considerations would impact our conclusions. Clearly, additional research and better data are needed to answer these questions. Our unadjusted average costs per FTE show that the two-year college has some cost advantage. Looking at these figures, researchers can continue to say that "costs per student at two-year institutions are significantly lower than costs per student at four-year institutions" (Archibald & Feldman, 2008, p. 279; Cellini, 2009; Doyle, 2009). However, when we adjust the costs figures for lower division students it muddies the water. The cost advantage would change depending on which students were diverted to either the two- or the four-year college and which programs

they were moving to and from. On a larger scale, costs and subsidies would also depend on whether the student shifts were between public or private colleges and whether the four-year college was a high-cost research institution or, as we have assumed, a lower-cost public institution. Thus, while calculating the exact impact on these student shifts is beyond this paper, we are still led to the conclusion that it is probably not any cheaper for the public purse (state plus local) to educate most students for the first two years of a bachelor's degree at the community college. This strongly supports the conclusions of the earliest study of this issue by James (1978) and confirms the suspicions of Rouse (1998) that community college subsidies are larger than those going to lower division undergraduates at four-year colleges.

Equity

Throughout this paper we have not made any judgments about the appropriate level of costs or subsidies. Even if FTE costs were higher at the community college, funding these colleges might still be justified on the basis of access. Or, since we know that lower income and minority students are more likely to enroll in the community college, we might argue that equity considerations justify a higher subsidy. In fact, our analysis suggests that low income students who use the community college for the first two years of a bachelor's degree and then transfer to a four-year college receive high public subsidies. Outcomes aside, this is a less regressive pattern of financing than if the same student had started at the four-year college. Further equity questions along this line are explored in Romano (2005).

In addition, our analysis says nothing about the fact that local and state governments might want to support higher cost programs at the community college to promote local

economic development. In short, there are a number of equity and labor market issues that we did not broach but which are important ingredients in any public policy decision over funding

Outcomes

Critics will remind us that, even if we could show that it costs less to educate students at the two-year college, we must also think about what we are getting for our money. This is an important question with an incomplete answer at this time. The largely polemical arguments of the 1970's and 80's (as examples see Pincus,1980; Brint & Karabel,1989), that attending community colleges had a negative effect on educational attainment, have been replaced by more rigorous studies as better data have become available. After a review of the evidence, Rouse states that "overall it appears that two-year colleges increase educational attainment by an amount equal to four-year colleges" (Rouse, 1998, p. 613). Other recent research shows that educational attainment has been increased by the expansion of the community college and does not divert a significant number of students from their educational goals (Hilmer, 1997; Grubb, 1999). A recent examination of this topic by Leigh & Gill (2003) concluded that “policymakers should not be overly influenced by [the negative] diversion effect arguments in designing the role of community colleges in state-level master plans for higher education” (p. 28).

Despite these studies, evidence does exist that starting a bachelor’s degree at the community college puts the student at a disadvantage (Doyle, 2009; Long & Kurlaender, 2009). Many researchers would probably agree with Pascarella’s statement that students “are about 15% less likely to complete a bachelor’s degree in the same period of time as similar students who start at four-year colleges and universities” (Pascarella, 1999, p.10).

If this is the case, one answer to this problem is to improve the transfer process (see Wellman, 2002 for suggestions). Another might be to convert the community college into a lower-cost bachelor's degree producer. At the present time, 14 states have permitted their community colleges to offer selected four-year degrees (Townsend, 2009). Whether the expected lower cost at the community colleges would be the result of increased productivity or lower quality is an open question.

Thus, while the question of equal outcomes is still a matter of debate, it is clear that lower out-of-pocket student costs will continue to lure more students to the community college as their entry point into higher education. Public policy will no doubt follow this flow with the argument that less funding can be provided to the public four-year colleges and that public subsidies for higher education can be reduced by supporting students at the community college level. Our research suggests that this may not be the case.

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Appendix A Data Definitions and Calculations

Data used in the calculations found in Table 2 and Figures 1-3 have been downloaded from the Delta Cost Project. Those not explained in the body of the paper include (from Wellman, Desrochers & Lenihan, 2008, 24, 48-50):

1. **FTE**= Full-time equivalent student. All FTE figures are for fall enrollments and include both full-time and part-time students.
2. **Total education and general expenses** include all spending for core operating support, excluding auxiliary enterprises (self-supporting activities such as book stores and dormitories). This includes all instructional costs as reported to IPEDS + research + public service + student services + institutional support + operations and maintenance + scholarships and fellowships.
3. **Tuition and fee revenue** includes all revenue reported by the institution from these sources, less any institutional grants and tuition discounts.
4. **Capital costs** include the cost of land, buildings and equipment. Most of this is excluded from our figures but may include amortization and depreciation of equipment and payments for debt service if those costs are in the current operating budget as reported to IPEDS.
5. **Computation and alternate measures of the divisor**:

Computation of the Divisor

Groups	Proportion from total	Proportion of each group	Cost Weight each group	Adjustment Factor
	(1)	(2)	(3)	(4) = (1) x (2) x (3)
Upper division undergraduate	0.876	0.4	1.5	0.5256
Lower division undergraduate	0.876	0.6	1	0.5256
Graduate	0.124	1	3.75	0.465
			Total	**1.5162**

Description:
For Master's level colleges 87.6 % are undergraduate students and 12.4% are graduate students.
Of total undergraduate students, 40% are upper division students and 60% are lower division students.
The cost per FTE is weighted as follows: graduate students, 3.75; upper division undergraduates, 1.50; lower division undergraduates, 1.00; and unclassified students 1.00

In order to adjust the master's level data to account for only lower-division costs we have used a divisor of 1.5162. Critics might claim that our proportions and weights are wrong but this would only be true if very unreasonable assumptions are made. In order to make the community college less expensive we would have to get to a divisor of less than 1.25. At the extreme, we could do this if we made all of the weights and proportions equal. Common sense tells us that this can't be right. We have verified using IPEDS that nationally 12.4 percent of master's level enrollments are graduate students. Even if we gave them a cost weight equal to that of the upper-division students it would still give us a divisor of 1.43. Or perhaps we could make the unreasonable assumption that 50 percent of undergraduates are upper-division students and that they cost the same as lower-division students-- that would still give us a divisor of 1.35. In playing with these ratios

and weights no reasonable assumptions, that do not violate common sense, can be found which gets us to a divisor below 1.25.

Tables and Figures

Table 1 Current Fund Expenditures per FTE of Public Colleges for 2000-01 (in 2001 dollars)

4-year	$27,973
Doctoral, extensive	37,738
Doctoral, intensive	21,290
Master's	13,886
Baccalaureate	12,309
Specialized institutions……	101,090
Art, music, or design	28,427
Engineering or technology	23,794
Medical or other health ...	325,371
Tribal	22,159
Other specialized	18,231
2-year	$ 9,183
Associate of arts	9,173
Tribal	17,096

Table 2. Median expenditures, tuition and fee revenue and subsidies per FTE at public two- and four-year colleges, 2005 (in thousands of 2005 dollars)

Educational and general expenditures per full-time equivalent (FTE) student	Total	Minus research & Public Service	Minus R, PS & fixed costs	Tuition & fee revenue	Subsidy-1	Subsidy-2
	(1)	(2)	(3)	(4)	(5)	(6)
Two-year college	9291	9110	6075	2698	3377	6412
Four-year (public) college[a]	11,581	11,095	7113	5003	2110	6092
Four-year (public) college adjusted (lower division)[b]	7638	7318	4691	5003	(312)	2315
Difference: 4-yr. minus 2-yr:						
Four-year college (unadjusted)	2290	1985	1038	2305	(1267)	(320)
Four-year college (adjusted)	(1653)	(1792)	(1384)	2305	(3689)	(4097)

Source: Delta Cost Project IPEDS Database; and U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), 2006. Computation by DAS-T Online Version 5.0 on 11/13/2009

Col. 1 = operating costs (excludes capital costs).
Col. 3 = col. 1 minus research (R) and public service (PS) and fixed costs (administration; operation and maintenance of plant)
Col. 5= col. 3 minus col. 4
Col. 6= col. 2 minus col. 4
a= public master's level (excludes research universities)
b= 4-year college figures are adjusted to approximate the costs of lower-division instruction using a divisor of 1.5162.

Figure 1 Median FTE Costs for Two- and Four- Year Colleges, 1987-2005 (in 2005 dollars)

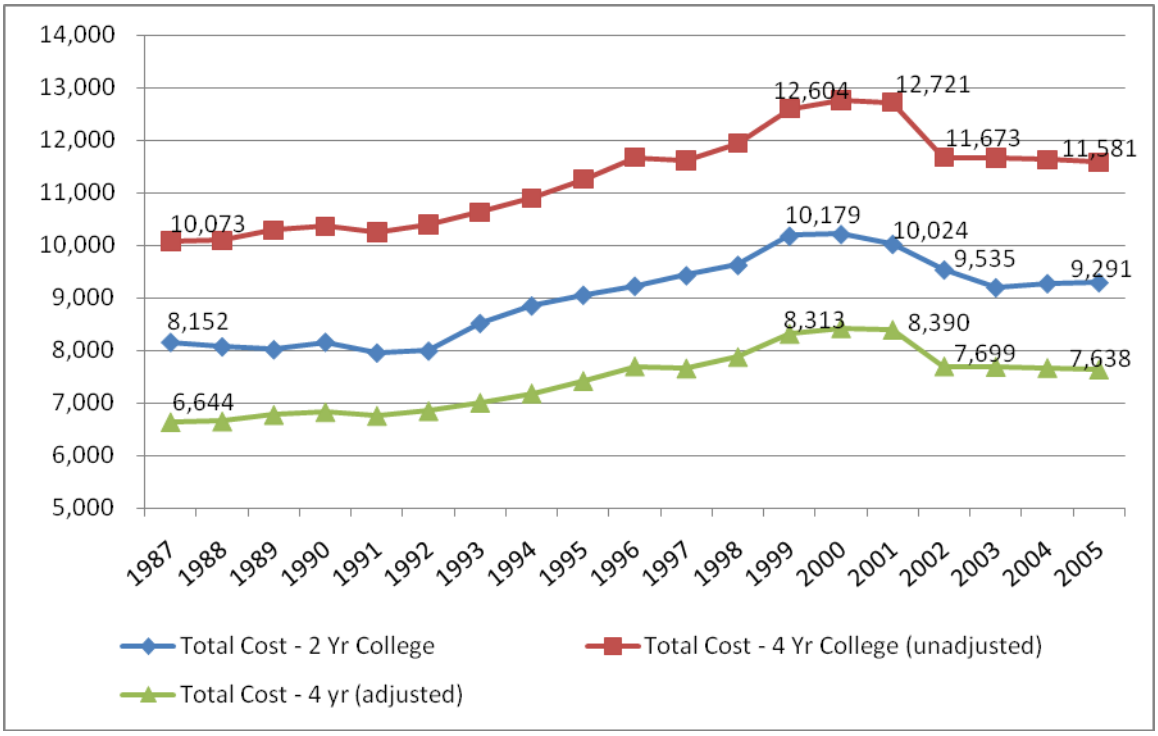

Figure 2 Subsidy-1 Median FTE Public Subsidies for PublicTwo-Year Colleges vs Unadjusted and Adjusted Data for Four-Year Colleges, 1987-2005 (in 2005 dollars)

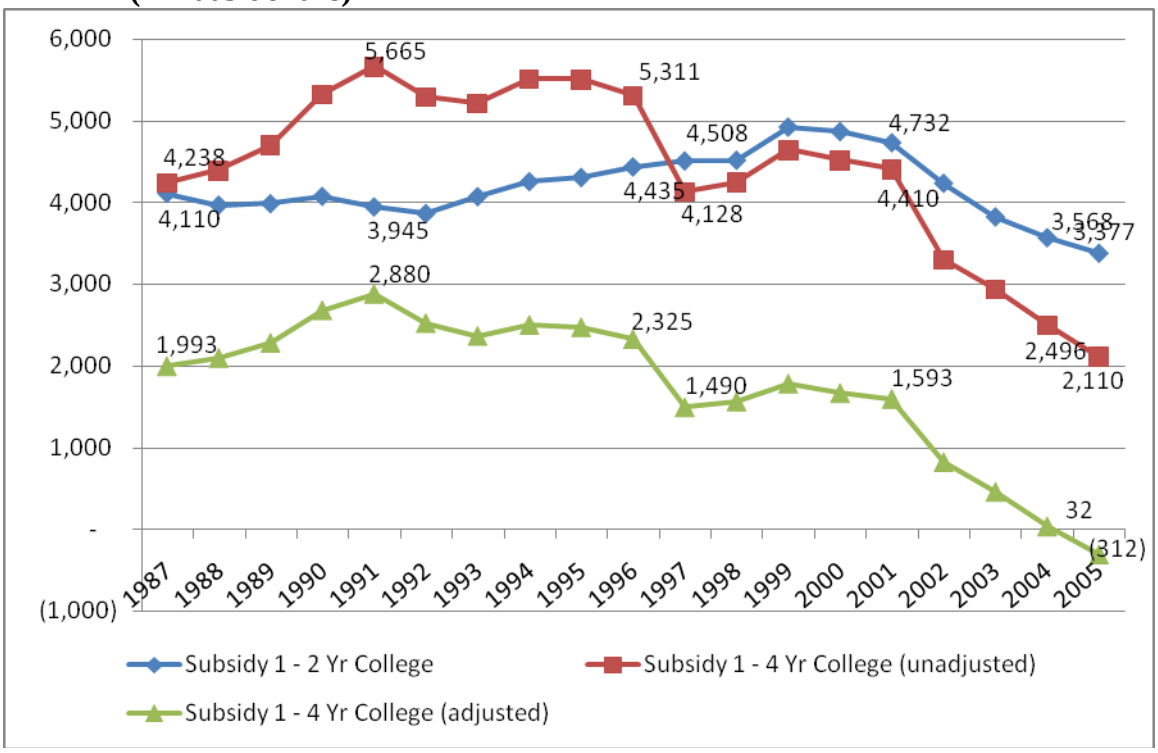
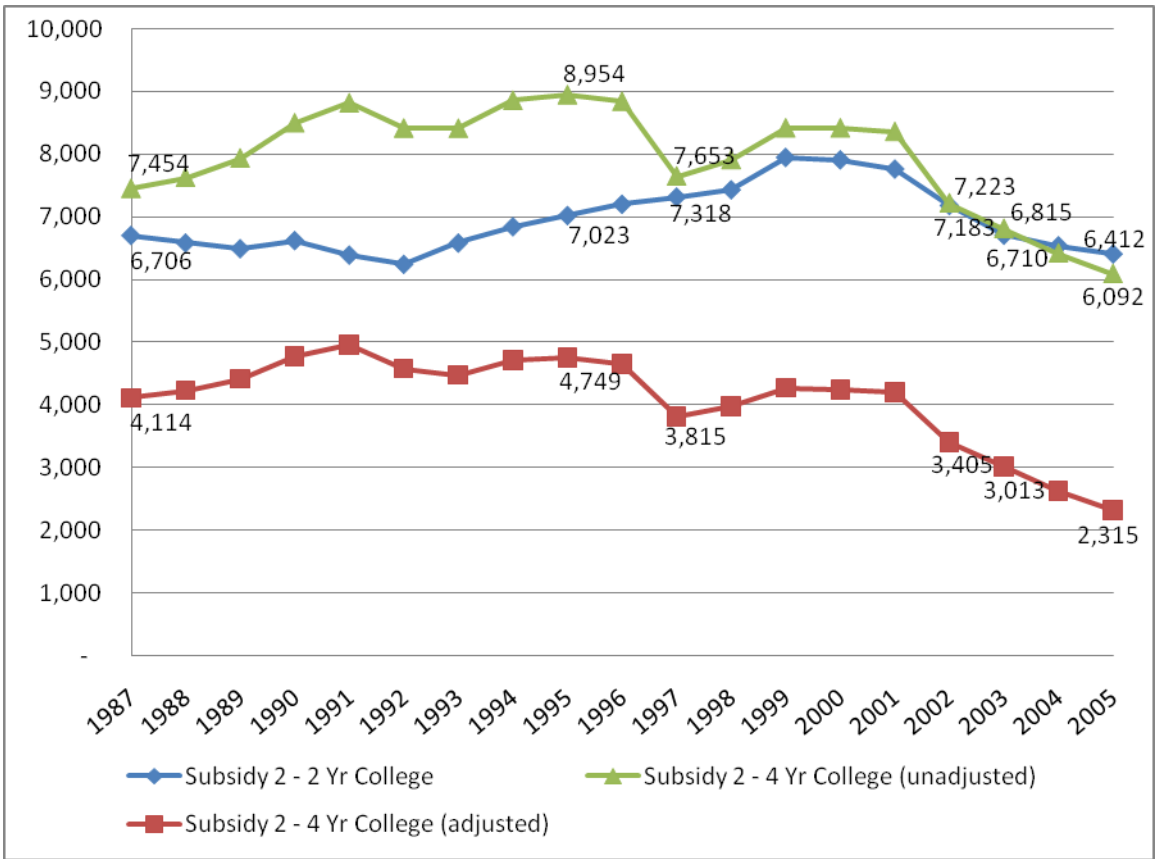
Figure 3 Subsidy-2 Median FTE Public Subsidies for PublicTwo-Year Colleges and Unadjusted and Adjusted Data for Four-Year Colleges, 1987-2005 (in 2005 dollars)