Enrollment Projection and Costing Models

In this report, the Hanover Research Council provides examples of enrollment projection and costing models that can be used in the two-year college setting.
Introduction

This report identifies some of the enrollment and costing projection models used by public, two-year colleges. The first section features enrollment projection models used by Burlington Community College, Skyline College, Howard Community College, and Halifax Community College and ends with a brief description of the regression analyses that some colleges and higher education systems, like the Maryland Higher Education Commission, have developed to forecast enrollment for their service areas. For each model, we provide a detailed description of its methodology, using actual data, and discuss its shortcomings or limitations.

The models in this first section range from those that rely on easily accessible data and straightforward calculations to those that require complex data and statistical calculations. The model used by Howard Community College, for example, simply calls for calculating differences in the college’s enrollment history and applying the “change ratios” to future classes. On the other hand, the California Community Colleges System uses an econometric regression model that calls for data on several independent variables, like tuition, adult population, and unemployment, to predict enrollment in the state’s two-year colleges. The evidence suggests that regression analyses are more rigorous and tend to take into account factors affecting enrollment that the non-statistical models ignore, lending more credibility to their projections.

The second section describes the Delaware Study of Instructional Costs and Productivity, the Kansas Study, and the NACUBO Methodology for Identifying Costs of Higher Education. We explain each standardized costing model’s components and any limitations to adopting it for use.
Enrollment Projection Models Used by Two-Year Institutions

Burlington County College

Projections of 18 Year-Olds

One of the ways that Burlington County College, a two-year public college in New Jersey that enrolls over 15,000 students, projects enrollment is by projecting the number of 18 year-olds in its service area. BCC retrieves birth certificate data from the state’s Department of Health and Senior Services and adjusts the years to reflect the population of potential entering college students. The Center for Health Statistics at New Jersey’s DHSS provides statistics on the annual number of live births by county. Beginning with the year 1984 and adding 18 to the birth year, BCC estimates the number of 18 year-olds in Burlington County for the years 2002-2020. For example, if, according to the DHSS, there were 4,831 live births in the county in 1984, the model assumes that 18 years later, in 2002, there will be about 4,831 18 year-olds in the county. Since this is the traditional college-age population, changes to the size of this cohort from year to year is likely to affect enrollment.

For BCC, the analysis is left simply at graphing the projected numbers of 18 year-olds and analyzing the changes from 2002-2020. However, the birth certificate-based model may be taken a step further to project the traditional-age cohort of the entering classes. Using data from prior years, a college can determine ratios of enrolled students from its service area to the population of 18 year-olds in that area. Assume, for example, that BCC enrolled 1,445 traditional-age students from Burlington County in 2008. According to the model’s adjusted birth certificate data, there were 5,778 18-year olds in the county that year. Dividing BCC’s hypothetical entering class from its service area by the population of 18 year-olds produces a ratio of about .25. This ratio can be multiplied by the projected number of 18 year-olds in 2009, 2010, 2011 and so forth to project part of BCC’s entering class from Burlington County in those years. The graph on the following page illustrates BCC’s projected enrollment for 2008-2020 based on this hypothetical ratio. Depending on the particular interests of the college, a number of ratios can be used to project enrollment (e.g., the ratio from the latest year, the average ratio over a set number of years, the minimum and maximum ratios over those years, etc.).

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Hypothetical Projections of BCC’s Entering Class Based on a 1:4 Relationship between Entering Students from Burlington County and Adjusted Birth Certificate Data

<table>
<thead>
<tr>
<th>Year</th>
<th>Adjusted Birth Certificates of 18 Year-Olds*</th>
<th>BCC Entering Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>5778</td>
<td>1445</td>
</tr>
<tr>
<td>2009</td>
<td>5623</td>
<td>1406</td>
</tr>
<tr>
<td>2010</td>
<td>5463</td>
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<tr>
<td>2011</td>
<td>5430</td>
<td>1358</td>
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<tr>
<td>2012</td>
<td>5218</td>
<td>1305</td>
</tr>
<tr>
<td>2013</td>
<td>5031</td>
<td>1258</td>
</tr>
<tr>
<td>2014</td>
<td>5297</td>
<td>1324</td>
</tr>
<tr>
<td>2015</td>
<td>5221</td>
<td>1305</td>
</tr>
<tr>
<td>2016</td>
<td>4981</td>
<td>1245</td>
</tr>
<tr>
<td>2017</td>
<td>5178</td>
<td>1295</td>
</tr>
<tr>
<td>2018</td>
<td>5186</td>
<td>1297</td>
</tr>
<tr>
<td>2019</td>
<td>5349</td>
<td>1337</td>
</tr>
<tr>
<td>2020</td>
<td>5378</td>
<td>1345</td>
</tr>
</tbody>
</table>

*Source: New Jersey Department of Health and Senior Services.
Projections of High School Seniors

Another way that Burlington County College forecasts enrollment is by projecting the number of 12th grade students in its home county using data from New Jersey’s Department of Education. The DOE publishes “reports cards” for all public primary and secondary schools in the state. The report cards include enrollment by grade for the academic years 2004-05 to 2007-08. BCC aggregates the enrollments for each grade (Kindergarten to 12th) at each of the primary and secondary schools in Burlington County for each of the available academic years. Then, it calculates the survival rate for each class as it progresses from one year to the next, using the following operation:

\[
\text{Survival Rate} = \frac{(\text{Current year grade } B) - (\text{Previous year grade } A)}{(\text{Previous year grade } A)}
\]

For example, Burlington County public schools enrolled a total of 4,745 pupils in kindergarten in 2004-05.\(^4\) In 2005-06, as this class progressed to the 1st grade, the schools reported 5,186 kindergarteners (i.e., some students were picked up).\(^5\) In order to calculate the survival rate for this class, the kindergarten enrollment (4,745) is subtracted from the 1st grade enrollment (5,186), and then divided by the kindergarten enrollment (4,745).

BCC repeats this operation for the kindergarten class that entered school in 2005-06 and progressed to 1st grade in 2006-07 and for the kindergarten class that entered in 2006-07 and progressed to 1st grade in 2007-08. Then, it averages the three resulting survival rates.

The steps explained above are repeated for the 1st through the 11th grades.

Using the enrollment data for the latest year available and the average survival rates, BCC then calculates projections of future classes. The following formula is used:

\[
(\text{Original Enrollment} \times \text{Corresponding Survival Rate}) + \text{Original Enrollment} = \text{Next Year’s Class}
\]

For instance, the kindergarten enrollment in 2007-08 (4,612) is multiplied by the average K to 1st grade survival rate (0.106582), which results in 491.6 (i.e., 491.6 new

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\(^4\) This figure is calculated by aggregating all of the kindergarteners at all of the elementary schools in Burlington County. See: “2007-08 Report Card,” Department of Education, <http://education.state.nj.us/rc/rc08/menu/05.html>.

\(^5\) Ibid.
students were picked up during the transition). These new students are added to the original enrollment, yielding a 2008-09 1st grade class of 5,103.6 students.

BCC repeats this operation for each of the grades using their respective survival rates (e.g., 1st grade corresponds to the 1st to 2nd grade average survival rate, 2nd grade corresponds to the 2nd to 3rd grade survival rate, and so forth). Then, the projections for 2008-09 are used as the base year to calculate the projections for 2009-10, as the classes progress to the next grade. This process is repeated until BCC obtains the projected senior classes for kindergarten to the 11th grade. The model produces a total of 12 projections (i.e., for 2008-09 to 2019-20).

Illustrated on the following page is a diagram of Burlington County’s class sizes as they progress from one year to the next, based on the survival rate of their respective grades.

Like the birth certificate-based model, the 12-year projections of high school seniors may be taken a step further to project a portion of the college’s incoming classes. Using its enrollment history, a college can determine the ratio between the number of incoming freshmen who graduated from high schools in the college’s service area to the total number of high school graduates from that area. Then, this ratio may be multiplied by the projections of 12th graders to forecast the number of traditional students in the incoming classes.
Extended Outlook of Student Enrollment in Kindergarten to the 12th Grade in Burlington County

Aggregate enrollment data of elementary and secondary schools in Burlington County (2007-08)

<table>
<thead>
<tr>
<th>K</th>
<th>2008-09</th>
<th>2019-20</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4612</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>5156</td>
<td>5103.6</td>
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<tr>
<td>3</td>
<td>5060</td>
<td>5049</td>
</tr>
<tr>
<td>4</td>
<td>5206</td>
<td>5077.9</td>
</tr>
<tr>
<td>5</td>
<td>5121</td>
<td>5393.1</td>
</tr>
<tr>
<td>6</td>
<td>5203</td>
<td>5187.3</td>
</tr>
<tr>
<td>7</td>
<td>5277</td>
<td>5536</td>
</tr>
<tr>
<td>8</td>
<td>5303</td>
<td>5192.2</td>
</tr>
<tr>
<td>9</td>
<td>5436</td>
<td>5338.9</td>
</tr>
<tr>
<td>10</td>
<td>5943.5</td>
<td>6194</td>
</tr>
<tr>
<td>11</td>
<td>5763</td>
<td>5593</td>
</tr>
<tr>
<td>12</td>
<td>5563</td>
<td>5547.2</td>
</tr>
<tr>
<td>13</td>
<td>5457.5</td>
<td>5642.8</td>
</tr>
</tbody>
</table>

Projections
Due in large part to their simplicity, the models also suffer from a number of practical limitations. An obvious limitation of the birth certificate-based model is that it assumes the absence of deaths and of migration to and from the service area. (Or, alternatively, it assumes the outflow of residents from the college’s home county equals the inflow, cancelling out the migration factor). While the occurrence of deaths before the age of 18 is likely to be minimal and therefore leave the data relatively unaffected, this may not be the case for migration. Regions that are, for example, experiencing economic decline or growth would have to take migration into account. Similarly, the second model (i.e., projections of high school seniors) excludes data on children who attend private schools or are homeschooled, which may skew the projections. Finally, it should be kept in mind that both models account only for traditional-age college students. At colleges where substantial proportions of the entering class consist of returning students or working professionals, these models probably would not be as useful.

**Skyline College**

Skyline College is a public, two-year college in San Bruno, California that enrolls over 25,000 students. In 2006, consultants at Voorhees Group LLC developed enrollment projections for Skyline using the college’s 2004-05 enrollment and population projections from the U.S. Census Bureau for the years 2010, 2020, and 2030. In order to make the data more precise and to match Census categories, Skyline’s enrollment was broken down by:

- Gender
- Race/Ethnicity (White, Hispanic, Asian, Pacific Islander, Black, American Indian, and All Other)
- Age (15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, and 65+)
- County (San Francisco, San Mateo, and Outside Counties)

The counties selected are the primary markets from which Skyline draws its current students. Since the Census data did not record the actual population for these counties for 2005, this was estimated by taking the average of the population counts for 2000 and the projected population counts for 2010. For example, the Census reports that there were 6,678 white males ages 20-24 in San Mateo County in 2000 and there will be a projected count of 9,036 in 2010. Based on these statistics, it was estimated that there were 7,857 white males ages 20-24 in San Mateo County in 2005. In 2004-05, Skyline enrolled 574 white males ages 20-24 from San Mateo County. Dividing Skyline’s enrollment by the estimated 2005 population produced an

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7 Ibid. 5.

8 Ibid.
enrollment share for white males ages 20-24 from San Mateo County (i.e., 574/7,857 = .0731). This operation was performed for the two genders, the seven race/ethnicity categories, and eleven age groups, giving rise to 144 enrollment shares for each of the three counties. The table below shows the shares for Skyline College by county, gender, and age.

**Percent Enrollment Shares of the Estimated 2005 Population by Age and County**

<table>
<thead>
<tr>
<th>Age Category</th>
<th>San Mateo Males</th>
<th>San Mateo Females</th>
<th>San Francisco Males</th>
<th>San Francisco Females</th>
<th>Other Counties Males</th>
<th>Other Counties Females</th>
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</thead>
<tbody>
<tr>
<td>15-19</td>
<td>7.2</td>
<td>8</td>
<td>3.9</td>
<td>3.5</td>
<td>.2</td>
<td>.3</td>
</tr>
<tr>
<td>20-24</td>
<td>11.4</td>
<td>14.9</td>
<td>6</td>
<td>5.1</td>
<td>.5</td>
<td>.8</td>
</tr>
<tr>
<td>25-39</td>
<td>3.6</td>
<td>5.9</td>
<td>1.5</td>
<td>1.8</td>
<td>.3</td>
<td>.4</td>
</tr>
<tr>
<td>30-34</td>
<td>1.6</td>
<td>3.2</td>
<td>.6</td>
<td>.6</td>
<td>.2</td>
<td>.2</td>
</tr>
<tr>
<td>35-39</td>
<td>1.1</td>
<td>2.2</td>
<td>.3</td>
<td>.3</td>
<td>.2</td>
<td>.2</td>
</tr>
<tr>
<td>40-44</td>
<td>.7</td>
<td>2</td>
<td>.2</td>
<td>.3</td>
<td>.2</td>
<td>.1</td>
</tr>
<tr>
<td>45-49</td>
<td>.7</td>
<td>1.7</td>
<td>.2</td>
<td>.2</td>
<td>.1</td>
<td>.1</td>
</tr>
<tr>
<td>50-54</td>
<td>.6</td>
<td>1.4</td>
<td>.2</td>
<td>.2</td>
<td>.1</td>
<td>.1</td>
</tr>
<tr>
<td>55-59</td>
<td>.6</td>
<td>1.1</td>
<td>.2</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
</tr>
<tr>
<td>60-64</td>
<td>.4</td>
<td>.6</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
</tr>
<tr>
<td>65+</td>
<td>.8</td>
<td>.9</td>
<td>.1</td>
<td>.2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>


After calculating all of the enrollment shares, the consultants made assumptions concerning how these ratios would change over the next 25 years. For the baseline scenario, they assumed that the ratios would remain constant from 2005-2030. The ratios were simply multiplied by the Census projections for each category and then aggregated to project total enrollment for the ten-year periods (e.g., 2010, 2020, and 2030). It was discovered that the projected enrollment would be 24,717 in 2010, 25,263 in 2020, and 24,633 in 2030.¹⁰ In other words, enrollment would remain relatively constant, fluctuating between 0.5% to 2% of the 2004-05 figure. In addition to this scenario, the ratios of Hispanics ages 15-24, of all students of color, and of 25-34 year-olds were increased by, respectively, 2%, 2%, and 1%, in different scenarios. The consultants based these scenarios on demographic trends in San Francisco County that suggest a rise in the proportion of minorities, especially Hispanics, and a

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¹⁰ Ibid. 8.
rightward shift in the region’s age distribution. They found that increasing these ratios resulted in enrollment projections that are 12% to 25% higher than Skyline’s enrollment in 2005.

The Census-based model has an advantage over the BCC models because the ratios can be altered to reflect demographic and enrollment trends. For example, the consultants hired by Skyline increased the share of Hispanic students in anticipation of this subgroup’s growth in the region. However, the model also has a few limitations that should be taken into account. Because the model relies on Census population projections by county, and because the Census develops these projections only in ten-year increments, the number of enrollment projections generated by the model is limited. For Skyline, there were only three projections (i.e., for 2010, 2020, and 2030). Second, while current trends may indicate the direction in which to adjust the college’s shares, the exact percent by which they are adjusted is likely to be subjective. It is not clear, for example, why the consultants increased the Hispanic, students of color, and age 25-34 ratios by the percentages that they did.

Howard Community College

Howard Community College in Columbia, Maryland enrolls about 7,500 students. In 1991, one of the ways that the Office of Planning and Evaluation at HCC projected enrollment for the upcoming year was by calculating differences in the college’s enrollment history. As the first table on page 13 shows, 2,772 students attended HCC in 1989, 3,162 attended in 1990, and 3,300 attended in 1991. Using this data and full-time equivalent (FTE) enrollment for years dating back to at least 1982, HCC computed changes in the number of students attending the college over one-, three-, five-, and ten-year increments. For example, dividing the 1991 enrollment by the figure for 1990 (3,300/3,162) produces a “change ratio” of 1.044 for this one-year period. Similarly, dividing the 1991 enrollment by the 1989 figure (3,300/2,771) results in a change ratio of 1.088 for this three-year period. The change ratios for the five- and ten-year periods were determined by dividing the 1991 enrollment by those for 1987 and 1982, respectively. Then, HCC multiplied the 1991 enrollment by the change ratios for each of the four periods to determine a range of projections for 1992.

The tables on page 13 show HCC’s enrollment history from 1981-1991, the change ratios, and the projected enrollments. As the third table demonstrates, enrollment for 1992 is projected to be in the range of 3,445 to 3,567, a difference of over one hundred students.

In order to test the accuracy of the model, HCC compared enrollment forecasts to actual enrollment for prior years. It found mixed results, leaning toward fairly inaccurate. For example, the one-year change ratio proved to be a “highly accurate
predictor” of enrollment in credit courses over the past four years.\textsuperscript{11} Indeed, the ratio predicted within three percentage points of the actual enrollment. On the other hand, HCC also noticed cases of “wide swings,” especially for non-credit courses, between some of the forecasts of the change ratios and the actual enrollments. While the one- and ten-year change ratios proved to be more accurate than the other two, even their predictions were off significantly for some years. The one-year change ratio overestimated by 20% in 1984 for credit courses, and the ten-year change ratio was underestimated by more than 12% in 1990 for non-credit courses.\textsuperscript{12} These margins of error suggest that the change ratios “may not always provide us with accurate forecasts.”\textsuperscript{13} According to HCC, the utility of the model depends on recognizing when an enrollment pattern is likely to continue and when it is likely to change. If conditions that affect the decision to attend college, like the state of the local economy, are stable from one year to the next, the model may provide accurate forecasts.

\textsuperscript{12} Ibid. 14.
\textsuperscript{13} Ibid. 15.
HCC’s FTE Enrollment for 1981-1991

<table>
<thead>
<tr>
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<th></th>
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<tbody>
<tr>
<td>Credit</td>
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<td>1639</td>
<td>1861</td>
<td>1757</td>
<td>1693</td>
<td>1640</td>
<td>1686</td>
<td>1783</td>
<td>1925</td>
<td>2109</td>
<td>2258</td>
</tr>
<tr>
<td>Non Credit</td>
<td>419</td>
<td>404</td>
<td>471</td>
<td>611</td>
<td>647</td>
<td>709</td>
<td>749</td>
<td>838</td>
<td>847</td>
<td>1053</td>
<td>1042</td>
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<tr>
<td>Total</td>
<td>1906</td>
<td>2043</td>
<td>2332</td>
<td>2368</td>
<td>2340</td>
<td>2349</td>
<td>2435</td>
<td>2621</td>
<td>2772</td>
<td>3162</td>
<td>3300</td>
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Change Ratios of HCC’s FTE Enrollment

<table>
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<tr>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Credit</td>
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<td>1.082</td>
<td>1.066</td>
<td>1.045</td>
</tr>
<tr>
<td>Non Credit</td>
<td>.99</td>
<td>1.081</td>
<td>1.084</td>
<td>1.1</td>
</tr>
<tr>
<td>Total</td>
<td>1.044</td>
<td>1.081</td>
<td>1.071</td>
<td>1.058</td>
</tr>
</tbody>
</table>


HCC’s Projected FTE Enrollment for 1992 Based on Change Ratios

<table>
<thead>
<tr>
<th>Duration</th>
<th>One-Year</th>
<th>Three-Year</th>
<th>Five-Year</th>
<th>Ten-Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit</td>
<td>2418</td>
<td>2443</td>
<td>2407</td>
<td>2360</td>
</tr>
<tr>
<td>Non Credit</td>
<td>1032</td>
<td>1126</td>
<td>1130</td>
<td>1146</td>
</tr>
<tr>
<td>Total</td>
<td>3445</td>
<td>3567</td>
<td>3534</td>
<td>3491</td>
</tr>
</tbody>
</table>


14 Available at: <http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/23/74/a9.pdf>,
Halifax Community College

In its 2007-2013 long range plan, Halifax Community College, which enrolls about 1,720 students, projects its enrollment based on projections for the entire North Carolina Community College System. Community colleges that are members of the NCCCS provide instruction in the following three areas:15:

- Curriculum Programs (i.e., “post secondary education leading to an associate degree, diploma or certificate”)
- Continuing Education (i.e., “classes in occupational skills, industrial training and general interest”)
- Basic Skills (i.e., adult education classes leading to high school equivalency)

The NCCCS projected FTE enrollment in these areas “based on previous years’ data.”16 It provided the system-wide projections for 2008-2013 to individual colleges, including Halifax. In addition, it calculated each college’s average shares of the system’s total enrollment over the past five years. According to the NCCCS, Halifax’s average shares are .94% for Curriculum Programs, .69% for Continuing Education, and .69% for Basic Skills.17 By multiplying Halifax’s share of each instructional area by the NCCCS’s FTE total for that area, the college isolated its enrollment projections. For example, the NCCCS projected that 153,282 students will enroll in Curriculum Programs in North Carolina’s community colleges in 2008-09. Multiplying this figure by Halifax’s share of Curriculum Programs results in 1,441 students (153,282 * .0094). This operation was performed for enrollment in Basic Skills and Continuing Education and the three sub-projections were then aggregated, producing a 2008-09 FTE enrollment projection for Halifax. Halifax followed the same pattern for projecting the 2009-10 to 2012-13 enrollments. The table on the following page shows the college’s enrollment projections, based on the NCCCS’s totals and Halifax’s enrollment shares.

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16 Ibid.
17 Ibid.
As mentioned earlier, Halifax's approach to forecasting enrollment is based on projections supplied by NCCCS. Therefore, it appears that this model is limited to only those colleges that are part of a county or state-wide system that already provides the projections.

**Regression Models**

Perhaps the most prevalent method for projecting college enrollment is by using regression analyses. A number of two-year colleges and higher education systems, including the Maryland Higher Education Commission, the California Community Colleges System, and the Texas State Higher Education Coordinating Board, hire statisticians to develop these models, which can be quite complex. Typically, however, the model begins with a stand-in figure for enrollment. For the MHEC, this is Maryland's total enrollment in community colleges over the past five years broken down by gender, age, and enrollment status (full-time or part-time). Then, statistics for independent variables that are likely to affect enrollment are added to the equation. The MHEC adds statistics for variables like the percent change in tuition and fees, the projected change in the number of Maryland high school graduates, and the percent change in per capita disposable income. The California Colleges System also considers the “out of pocket” price of enrollment (i.e., tuition, fees, transportation, childcare, and books and supplies), as well as variables like the adult population in the state, unemployment, budget outlays and financing. For the

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19 Ibid. 22.

Like all regression models, those for enrollment projections may be complicated and time-consuming to develop. In addition, they may suffer from internal problems like independent variables that are highly interrelated, relationships that are not linear, and other measurement errors.

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Costing Models Developed for Widespread Use

The following section provides information on three prominent cost models that have been developed for broad usage at postsecondary institutions. The models were created to handle data from different schools where reporting and accounting practices are not standardized.

The first two models we review are the Delaware Study of Instructional Costs and Productivity and the Kansas Study. Each of these models measures direct costs and productivity at the discipline level. The Delaware Study is designed for four-year institutions, while the Kansas Study is designed for two-year colleges. The third model reviewed in this section is the National Association of College and University Business Officers’ (NACUBO) Methodology for Identifying the Costs of Higher Education. The NACUBO model measures the average total cost (direct and indirect) of educating one undergraduate student in one year for an entire institution.

The Delaware Study of Instructional Costs and Productivity

One of the most influential studies on costing in higher education is the Delaware Study of Instructional Costs and Productivity. The Delaware Study began in 1992 and has been collecting data annually since. The project has been described as a data sharing consortium of four-year institutions, and participants are provided with benchmarking data from similar colleges and universities. Each year, over 200 colleges and universities, two-thirds of which are public, participate in the study.\(^{22}\)

The Delaware Study collects data from each academic discipline within an institution, as identified by the four-digit CIP code. Data are divided into two main sections: instructional course load and cost data.

The course load section collects data to satisfy the following metrics:\(^{23}\)

- Lower division and upper division student credit hours and organized class sections taught per FTE faculty (broken down by Regular Faculty, including Tenured and Tenure-Eligible, and Non-Tenure Track; Supplemental Faculty; and Teaching Assistants)
- Total undergraduate student credit hours and organized class sections taught per FTE faculty
- Total graduate student credit hours and organized class sections taught per FTE faculty
- FTE students taught per FTE faculty


The second section of the Delaware Study, which collects cost data, asks for information in the following four groups:24

- The total number of student credit hours, both graduate and undergraduate, that were generated during the academic year for terms that were supported by the department’s instructional budget.
- Total direct expenditures for instruction in the fiscal year:
  - Direct expenditures for salaries (faculty FTE, where applicable, are distributed proportionally across departmental and non-departmental salary sources based on percent of workload attributable to each source)
  - Direct expenditures for benefits
  - Direct expenditures other than personnel related
  - Total direct expenditures
- Total direct expenditures for separately budgeted research activity during the fiscal year.
- Total direct expenditures for separately budgeted public service activity during the fiscal year.

The information collected in the costs section is utilized to make the following measurements:25

- Direct instructional expense per student credit hour taught
- Direct instructional expense per FTE student taught
- Personnel costs as a percentage of direct instructional expense
- Separately budgeted research and service expenditures per FTE tenured and tenure track faculty

To allow for accurate comparisons between institutions, the creators of the Delaware Study established FTE reporting guidelines for all participants. Separate FTE guidance is provided for regular faculty, supplemental faculty, and teaching assistants, and the Study’s “Definitions and Calculations” document provides clear instructions to standardize FTE accounting.26

The Kansas Study

Acknowledging the value and impact of the Delaware Study for four-year institutions, administrators in the Johnson County Community College (JCCC) Office of Institutional Research developed the idea for the Kansas Study, which would collect

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and analyze cost and productivity data for the community college sector. With the call for greater cost accountability and shrinking of public support in higher education, JCCC administrators understood that community colleges would face increasing resource constraints in the future. As a result, resource reallocation strategies will be of critical importance for the funding of new or expanded programs (and other initiatives) at two year colleges, and the Kansas Study was designed to help community college administrators make data-driven resource reallocation decisions.27

Funded by a three-year grant from the U.S. Department of Education, JCCC began developing a community college-oriented cost and productivity study. The grant was awarded in 2002, and the study went through a development phase that involved input from a 21-member committee, which was composed of representatives from two-year colleges and national higher education associations. After two pilot runs, the full study was implemented in 2004.28

The design of the Kansas Study resembles the Delaware Study in many ways. Data are collected at the academic discipline level as determined by the Kansas Study coding scheme, which is based loosely on the CIP system. The key differences between four-year and two-year institutions that the Kansas Study’s developers observed were twofold: First, community college faculty generally do not participate in the conduct of scholarly research. Second, the proportion of part-time instructors is significantly higher within two-year colleges than at four-year institutions. The data collection tool and the cost and productivity calculations used in the Study reflect these differences.29

Like the Delaware Study, the Kansas study collates data into two sections: instructional workload and instructional costs. The instructional workload form asks participants to record contact/clock hours and student credit hours taught by each faculty type. The three faculty classification types are: full-time faculty, adjunct or part-time faculty, and other full-time employees (faculty that teach, but are primarily tasked with administrative functions). Total student credit hours are calculated by summing contact/clock hours – which are converted to a credit hour equivalent – and student credit hours.30

There are a few interesting conditions of note for the instructional workload collection form that differ from the Delaware study. First, when a faculty member is teaching in two separate departments, but is only being paid by one, the student credit hours taught in each discipline are reported separately. Costs are calculated by prorating the salary by the number of credits taught in each discipline, even if the

28 Ibid.
29 Ibid.
salary is only paid by one of those disciplines. Second, in the Kansas study, each participating institution is allowed to use its own definition for calculating faculty FTE. If an “institutional convention” does not exist for FTE calculation, data reporters are instructed to use 15 credit hours as a standard divisor. Additionally, full-time faculty who teach additional or overtime courses above their contracted course loads are reported only as 1.0 FTE, whereas the Delaware study allows certain faculty to count above 1.0 FTE.  

The instructional costs section of the data collection form only asks for data pertaining to two main items. The first item gathers the total student credit hours generated during a 12-month period. The second item collects salary and benefits data for all faculty within the reporting discipline. Additionally, cost data for support staff and department chairs, as well as data for dedicated labs, are collected. Once the data fields are complete, a direct cost per-student credit hour is calculated for each reporting discipline.

As with the Delaware Study, the Kansas Study is not a full costing model, since it only measures direct costs. However, the Study serves an important role as a simple, standardized model for calculating costs at the discipline level.

**The NACUBO Methodology for Identifying the Costs of Higher Education**

In response to the growing demands for public accountability in higher education, NACUBO designed a methodology that could be used at all postsecondary institutions to “explain and present how much it costs to provide one year of undergraduate education and related services.” NACUBO set out to create “a uniform methodology that would allow any institution, regardless of type, size, or control, to take information from existing financial statements and reformat or modify the data to display, in a clear and concise manner, its average annual cost of educating undergraduate students along with the price of tuition.”

NACUBO convened a committee of experts to design the costing methodology. After several meetings, the committee laid out the following four principles to guide methodology development:

- Rely on basic averaging techniques
- Concentrate on the cost of undergraduate education
- Use existing cost allocation methods wherever possible
- Keep it simple

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32 Ibid. Also see: <http://www.kansasstudy.org/DataCollection>.
34 Ibid. Pg. 7.
35 Ibid. Pg. 8.
Following three pilot tests with modifications after each, NACUBO personnel arrived at a methodology that they felt adequately met the project’s goals.

The template for data collection in the NACUBO model is separated into five sections. The first is a general institution information section, which includes contact information, general demographics, and student FTE information (including weighting clarifications). Subsequent sections collect cost data for several broad areas, as shown below. For each cost area, institutions are asked to express costs on a per-undergraduate basis. A final section summarizes the totals from the cost sections and recaps costs by component. There is also an optional addendum in which institutions may provide details about facilities and capital costs.

NACUBO did not define a rigid student FTE calculation standard. Rather, the model allows each institution to use its own method. The organization does note that flexibility in calculating student FTE reduces the degree to which inter-institutional comparisons can be meaningful. NACUBO, however, set a uniform policy for part-time students. The total number of credit hours taken by part-time students is divided by 24 to determine an FTE calculation for this group. Also of note, non-credit students are not included in FTE calculations.

The expense classifications and addendum items from the NACUBO model follow below:36

Section 2: Instruction and Student Services
- Instruction
- Departmental administration
- Student Services
- Library
- Allocated O and M Expenses
- Allocated Depreciation: Facilities
- Allocated Depreciation: Equipment
- Allocated Administration (G&A)

Section 3: Institutional and Community Costs
- Cultural, Religious Life, and Recreation
- Museums, Gardens, Etc.
- Net Cost of Intercollegiate Athletics
- Net Cost of Other Auxiliary Operations
- Other (Specify)
- Allocated Facilities O & M Expenses
- Allocated Depreciation: Facilities

36 Ibid. Pp. 27-31
Allocated Depreciation: Equipment
Allocated Administration (G&A)

Section 4: Undergraduate Financial Aid Costs

Institutional Resources

Addendum: Facilities and Capital Costs:

- Book value of all facilities
- Estimated replacement value of all facilities
- Portion of estimated replacement value of all facilities applicable to education
- Portion of above value applicable to undergraduates

Once the final methodology was accepted, the survey was administered to and completed by 150 institutions. The group comprised both two- and four-year institutions with varied demographics. The most important finding of the survey was that the methodology was fundamentally sound for what it was trying to accomplish. Beyond this finding, NACUBO identified three other broad observations.

First, cost exceeds price. At nearly all colleges and universities, the cost of providing an undergraduate education was greater than the amount charged to students in the form of tuition and fees. Within the group of participating community colleges, cost minus price ranged from $3,000 to $7,000 per year.

Second, the overwhelming majority of costs come from instruction and student services. Within the community college participant population, an average of 85.61% of total costs fell into these categories. This is in comparison to 13.01% for institutional and community costs and 1.38% for financial aid costs.

Finally, the researchers observed that the cost associated with educating a single student varies wildly across the respondent population. Institutions at the lower end spend less than $5,000 per year to instruct a student, while schools at the higher end average more than $50,000 per student per year. Among the community college participants, total expenditures typically ranged from just below $5,000 to $9,000 for one year of instruction per student.37

The NACUBO methodology has been successful for determining a reasonable average cost of delivering a year of undergraduate education. However, the developers of the model caution against certain applications of its results. Because the model relies heavily on the each institution’s interpretation of how data should be reported, the model should not be used for benchmarking or comparisons between

37 Ibid. Pp. 33-35
schools. Additionally, the reliance on institutional averages precludes program- or discipline-level cost analyses.

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38 Ibid. Pg. 22
Note

This brief was written to fulfill the specific request of an individual member of The Hanover Research Council. As such, it may not satisfy the needs of all members. We encourage any and all members who have additional questions about this topic – or any other – to contact us.

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