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The Financial Impact of Part-Time Enrollments on Two-Year Colleges

A Marginal Cost Perspective

The number of part-time students attending public two-year colleges increased rapidly during the 1970s. By the end of the decade, aggregate part-time enrollment constituted about 63 percent of total headcount enrollment at those institutions [26]. Concern has been expressed about the financial implications of this trend from an institutional perspective. The question is whether the conventional ratio (three-to-one or so) for converting part-time to full-time-equivalent (FTE) enrollment accurately represents the actual costs of providing services to part-time versus full-time students [see, for example, 1, 23, 29, 39]. This question has not been explored empirically in the literature except for Kress [22], tangentially, and Brinkman [4].[1]

The conventional three-to-one ratio is not a hard and fast rule, but it is grounded in typical student behavior, at least in the instructional area. Although national data on student credit hours are not available, a sampling of reports published by state agencies indicates that a part-time student at a public two-year college generally does take about one-third as many credits as a full-time student, with some variation by state [7, 28, 29, 33, 38]. Comparable data about institutional services other than instruction are not available. Some would argue (see Ohio Board of Regents [30] for an opinion survey on this issue) that for many of the activities included within "student services," a part-time student may require as much by way of institutional resources

[1]See [18] for a pertinent review of the literature on community college finance through mid-1980. For recent, wide-ranging discussions of community college finance, see [3, 13, 32].

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as a full-time student requires. If so, then reliance on the three-to-one ratio for funding or allocation could inadvertently have adverse effects on institutional finances.

The purpose of this article is to assess the relative effect of part-time versus full-time students on several types of expenditures in two-year colleges. Institutional expenditures for instruction, student services, and (total) educational and general purposes are considered. The financial impact of part-time and full-time students are assessed in terms of marginal costs, that is, the change in total costs (expenditures) associated with the enrollment of one additional student. Marginal costs are estimated for both part-time and full-time students for each expenditure type. The estimates are compared with one another, and the results are discussed in relation to ratios used for converting part-time to FTE enrollments. A determination of average costs would address more directly the concerns mentioned at the outset; however, because services are typically provided jointly to full-time and part-time students, that determination is difficult to make. Fortunately, because the two costs are related, estimates at the margin can provide some idea of the behavior of average costs as well.

Instruction and student services, as conventionally understood in higher education, account for a large proportion of the services that are provided directly to students. Traditional classroom teaching is the predominant activity of instruction, while student services includes a wide variety of activities (for example, registration, admissions, personal counseling, career counseling, testing, and financial aid processing). Disparate modes of operation in the two areas should be reflected in disparate expenditure patterns. In both cases, the overall resources required by a typical part-time student are surely less than those required by a typical full-time student. The difference should be greater for instruction than for student services, however, because the latter includes many activities, such as registration and personal counseling, that often require the same amount of institutional effort regardless of whether the student has full- or part-time status. It is also hypothesized that the magnitude of the marginal-cost ratio between full- and part-time students will be roughly three-to-one for instruction, based on relative credit-hour loads for the two types of students (as mentioned earlier). It should be noted, however, that the ratio was found to be considerably higher than that in a previous study [4]. The expectation for student services is that the marginal-cost ratio will be somewhat less than three-to-one.

Educational and general expenditures include expenditures for both instruction and student services, as well as for numerous other functions (academic support, institutional support, operation and maintenance of the plant, and so forth). Relating this composite expenditure category to full- and part-time enrollments is a means of assessing the relative impact of the two types of students in the context of a broad measure of institutional finances. Because of the preponderant weight of instruction within the total budget of most two-year colleges, the ratio of full-time to part-time marginal costs for educational and general purposes should be similar to that for instruction.

The results of the analysis are intended to provide background information for assessing the appropriateness of particular funding formulas, tuition rates, and fee levels. Estimates of the relative cost of providing services to full-time versus part-time students will also be useful for enrollment planning, in that the estimates provide a basis for assessing the financial impact of various mixes of enrollment alternatives.

Model

The relationship between expenditures and enrollment was examined by estimating several translog cost functions. Theoretically, an industry's cost and production structure can be equivalently analyzed using either a cost function or a production function. When the level of output is determined exogenously, as is generally true in public higher education, the former approach is preferable [27]. Using cost functions is often more convenient as well, especially when analyzing multiproduct enterprises. In any case, it is the predominant approach in recent literature.

The general form of a cost function may be expressed as

$$C = C(Q,P;T) \tag{1}$$

where total cost, C, is represented as a function of output, Q, the prices of inputs, P, and a set of technological conditions, T, that may have some effect on the relationship between C and Q [24].[2] Under theoretically ideal circumstances (that is, intent to minimize costs coupled with full knowledge of all production relationships), the cost function specifies the minimum cost for a given level of output. As it is generally agreed that the actual circumstances prevailing at higher edu-

[2]Estimating a cost function is appropriate only if total costs are a function of output, and output does not at the same time depend on total costs. Although that one-way relationship is assumed here, the possibility of simultaneous-equation bias should be kept in mind in weighing the results of the study.

cation institutions do not fit the theoretical model [2], the cost functions estimated here simply reflect average institutional behavior (for a similar situation with respect to hospital costs, see Pauly [31]). Cohn [6] refers to such cost functions as "approximate."

Selecting a particular form for the cost function is essentially a matter of deciding what can and cannot be assumed about the relationships and overall behavior of the variables in the function. In recent years, econometricians have turned increasingly to one or another version of the translog model because it imposes the fewest restrictions on cost and production behavior [5, 34]. In the translog function, all variables are expressed as natural logarithms, and all independent variables are interacted with one another and taken to the second power.[3] So constituted, the function contains no separability or homogeneity of output assumptions. That is, the behaviors of the independent variables are not assumed to be unrelated to one another, nor are total costs assumed to increase exactly in proportion to increases in output. Such assumptions can lead to distorted estimates of marginal costs [5]. The translog function does incorporate two regularity conditions: total costs must increase in proportion to an increase in the prices of inputs, and in the same direction as an increase in output. Generally, in the absence of prior knowledge about the proper functional form, the more flexibility that is preserved, the better.

Variables

In the translog model used for the present study, costs were represented by reported expenditures, output by the number of full-time, part-time, and noncredit students, prices by average salaries for full-time faculty, and technological conditions by program emphasis, the percent of students earning degrees, and the system status of the institution (i.e., free standing or part of a system). Reported expenditures for the instructional and student services functions represent direct costs only—for labor primarily, along with supplies, travel, and certain other expenses. Educational and general expenditures are also pre-

[3]In general form, using the notation from equation 1, the translog cost function can be written as

$$\begin{aligned} lnC = {} & a_o + \sum_r a_r lnQ_r + \tfrac{1}{2}\sum_r\sum_s a_{rs} lnQ_r lnQ_s + \sum_i b_i lnP_i \\ & + \tfrac{1}{2}\sum_i\sum_j b_{ij} lnP_i lnP_j + \sum_k d_k lnT_k + \tfrac{1}{2}\sum_k\sum_l d_{kl} lnT_k lnT_l \\ & + \sum_r\sum_i lnQ_r lnP_i + \sum_r\sum_k h_{rk} lnQ_r lnT_k + \sum_i\sum_k m_{ik} lnP_i lnT_k + e. \end{aligned}$$

dominantly for personnel but also include the cost of utilities, library acquisitions, and so forth.

Properly speaking, the number of students enrolled is only a proxy for output. It is appropriate for the purpose of this study because funding of two-year public colleges is often driven by enrollment. By using both full- and part-time enrollments as output measures in the model, we can estimate their respective impact on total costs without resorting to the use of FTE enrollment data. The latter data are subject to inconsistent reporting across institutions. The third type of output, noncredit enrollment, is not a major cost factor at the typical two-year college (on average, only about 4 to 5 percent of instructional expenditures are for this purpose according to Dickmeyer and Cirino [10]). It does add a relevant dimension, though, when outputs are characterized in terms of enrollment.

From the perspective of this study's primary objective—obtaining marginal cost estimates for full- and part-time students—the remaining variables in the model serve as controls, or intervening variables [19]. The prices of inputs will differ from one institution to another. Data are available on one key input price, the average salary paid to full-time faculty. In the instructional cost model, this price is used to represent not only faculty costs (for both full- and part-time instructors) but also nonfaculty costs. In other words, it is assumed that institutional differences in clerical wages, for example, as well as in salaries for part-time faculty, will be highly correlated with differences in salaries for full-time faculty, and thus that all of these costs can be adequately represented by the one variable. In the student services cost model, average faculty salaries are again used—for lack of better data—on the assumption that salaries for student services personnel will typically be highly correlated with faculty salaries. Similarly, for educational and general expenditures, average faculty salaries are used to represent price differentials across institutions for a variety of inputs. With only one price variable in the model, no interaction terms involving that variable are needed—there are no substitution possibilities to accommodate.

Two-year colleges also differ with respect to the composition of their enrollments and their curricula, both of which could affect unit costs. In addition to the full-time versus part-time issue, which is already being addressed in the model, a higher percentage of degree completers might be expected to lead to higher per-student costs in both the instructional and student services areas. To complete a degree, students must take advanced, presumably more expensive, courses. They may also need additional counseling or other assistance along with degree certification. With respect to the curriculum, differences in the unit costs of programs, such as the cost of a student credit hour in engineering versus one in arts and sciences, have been well documented [12, 35, 37]. For the present study, the extent of an institution's commitment to (relatively) high cost programs is represented by the combined percentage of degrees awarded in mechanical and engineering technologies, health services, and natural science programs.

Public two-year colleges can be part of a system of institutions or they can stand alone. If, in the former case, some administrative functions are carried out at a system office, the effect will be to lower institutional expenditures relative to a comparable stand-alone institution that must handle all administrative functions. In dealing with this matter here, so-called branch campuses were eliminated from the sample altogether. For the remaining institutions, a dummy variable was used to distinguish between those with some sort of system or multicampus arrangement (value = 0) and the stand-alone institutions (value = 1). So constituted, the expected sign on the variable is positive, or, in other words, the cost function is expected to be shifted upwards for stand-alone institutions. (See Cowing and Holtmann [8] for a similar use of dummy variables in a translog cost function.)

Data

Raw (untransformed) mean values for each of the variables are shown in Table 1. All variables except the dummy for system status appear as natural logarithms in the estimating equation. All data are

TABLE 1
Means and Standard Deviations for Variables

Variables	$\bar{X}$	S.D.
CI (total expenditures for instruction)	$3,524,000	$3,463,000
CS (total expenditures for student services)	$ 610,000	$ 676,000
CE (total educational and general expenditures)	$7,006,000	$6,951,000
FTS (number of full-time students)	1,645	1,588
PTS (number of part-time students)	2,840	3,614
NCS (number of noncredit students)	4,335	8,825
AVGSAL (average salary of full-time faculty)	$ 18,578	$ 3,765
DEGP ([number of degrees awarded/number of full-time students] × 100)	29.0%	13.4%
HCP ([proportion of degrees earned in engineering + natural science + health services] × 100)	36.2%	19.9%
SYS (dummy, where 1 = stand-alone institution; 0 = part of system or of multicampus)	0.693	0.461

for 1979–80. The source for all data was the Higher Education General Information Survey (HEGIS), except for data on noncredit enrollments which came from the annual directory of the American Association of Community and Junior Colleges [14]. Although HEGIS data have been shown to contain errors [as in 25], there is no reason to suspect the presence of systematic error that could bias the study.

The number of institutions studied was 779, or about 75 percent of all public two-year institutions in 1979–80; excluded institutions primarily lacked one or more data elements, enrolled fewer than 200 FTE students (full-time headcount plus one-third of part-time headcount), or were branch campuses. A handful of outliers were also excluded. The sample was not randomly drawn, then, but it was broadly representative of public two-year colleges. The model was estimated using ridge regression. The abundance of squared and interaction terms in a translog model usually leads to multicollinearity problems. By introducing a small amount of bias into the system, ridge regression makes it possible to estimate parameters that are more stable when severe collinearity is present than those estimated by ordinary least squares under the same circumstances [9, 17, 21, 36, and, for critical commentary, 20].

Results

The results of estimating the translog function are shown in Table 2. The general results are about as expected. The models explain much of the variation in total costs among institutions, especially for instruction and educational and general expenditures. The output variables (in second-order form), along with average salaries, are positively related to expenditures across all three expenditure categories. Several other variables and interaction terms also appear to be important in the model.[4] Of course, the full effect of a variable that is interacted or taken to a second power can only be assessed in terms of a set of coefficients; pertinent data are provided in Table 3. With the exception of the dummy variable (SYS), each regression coefficient shown in Table 2 can be read as an elasticity, that is, as the percentage change in total costs associated with a one percent change in the value of the corresponding variable. Note that the elasticity for average faculty salaries is less than one. This finding means that the salary compo-

[4]In ridge regression, one may not assign significance levels to the ratio between the regression coefficients and their standard errors when the value of the bias parameter is estimated from the data, as was done in this study. See [36] for a discussion of this issue.

nent is reflecting only a portion (64 percent to 83 percent across the three equations) of the cost of a hypothetical unit of input. The sign

TABLE 2

Regression Results for Three Equations

Independent Variables	Dependent Variables: Instructional Expenditures	Dependent Variables: Student Services Expenditures	Dependent Variables: Educational and General Expenditures
FTS	0.190 (0.069)	0.291 (0.119)	0.101 (0.066)
$(FTS)^2$	0.035 (0.005)	0.022 (0.008)	0.040 (0.004)
(PTS)	0.030 (0.047)	-0.050 (0.082)	0.021 (0.045)
$(PTS)^2$	0.019 (0.003)	0.016 (0.005)	0.018 (0.003)
NCS	-0.038 (0.019)	-0.003 (0.033)	-0.023 (0.019)
$(NCS)^2$	0.007 (0.001)	0.005 (0.002)	0.007 (0.001)
AVGSAL	0.640 (0.062)	0.827 (0.024)	0.681 (0.059)
DEGP	-0.550 (0.144)	-0.486 (0.248)	-0.401 (0.138)
$(DEGP)^2$	0.108 (0.019)	0.089 (0.033)	0.087 (0.018)
HCP	-0.218 (0.066)	-0.224 (0.113)	-0.254 (0.018)
$(HCP)^2$	0.022 (0.006)	-0.025 (0.011)	0.009 (0.006)
(FTS)(PTS)	-0.010 (0.004)	-0.011 (0.008)	-0.016 (0.004)
(FTS)(NCS)	-0.003 (0.003)	0.002 (0.004)	-0.004 (0.003)
(FTS)(DEGP)	0.007 (0.015)	0.018 (0.025)	0.004 (0.013)
(FTS)(HCP)	0.022 (0.009)	0.010 (0.015)	0.032 (0.008)
(PTS)(NCS)	-0.001 (0.002)	0.001 (0.003)	0.000 (0.001)
(PTS)(DEGP)	-0.021 (0.011)	-0.021 (0.019)	-0.013 (0.011)
(PTS)(HCP)	-0.004 (0.007)	0.039 (0.013)	0.003 (0.007)
(NCS)(DEGP)	-0.001 (0.005)	-0.008 (0.008)	-0.003 (0.004)
(NCS)(HCP)	0.005 (0.003)	0.009 (0.005)	0.002 (0.002)
(DEGP)(HCP)	0.011 (0.015)	0.021 (0.026)	-0.001 (0.020)
SYS	0.007 (0.019)	0.044 (0.033)	0.012 (0.019)
Constant	5.49	1.92	6.14
R^2	0.92	0.81	0.92

NOTES: Figures in parentheses are standard errors; abbreviations are identified in Table 1.

TABLE 3

F Tests to Determine the Statistical Significance of Sets of Variables

All Variables that Include:	Expenditure Type: Instruction	Student Services	Educational and General
FTS	251.32*	71.77*	255.68*
PTS	25.53*	15.32*	28.00*
NCS	13.02*	3.75*	14.35*
DEGP	4.35*	1.51	3.11*
HCP	12.05*	3.75*	5.64*

NOTES: Numbers shown are F scores for the change in R^2 associated with removing each set of variables from the model; abbreviations are identified in Table 1.
$^*p<0.01$.

for SYS is as expected in the three models, but the variable has little impact: the coefficients are to be read as percentage increases in total costs associated with being a stand-alone institution.

Table 4 shows the marginal cost estimates (for full- and part-time students) and the ratio between them (for each of the three expenditure categories analyzed).[5] For example, the marginal costs for instruction at small institutions are estimated to be $1335 for a full-time student and $245 for a part-time student, a ratio of 5.45 dividing the former by the latter. "Small institutions" refers to institutions lying within the smallest five percent of those in the sample (as measured by enrollment). Data on 10 such institutions, randomly chosen, were averaged to create a data set for a "typical" small institution—284 full-time and 221 part-time students. In a similar fashion, data for a typical large institution were created—4,665 full-time and 12,885 part-time students. Between these extremes, two types of middle-range institutions are also represented in Table 4. Section *C* shows the results of using raw enrollment means for the entire sample—1645 full-time and 2840 part-time students—to represent one such institution. Section *B* shows the results of using the logarithmic enrollment means for the entire sample—1150 full-time and 1366 part-time students—to represent the other. The raw data distributions for enrollments (and expenditures) were positively skewed, so the means of the logarithmic data

[5]With respect to the specific translog model estimated for this study, the marginal cost of the rth output is equal to

$$\frac{\delta ln\hat{C}}{\delta lnQ_r} \cdot \frac{\hat{C}}{Q_r} \text{ where } \frac{\delta ln\hat{C}}{\delta lnQ_r} = a_r + \sum_s a_{rs} lnQ_s + \sum_k h_{rk} lnT_k .$$

In other words, the marginal cost of a particular output is equal to the partial derivative of the estimated cost function with respect to that output, multiplied by the estimated value of total costs per unit of that output.

TABLE 4
Marginal Cost Estimates for Public Two-Year Colleges, 1979–80

Institutional Size and Student Type	Expenditure Type: Instruction	Student Services	Educational and General
A. Small			
FT student	$1335	$183	$2480
PT student	$ 245	$ 54	$ 510
FT/PT	5.45	3.39	4.86
B. Middle-Range I (Sample mean, logs)			
FT student	$1494	$201	$2741
PT student	$ 266	$ 46	$ 484
FT/PT	5.62	4.37	5.66
C. Middle-Range II (Sample mean, raw data)			
FT student	$1542	$210	$2617
PT student	$ 208	$ 38	$ 357
FT/PT	7.41	5.53	7.33
D. Large			
FT student	$1941	$257	$3116
PT student	$ 194	$ 32	$ 303
FT PT	9.94	8.03	10.28

were smaller. Fully two-thirds of all the institutions in the sample had enrollments equal to or less than the raw mean values.

In order to evaluate marginal costs at those various enrollment levels, values for the other independent variables in the model also had to be chosen. For the results shown in Table 4, the following conditions were imposed: the raw mean values for percent of degree completion (29) and percent of high cost programs (36.2) were used in all sections; with respect to noncredit enrollment, the average of actual values was used for section *A* (165 students), the log mean value for section *B* (354), and the raw mean value for sections *C* and *D* (4335); for faculty salaries, the log mean value was used for section *B* ($18,215), the raw mean value for section *C* ($18,578), and the average of actual values for sections *A* ($13,625) and *D* ($23,949). Neither degree completion nor program emphasis were correlated with full- or part-time enrollment levels; thus it was reasonable to leave them at their respective mean values. To some extent, noncredit enrollment (but particularly average faculty salaries) were correlated with full- and part-time enrollment levels; thus values other than those at the mean were required to adequately represent typical combinations of institutional characteristics across the (credit) enrollment spectrum.

The results shown in Table 4 can be summarized as follows. First, for all four institutional sizes, the ratio of full-time to part-time marginal costs is greater in the instructional area than in student services, but especially so at small institutions. Second, the marginal-cost ratios are greater than three-to-one for all three expenditure categories. Third, the marginal-cost ratios for educational and general expenditures are quite similar to those for instructional expenditures, regardless of institutional size.

In interpreting the change in marginal costs from small to large institutions, it is useful to recall that the salary data used in the calculations for sections *A* and *D* in Table 4 reflect the respective averages for the two institutional sizes, rather than the sample mean. By paying their full-time faculty a far lower wage rate, on average, than do the larger institutions, the small institutions overcome a portion of the diseconomies of scale that would otherwise accrue to their small size. For example, if the wage rate were held constant at the sample (raw) mean, the marginal cost for a full-time student in the instructional area would be $1628 instead of $1335 at small institutions. Conversely, a portion of the apparent diseconomies of scale at large institutions is due to relatively high wage rates. If salaries for full-time faculty at large institutions were at the sample (raw) mean, the marginal cost of instruction for a full-time student would be $1680 instead of $1941.

In moving from panel *A* to panel *D* in Table 4, one observes an increase in the ratio of full-time to part-time marginal costs in each of the expenditure categories. The increases in the cost ratio can be associated primarily with the substantial increases in the proportion of part-time students at the institutions depicted—from 0.44 in panel *A* to 0.73 in panel *D*—and not, as it may appear, with increases in institutional size. Indeed, when the proportion is held constant, an increase in institutional size is actually accompanied by a decrease in the estimated cost ratio, other things being equal. It should also be noted that there are institutions in the sample with a lower proportion of part-time students than the institution depicted in panel *A*. If the proportion is low enough, the model predicts that the cost ratio will likely be less than three-to-one, depending on the value of the other independent variables in the model. No simple threshold levels could be determined, so marginal cost estimates were generated for each of the institutions in the sample (not shown). At approximately 9 percent of the institutions, the resulting cost ratios were less than three-to-one for both instructional expenditures and educational and general expenditures; for student services expenditures the corresponding figure was 26 percent.

Several other results (not in the tables) may be of interest. In institutions where the curriculum consists primarily of relatively high-cost programs (as measured by the variable HCP), the marginal-cost ratios between full- and part-time students are higher for instruction but lower for student services, when compared to institutions at the mean. The differences are modest: for an institution with HCP at 80 percent, but otherwise at the (raw) means for the sample, the marginal costs of instruction are estimated to be $1798 and $233 for full- and part-time students, respectively, or a ratio of 7.72 compared to the 7.41 figure shown in Table 4. For student services, the corresponding estimates are $210 and $43, or a ratio of 4.88 as opposed to 5.53 in Table 4.

For an institution with (raw) mean characteristics, the marginal-cost estimates per noncredit student are $53, $6, and $93, for instruction, student services, and educational and general purposes, respectively; in other words, they are about one-thirtieth, or so, of the marginal cost of a full-time student for those same expenditure categories. These figures reflect considerable scale economies; excluding student services, marginal costs for noncredit enrollment are estimated to be substantially higher at low enrollment levels. On a related matter, the model predicts that enrolling the mean number of noncredit students, as opposed to enrolling no such students, increases total instructional costs at a typical institution by slightly more than 4 percent—about the same as the 4 to 5 percent calculated by Dickmeyer and Cirino [10] using accounting procedures.

Discussion

It was hypothesized at the outset that the difference in resources demanded by full-time versus part-time students (as measured by marginal costs) would be greater in the instructional area than in student services; the results appear to confirm that hypothesis. Differences between marginal costs for full-time and part-time students were estimated to be about 19 to 38 percent greater in the instructional area, across four representative institutional data sets. It was also hypothesized that the marginal cost for instruction of a part-time student would be about one-third that of a full-time student. But the results indicate that, at representative two-year colleges, it apparently costs only about one-fifth as much, or even less, to provide instructional services for an additional part-time student. These results are comparable to those found in an earlier study of instructional costs at two-year colleges using different models and samples [4]. We might infer, then, that these institutions make use of different production technologies in providing instructional services to part-time as opposed to full-time students; for example, they may use part-time students to fill course sections or they may depend heavily on part-time (much less expensive) faculty to teach part-time students. The latter possibility was also suggested by the findings in Kress's [22] study of costs at California community colleges.

The finding that the marginal-cost ratio (full-time to part-time) is directly related to the proportion of part-time students can be interpreted in a similar fashion. At institutions in which there are proportionately few part-time students, it may be that relatively little change occurs in the way services are provided for part-time students. They are treated more like full-time students, and relatively high unit costs result. As the proportion of part-time students increases, alternative, relatively less expensive means of providing services are employed. Modest evidence to this effect can be found in the positive correlation ($r = 0.41$) between the proportion of part-time students and the proportion of part-time faculty at the sample institutions (not in the tables).

The somewhat lower cost ratios in student services suggest that in this area it is more difficult for institutions to employ alternative, cost-saving technologies in serving part-time students. Still, the ratios were higher than expected for the majority of institutions. In the face of various one-to-one relationships in the production technology of student services, ratios in the four-to-one and higher range may indicate that many part-time students do not avail themselves of some of the services provided. They have to be admitted and registered, of course, and pay their fees, but perhaps they make relatively little use of more expensive services such as counseling.

In relating the findings of this study to funding algorithms that convert part-time to FTE enrollment, we note first of all that most funding formulas that are based on unit cost calculations employ average rather than marginal costs. It cannot be assumed that the relationship between marginal and average costs for full-time students is identical to that for part-time students. Thus we cannot assume that the full-time to part-time ratios for average costs are identical to those for marginal costs. However, the marginal cost ratios may be taken as an indicator of the corresponding average-cost relationships.

Second, from a marginal-cost perspective, it appears that current funding formulas often work to the advantage of institutions that are enrolling increasing numbers of part-time students, at least on the basis of part-time to FTE conversions. The data suggest that, for the majority of two-year colleges, educational and general expenditures for an additional full-time student are at least five times higher than for an additional part-time student. Few, if any, funding formulas appear to involve a conversion factor that high [11, 16]. Indeed, most formulas are more likely to reflect something close to the conventional three-to-one ratio, because most formulas are directly or indirectly based on student credit hour data—which, as noted earlier, are the foundation for the conventional ratio. Thus, from the perspective of converting part-time to FTE enrollments, current formulas would seem to be helping rather than hurting most two-year colleges. Institutions that enroll few part-time students relative to total enrollment appear to be an exception to this rule. Of course, neither situation implies anything at all about the adequacy of the overall funding of the institutions in question, and the particular circumstances at a given institution could result in very different cost relationships than those portrayed here.

Finally, the cost estimates in this study are the product of estimating a particular model in a particular way. The model employed would certainly be improved theoretically by the inclusion of additional data on the prices of inputs, especially salaries for part-time faculty, and perhaps by more data on variations in programs or on the environment surrounding the respective institutions. Whether any of these modifications would materially affect the primary results of the study cannot be known a priori. Given that some of the results run contrary to expectations, there is ample reason to develop additional evidence regarding the costs of providing services to part-time students.

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