



FOOTHILL-DE ANZA
Community College District

The Economic Impact
of the
Foothill-De Anza Community College District
and its Students

Prepared by

Kevin Stange
Graduate Student Researcher
Department of Economics
University of California, Berkeley

October 2005

Introduction and Summary

The Foothill-De Anza Community College District plays a vital educational, social, cultural and economic role in Silicon Valley. Each year, Foothill and De Anza colleges educate more than 60,000 students, employ more than 3,000 faculty and staff and provide countless community members with world-class lectures, performances and a host of other social and cultural events. The direct and indirect economic impact of Foothill-De Anza and its students is one incidental benefit of the district's primary purpose: to educate and enrich the lives of local residents. This report quantifies just a few of the many ways in which the district and its students influence the local and regional economy and examines the effects of financial support to the district provided by local taxpayers.

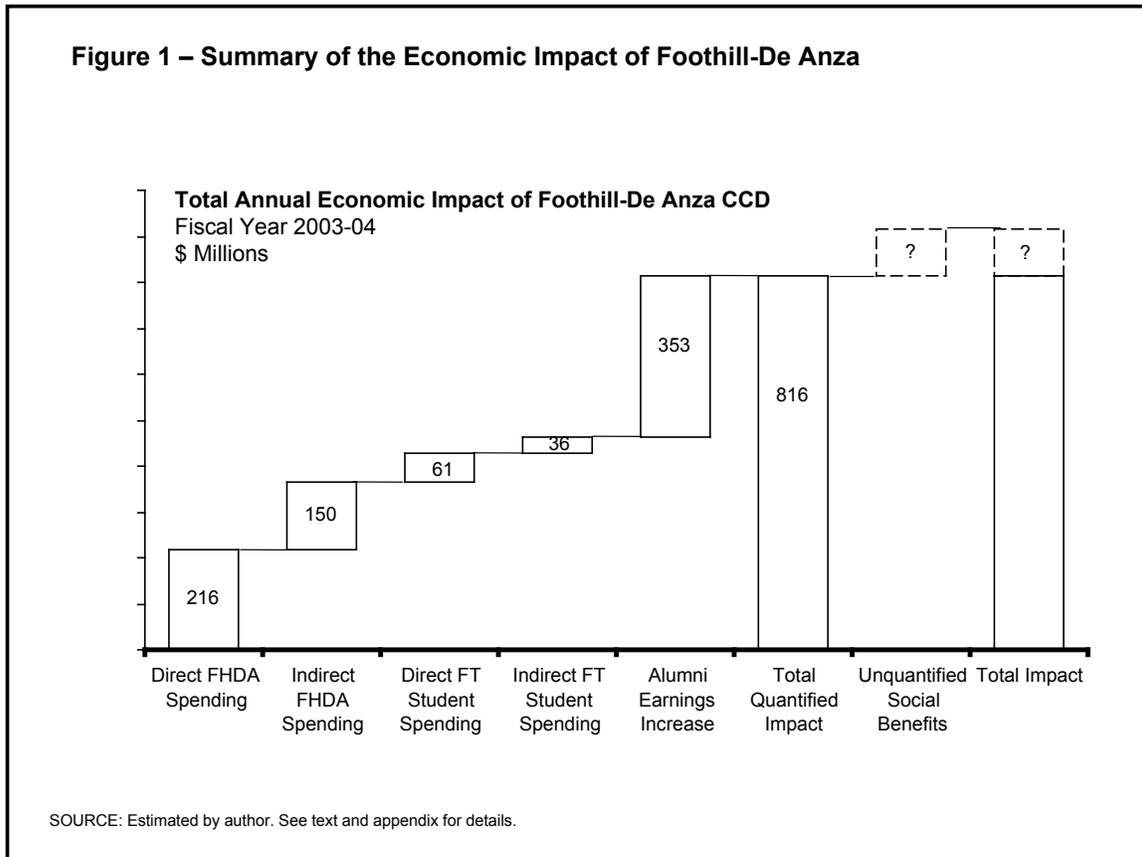
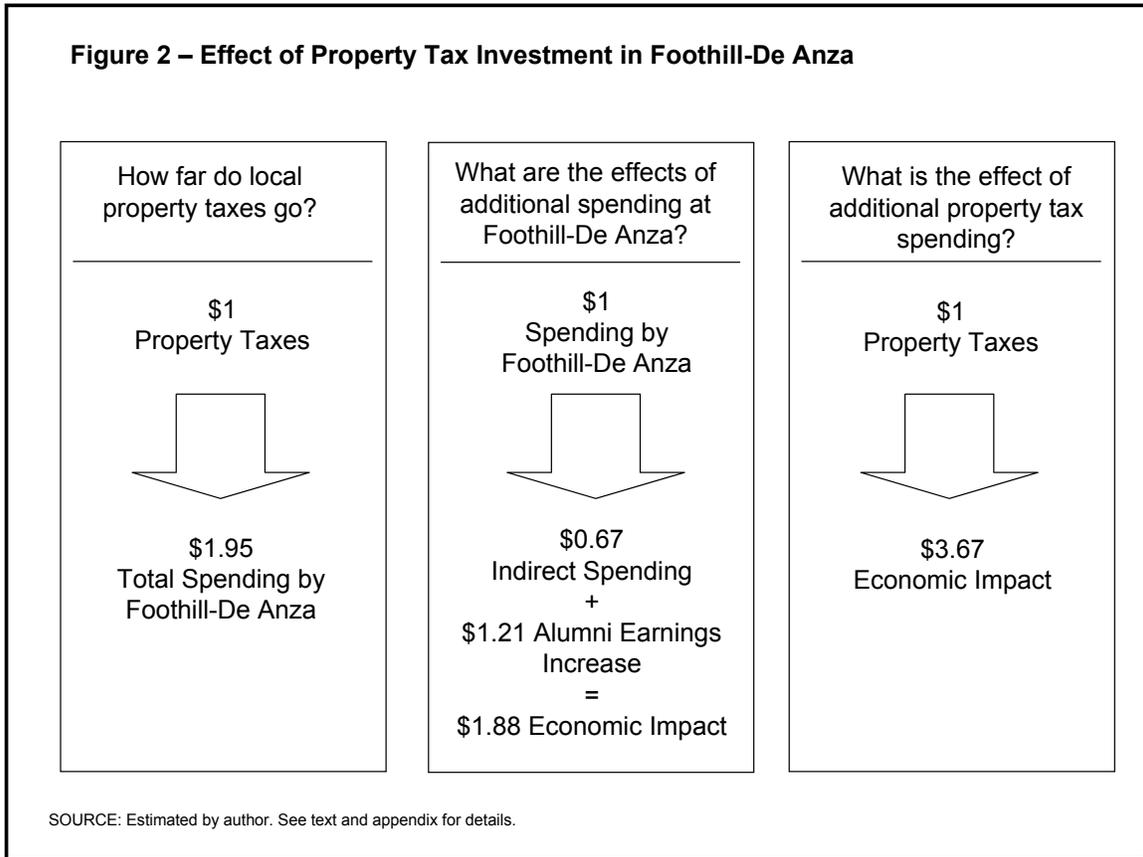


Figure 1 summarizes the main finding of the analysis: Foothill-De Anza directly and indirectly accounts for more than \$800 million of earnings in the local economy.¹ Spending by the district and its full-time students injects approximately \$277 million annually into the local economy. As this spending circulates throughout the rest of the economy, it generates an additional \$186 million of indirect and induced spending. Further, educating students has a profound impact on the local economy. Approximately \$353 million in annual earnings of local Foothill and De Anza alumni can be attributed to the colleges' investment in their productivity. Subsequent chapters examine each individual effect in more detail.

¹ This is a conservative estimate. For example, the direct and indirect spending by part-time students is excluded because their spending behavior is much less influenced by the presence of the district than that of full-time students; nevertheless, a degree of influence exists.

Figure 2 summarizes the effects of each dollar of property tax invested in Foothill-De Anza by local taxpayers, which accounts for just over 50 percent of the district's funding (with state, federal and other local sources comprising the remainder). Each dollar raised from local property taxes is associated with almost \$2 in total spending by the district. Each dollar spent by the district, in turn, generates an economic impact of \$1.85 through indirect spending and increased alumni earning potential. These matching, indirect spending and alumni earnings effects confirm that the Foothill-De Anza Community College District is an attractive investment for local tax dollars. All told, each dollar of property tax generates \$3.67 in local economic impact.



Direct Impact of Spending by the District and Its Students

While students are the most essential component of the “district,” the term “district” in this report is used to refer to the fiduciary agency with a distinct role in the local economy through employing faculty and staff and generating and disbursing revenue. The economic contributions of students are considered separately.

The district contributes to the local economy by hiring full- and part-time faculty and staff (who subsequently spend in the local economy), buying supplies and contracting for special services such as building inspections. Students pay rent and buy groceries, instructional supplies and other necessities. This section quantifies these direct spending effects.

Operational Expenditures by the District

The Foothill-De Anza Community College District directly injects almost \$200 million into the local economy every year through its day-to-day operations. As shown in Table 1, the district spends \$150 million on faculty and staff salaries and benefits annually. Because most district employees live in or near the district, nearly all of Foothill-De Anza’s payroll is spent locally. An additional \$35 million is spent on goods and services, including contracts with local businesses, purchases of goods to be sold at the district’s bookstores and dining facilities, and other operating expenses. Lastly, the district distributes an additional \$9 million to students in the form of financial aid from the federal government and other sources.

Table 1: Direct Operating Expenditures by Foothill-De Anza Community College District
Actuals 2003-04

Category	Total Expenditure (1)	Percent of Total
Employee Compensation (2)	150,292,083	77%
Goods and Services (3)	35,988,038	18%
Financial Aid to Students (4)	8,724,942	4%
Total Expenditures	195,005,063	100%

Source: Foothill-De Anza Community College District, 2004-05 Adopted Budget.

Notes: (1) Includes expenses from all general, enterprise, special revenue, and financial aid funds. All transfers out and other outgo (except financial aid to students) are excluded.

(2) Includes academic and classified employee salaries and benefits, including student employees.

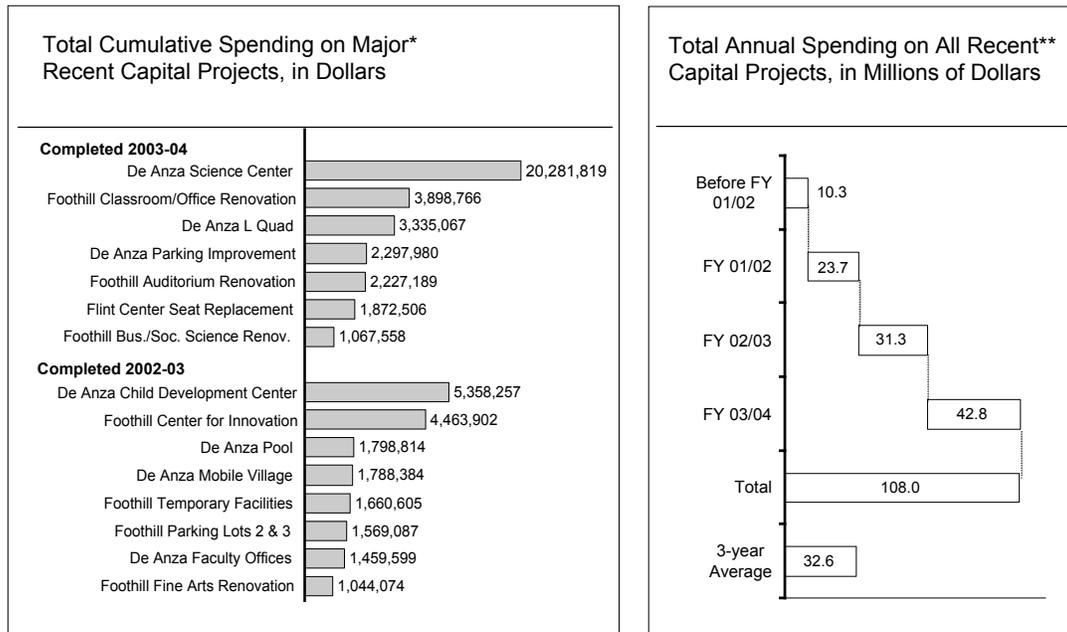
(3) Includes cost of sales (enterprise fund), materials and supplies, operating expenses and capital outlay.

(4) Includes transfers out and other outgo in financial aid funds.

Capital Expenditure by the District

The district also makes a considerable investment in the physical assets of Foothill and De Anza colleges. Figure 3 summarizes many of the major capital projects undertaken by the district over the past few years, chiefly through its Measure E construction bond. In fiscal year 2003-04, the \$20 million Science Center was completed at De Anza College, following the \$5 million Child Development Center completed the previous year. Foothill has undergone considerable renovation in the past few years, including the Krause Center for Innovation (almost \$4.5 million), classrooms and offices (\$3.9 million), the Smithwick Theater (\$2.2 million), Business and Social Sciences buildings (\$1.1 million), and the Fine Arts building (\$1 million). Parking has also been expanded and improved at both colleges. A total of \$108 million was spent on recent capital projects at the two colleges in recent years, an average of \$33 million annually.

Figure 3 – Spending on Recent Foothill-De Anza Capital Projects



SOURCE: Foothill-De Anza Community College District, FY 2003-04-05 Asset List
 NOTES: * All projects with total cumulative capital spending greater than \$1 million
 ** Includes all projects completed in 2002-03 and 2003-04 and projects that are not yet completed.

The District as a Major Employer

The district also has a direct impact on the local economy in its role as one of the largest employers in Silicon Valley. Presently, the district employs more than 3,000 full- and part-time faculty, staff, administrators and students. As shown in Table 2, almost half of district employees are faculty, with one-third employed full time. Classified staff and student employees comprise the remainder.

Table 2: Number of Foothill-De Anza Community College District Employees
as of November 1, 2004

Employment Category	Total Employment	Percent of Total
Faculty	1,407	47%
Full time	487	16%
Part time	920	31%
Classified Staff	569	19%
Student Employees	806	27%
Administrators	73	2%
Temporary Employees	152	5%
Grand Total	3,007	100%

Source: Foothill-De Anza Community College District

The great majority of district employees reside in the areas immediately surrounding the Foothill and De Anza campuses. This fact is important because the extent to which district spending on salaries and benefits reverberates throughout the regional economy depends largely on where employees who receive this salary spend it. Employment by place of residence is shown in Table 3. More than one-third of all employees live in the seven cities within the district boundaries, while half reside in areas immediately adjacent to the district or within neighboring San Mateo County. Only 100 employees—three percent of the total—reside outside the Bay Area.

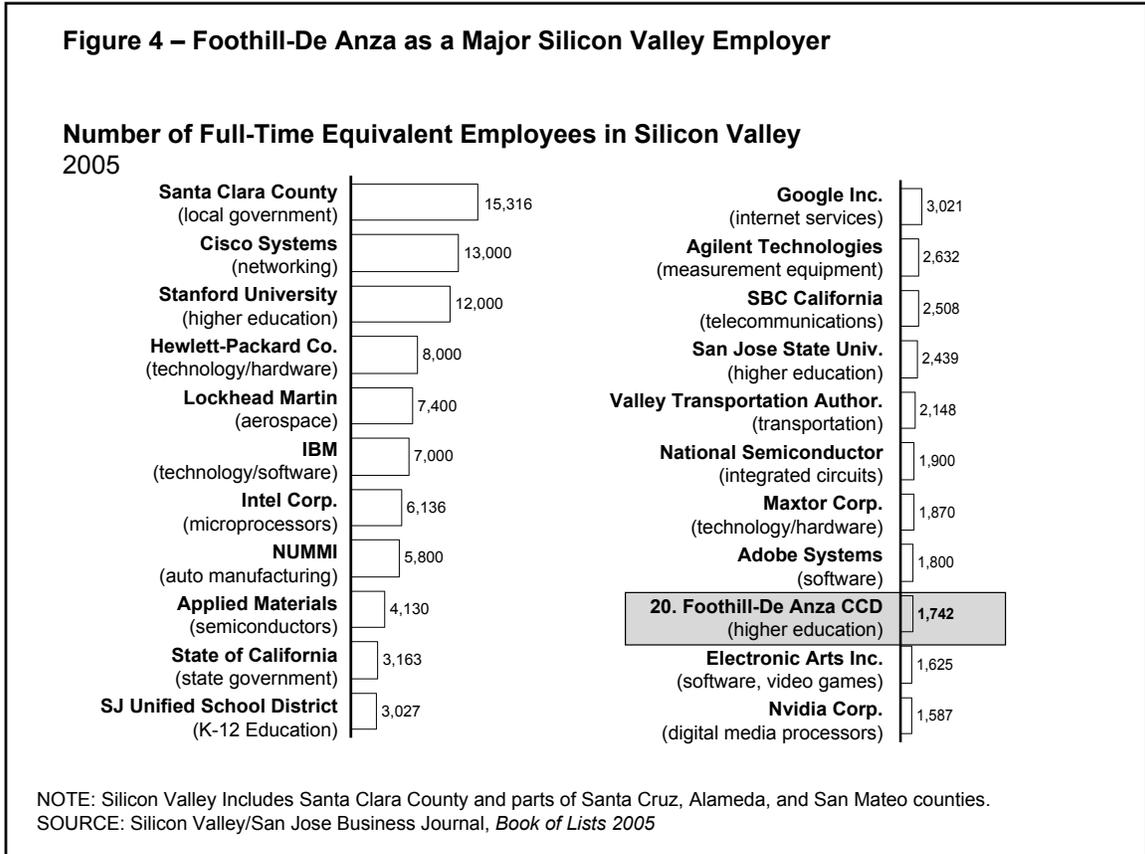
Table 3: Residence of Foothill-De Anza Community College District Employees
as of November 1, 2004

Place of Residence	Total Employment	Percent of Total
In Foothill-De Anza District ⁽¹⁾	1,053	35%
San Jose	862	29%
Immediately south of District ⁽²⁾	233	8%
Immediately north of District ⁽³⁾	184	6%
East of San Jose ⁽⁴⁾	114	4%
Other San Mateo County	100	3%
Other Bay Area	356	12%
Outside Bay Area	105	3%
Grand Total	3,007	100%

Source: Foothill-De Anza Community College District

Notes: (1) Includes Cupertino, Los Altos, Los Altos Hills, Mountain View, Palo Alto, Santa Clara and Sunnyvale
(2) Includes Campbell, Gilroy, Los Gatos, Monte Sereno, Morgan Hill and Saratoga
(3) Includes Atherton, Belmont, East Palo Alto, Foster City, Menlo Park, Portola Valley, Redwood
(4) Includes Alviso, Fremont, Hayward, Milpitas, Newark and Union City

With 1,742 full-time equivalent employees in 2005, the district is Silicon Valley's 20th largest employer, comparable to software publishers Adobe Systems and Electronic Arts. Stanford and San Jose State, both large universities with extensive graduate programs, are the only other higher education institutions in Silicon Valley with a greater impact on the local labor market. Figure 4 compares Foothill-De Anza to other major Silicon Valley public- and private-sector employers.



Spending by Foothill and De Anza Students

The expenditure by Foothill-De Anza as an institution captures only part of district-related direct spending injected into Silicon Valley’s economy: The district’s 65,500 full- and part-time students also spend a considerable amount in the local economy. The De Anza College Financial Aid Office estimates that it costs full-time students \$8,595 or \$13,665 to attend Foothill-De Anza for nine months, depending on whether they live at home with a parent or parents while attending. All told, full-time students spend an estimated \$100 million in the local economy annually. When part-time student expenditure is included, total student spending exceeds \$300 million.

Table 4 depicts the details of these calculations. Since the fraction of all students who live at home is not available, it is assumed that all students under the age of 25 do so. All other students are assumed to live on their own and therefore subject to the greater spending estimates. The overwhelming majority of students work while attending college, a process that often spans several years. To account for the fact that very few students enroll for exactly three quarters (equivalent to the typical school year) in a given year, each student is converted into a “nine-month full-year equivalent” before applying the per-student spending estimates. Finally, students enrolled in at least 12 units were designated as full-time and all other students were counted as equivalent to one-half of a full-time student.

Table 4: Annual Student Expenditure
Cost of Attendance 2004-05; Enrollment 2003-04

	Number of Full Year Students ⁽¹⁾		Total Student Expenditure ⁽⁵⁾	
	Living at Home ⁽²⁾	Not Living at Home		
Full Time Students Only	8,178	1,914		
Part Time Students	15,969	19,732		
FT and PT Students ⁽³⁾	16,163	11,780		
	Full Year Cost Per FT Student ⁽⁴⁾		Total Student Expenditure ⁽⁵⁾	
	Living at Home	Not Living at Home	FT students only	FT and PT students
Registration and Fees	\$818	\$818	\$8,255,256	\$22,856,829
Books and Supplies	\$1,287	\$1,287	\$12,988,404	\$35,961,783
Room and Board	\$3,403	\$8,473	\$44,047,056	\$154,811,515
Transportation	\$846	\$846	\$8,537,832	\$23,639,214
Personal/miscellaneous	\$2,241	\$2,241	\$22,616,172	\$62,618,769
Non-Resident Tuition	\$3,564	\$3,564	\$3,452,328	\$3,452,328
Total Cost	\$8,595	\$13,665	\$99,897,048	\$303,340,438

Source: De Anza College, Financial Aid Office (<http://www.DeAnza.edu/financialaid/coa2.html>)

Notes: (1) Average number of students enrolled in three quarters. Students enrolling in only one quarter are counted as 1/3 of an enrollment, whereas those enrolling in four quarters are counted as 1 1/3 of an enrollment. Full-time is defined as enrolling in 12 or more units.

(2) Students under 25 years old were assumed to be living at home with no dependents.

(3) Part-time students are counted at 50 percent.

(4) Cost of attendance for 2004-05 academic year, excluding materials fees. Non-resident tuition fees (\$99/ unit/qtr) are calculated assuming FT non-resident students enroll in 12 units. The number of full year, full-time non-resident students is 698 (living with relatives) and 270 (not living with relatives). Non-resident tuition of PT students is not included.

(5) Total Student Expenditure is the product of annual cost per full-time student and number of students.

Indirect Impact of Spending by the District and Its Students

Direct spending by the district and its students reverberates throughout the rest of the local economy. For example, Foothill-De Anza faculty and staff will spend some of their salary at local grocery stores, which further expands economic output and generates jobs. Combined, the district and its full-time students spend nearly \$280 million annually. This total combines estimates from Table 1 and 4, excluding several items that would be double-counted (e.g., student salaries and financial aid, fees, bookstore purchases). As depicted in Table 5, this combined direct spending induces an additional 67 percent in indirect spending. Overall, the district and its students create more than \$460 million in direct and indirect spending in the Silicon Valley economy.

Table 5: Direct and Indirect Expenditures by Foothill-De Anza Community College District and Its Students
Estimates for 2003-04

Category	Direct Spending	Multiplier ⁽⁵⁾	Indirect Spending	Total Spending
District Spending ⁽¹⁾	215,861,236	1.69	149,529,232	365,390,468
Payroll ⁽²⁾	147,288,208	1.67	98,683,099	245,971,307
Purchasing	35,988,038	1.77	27,710,789	63,698,827
Construction ⁽³⁾	32,584,990	1.71	23,135,343	55,720,333
FT Student Spending ⁽⁴⁾	61,159,568	1.59	36,084,145	97,243,713
Total District and Student Spending	277,020,804	1.67	185,613,377	462,634,181

Source: Foothill-De Anza Community College District
 Notes: (1) Does not include student financial aid
 (2) Excludes salaries and benefits paid to students
 (3) Three-year average of capital improvement purchases, from Figure 3
 (4) Total from FT student spending in Table 4, excluding tuition, sales and student use fees
 (5) Spending multiplier is the 1997 IMPLAN multiplier for the San Francisco Primary Metropolitan Statistical Area developed by the U.S. Department of Agriculture and used by Michael Potepan in "An Economic Analysis of San Francisco State University."

Spending by the district and its students also generates jobs in other industries within the local economy. Due to multiplier effects, approximately 21 full-time equivalent jobs are created for each million dollars of direct spending. In total, almost 5,900 jobs can be attributed to spending by the district and its students each year—2,547 jobs directly with Foothill-De Anza and 3,319 jobs in other industries.

Table 6: Direct and Indirect Jobs Created by Foothill-De Anza Community College District and Its Students
Estimates for 2003-04

Category	Direct Spending	Jobs Multiplier ⁽⁵⁾	Direct Jobs ⁽⁶⁾	Indirect Jobs	Total Jobs Created
District Spending ⁽¹⁾	215,861,236	20.8	2,547	1,943	4,490
Payroll ⁽²⁾	147,288,208				
Purchasing	35,988,038				
Construction ⁽³⁾	32,584,990				
FT Student Spending ⁽⁴⁾	61,159,568	22.5	0	1,376	1,376
Total District and Student Spending	277,020,804		2,547	3,319	5,866

Source: Foothill-De Anza Community College District
 Notes: (1) Does not include student financial aid
 (2) Excludes salaries and benefits paid to students
 (3) Three-year average of capital improvement purchases, from Figure 3
 (4) Total from FT student spending in Table 4, excluding tuition, sales and student use fees
 (5) Jobs multiplier is the number of total jobs generated by \$1 million of direct spending. This analysis uses the 1997 IMPLAN multipliers for the San Francisco Primary Metropolitan Statistical Area developed by the U.S. Department of Agriculture and used by Michael Potepan in "An Economic Analysis of San Francisco State University."
 (6) Number of full-time equivalent jobs. Part-time faculty are counted at 50 percent.

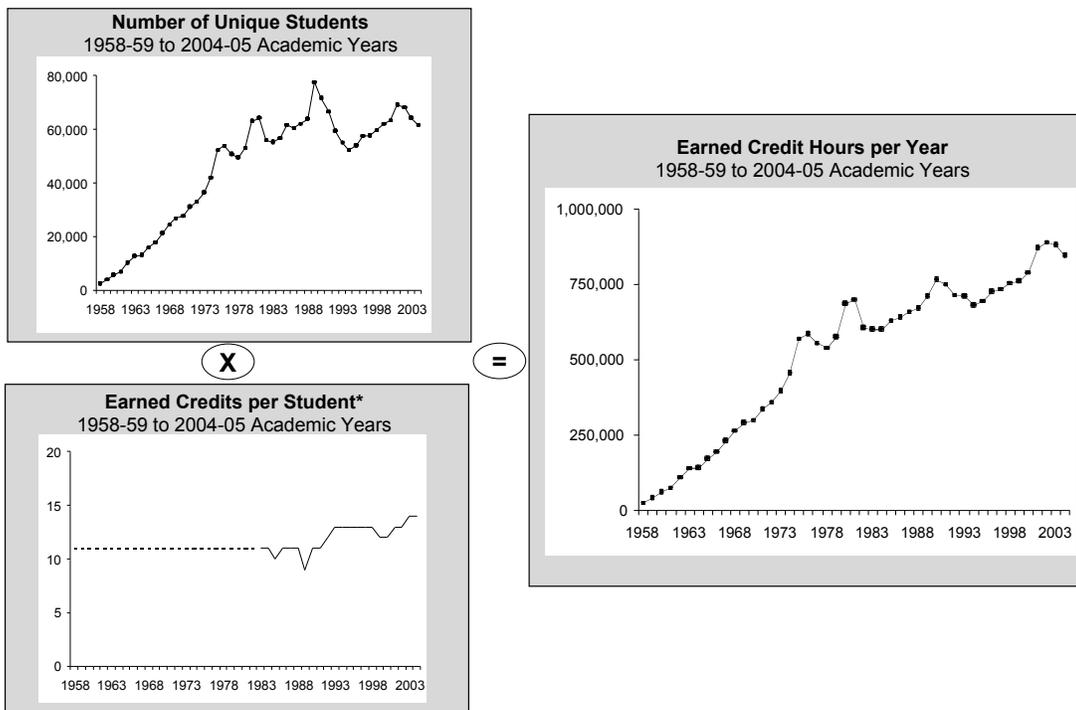
Cumulative Contributions to Workforce Productivity

Each year, more than 60,000 people learn new skills while attending Foothill and De Anza colleges. When Foothill and De Anza students join or rejoin the workforce, their newly acquired skills make them more productive, enhancing their individual earning potential and fueling local economic growth. As a result of sustained investment in the productive capacity of Foothill-De Anza students over the past 35 years, the local workforce embodies an estimated seven million credit hours of Foothill-De Anza instruction. This translates to more than \$350 million worth of earning potential last year alone and a benefit that will continued to be realized each year. Like investments in infrastructure, money invested in education returns benefits well into the future.

Yearly Investment in Workforce Productivity

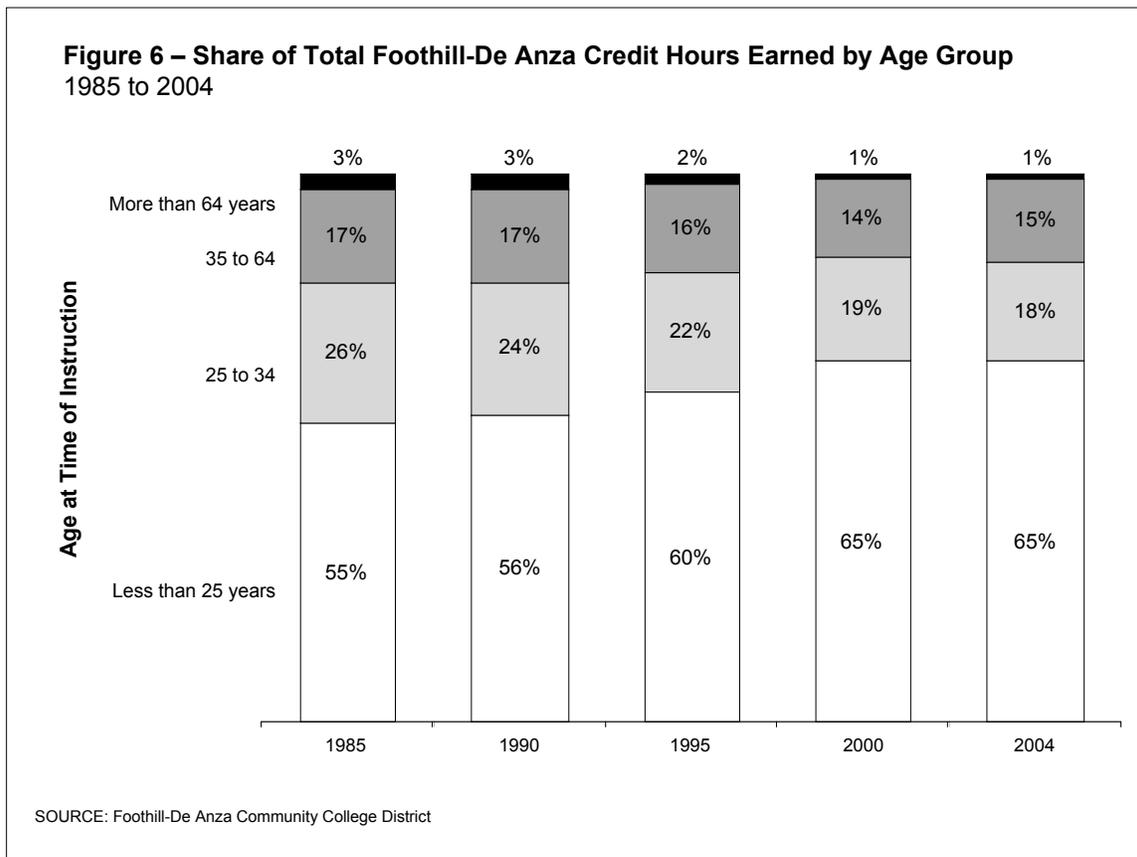
Since their inception, Foothill and De Anza colleges have equipped hundreds of thousands of individuals with invaluable skills. Figure 5 depicts the number of students, the average credits per student and total credits earned by Foothill and De Anza students every year since 1958. The number of students attending Foothill and De Anza colleges grew rapidly before 1980, but has fluctuated around 60,000 students since. At the same time, the average number of earned credits per student has slowly increased from 11 in 1983 to 14 in 2004. As a result, while the total number of credits earned by Foothill and De Anza students also grew rapidly before 1980, that figure has continued to steadily increase from 600,000 credits in 1983 to almost 850,000 by 2004. The total number of credits earned is one measure of the yearly contribution of Foothill and De Anza colleges to workforce productivity through instruction.

Figure 5 – Yearly Foothill-De Anza Investment in Workforce Productivity



SOURCE: Foothill-De Anza Community College District
 NOTE: * Earned credits per student is assumed to be constant prior to 1983.

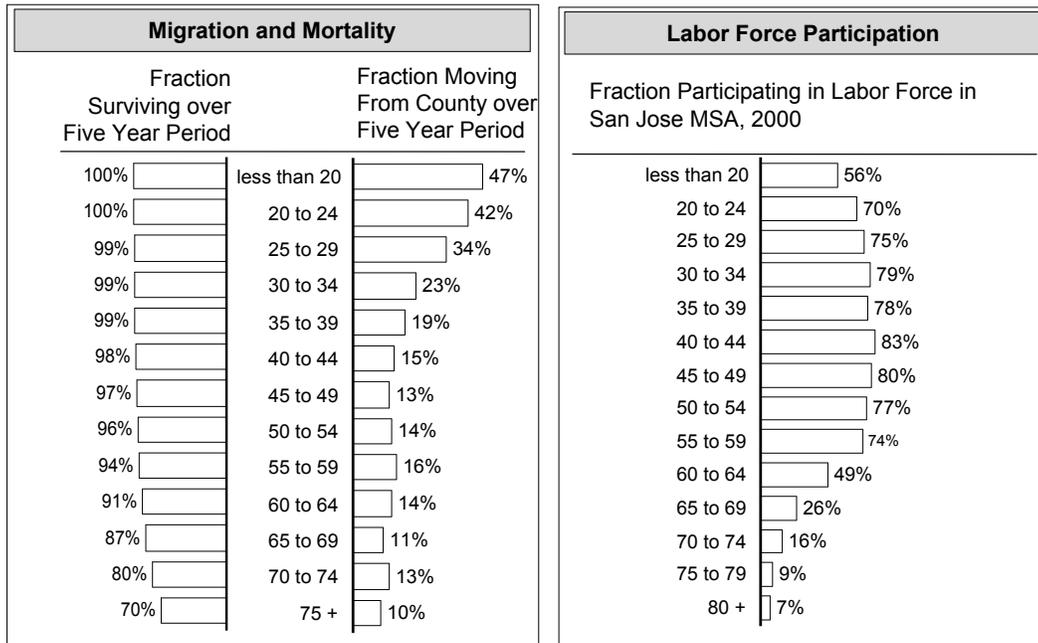
Figure 6 depicts the age distribution of Foothill and De Anza students earning college credits over the past 20 years. In 1985, 55 percent of these students were under 25, but during the 1990s, Foothill-De Anza’s credit-earners grew younger. In 2004-05, almost two-thirds of all college credits were taken by students younger than 25, up 10 percentage points from 20 years earlier. This shift will have two competing effects on the return from this investment. Clearly, investments in younger students have more years to return benefits than investments in older students, thereby increasing the rate of return. However, younger workers are also more likely to move away following college and have lower labor force participation rates, so benefits will not be realized immediately and will be more dispersed geographically. Consequently, it is difficult to predict whether the recent shift towards younger students will raise or lower the local rate of return on investment in Foothill-De Anza students.



Cumulative Investment in Workforce Productivity

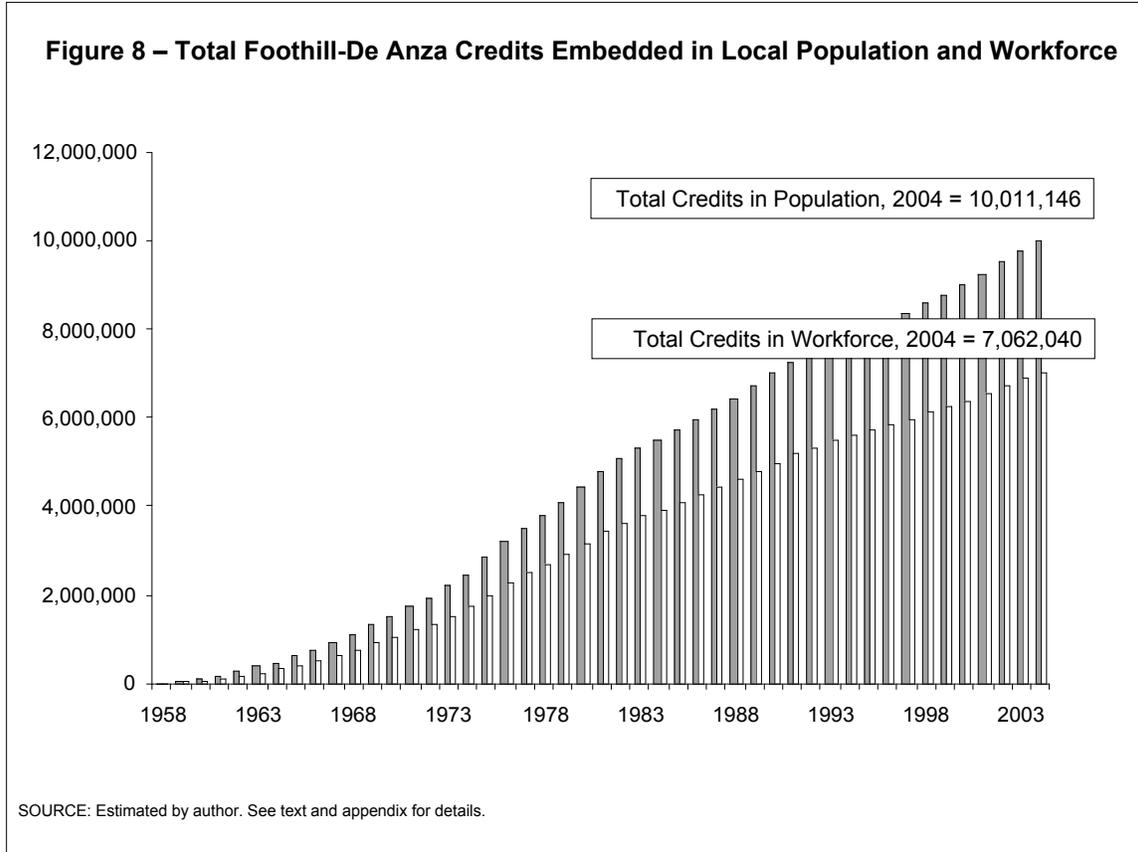
Unlike day-to-day spending, investment in productivity accumulates over time. Investments in the skills of workers as long as 30 years ago are still generating benefits today. Three main factors—migration, mortality and labor force participation—determine the extent to which yearly investment in student productivity accumulates and is utilized in the local workforce. Figure 7 summarizes the assumptions used to estimate this accumulation and utilization. As shown in the first column, the United States’ five-year mortality rates are very low at ages typical of Foothill-De Anza students. As students age after schooling, however, mortality reduces the number of credit-hours embedded in the local population. Migration is a much more significant source of credit loss in the local population. Young individuals, in particular, have very high rates of between-county migration. For instance, more than four in 10 Californians under the age of 24 will move counties over a five-year period. Out-migration rates do not fall below 20 percent until individuals reach their late 30s and remain over 10 percent even among the oldest individuals. Out-migration of Foothill and De Anza alumni reduces the colleges’ impact on the local economy while benefiting receiving communities. A final consideration is labor force participation. Not all Foothill-De Anza credit-hours of instruction embedded in the local population are put to productive use because not all former students are actively working. Alumni may choose not to work due to educational, familial, health or numerous other reasons. As shown in the final column of Figure 7, labor force participation increases with age as individuals leave school, assume more financial obligations and become more attached to workforce. As would be expected, participation drops off sharply as individuals approach retirement age.

Figure 7 – Migration, Mortality and Labor Force Participation by Age



SOURCE: U.S. National Center for Health Statistics Statistics, 2000 U.S. Census and 2004 American Community Survey. See appendix for details. NOTES: Age-specific mortality rates are for US overall in 2002. Five-year migration estimates based on one-year between-county migration rates for California overall. Age-specific mortality rates are for U.S. overall in 2002. Labor force participation is for residents of San Jose MSA who have completed at least 12 years of schooling but do not yet have a bachelor's degree.

Figure 8 plots the total number of college credit hours embedded in the local population and workforce over time, after accounting for age-specific migration, mortality and labor force participation. As of 2004, an estimated 10 million credit-hours of Foothill-De Anza instruction have accumulated within the local population. Once labor force participation is accounted for, more than seven million credit-hours were embedded in the actively employed local workforce in 2004.



Earnings Value of Accumulated Investment

Numerous studies have documented the tremendous economic benefit accruing to individuals who attend college. For instance, several studies estimate that each year of community college instruction increases earnings by six percent at every point in individuals' working careers.² This finding generally holds for men and women and across all age groups. Since older workers tend to earn more, the dollar value of each hour of instruction tends to increase with age. Figure 9 presents the average earnings and the estimated value of a unit of college credit for full-year Silicon Valley workers who do not yet possess a bachelor's degree. Assuming that each year of instruction increases earnings by six percent and that 45 credits constitute one full year, a unit of instruction at Foothill or De Anza is worth more than twice as much to a 57-year-old (\$65.52) than to a 22-year-old (\$28.53).

Figure 9 – Dollar Value of Each Foothill-De Anza Credit Earned

Age Group	Average Earnings, 2000*	Estimated \$ Value of Each FHDA Credit Earned**
16 to 19	13,844	\$18.46
20 to 24	21,401	\$28.53
25 to 29	34,408	\$45.88
30 to 34	39,922	\$53.23
35 to 39	43,557	\$58.08
40 to 44	47,978	\$63.97
45 to 49	45,846	\$61.13
50 to 54	47,115	\$62.82
55 to 59	49,140	\$65.52
60 to 64	37,886	\$50.51
65 and older	28,116	\$37.49

SOURCE: U.S. Census 2000 and various economic studies. See appendix for details.

NOTES: * Average wage and salary income for residents of San Jose MSA who have completed at least 12 years of schooling but do not yet have a bachelor's degree and who worked 50-52 weeks in the previous year.

** Assuming each year of community college increases earnings by six percent and one year is equivalent to 45 earned credits.

² See Kane and Rouse (1995), Leigh and Gill (1997), Kane and Rouse (1999), and Jacobson, LaLonde, and Sullivan (2005).

The first column of Figure 10 breaks down the total number of college credit-hours of Foothill-De Anza instruction embedded in the local workforce in 2004 by age group. Since most instruction targets younger individuals and out-migration reduces embedded credit hours with age, the majority of credit-hours are embedded in younger and middle-aged workers. The second column multiplies age-specific credit values (from Figure 9) by the number of embedded credits to estimate the dollar value of all embedded credits by age group. Over the past 35 years, Foothill and De Anza colleges have increased the annual earnings of local alumni by more than \$350 million.

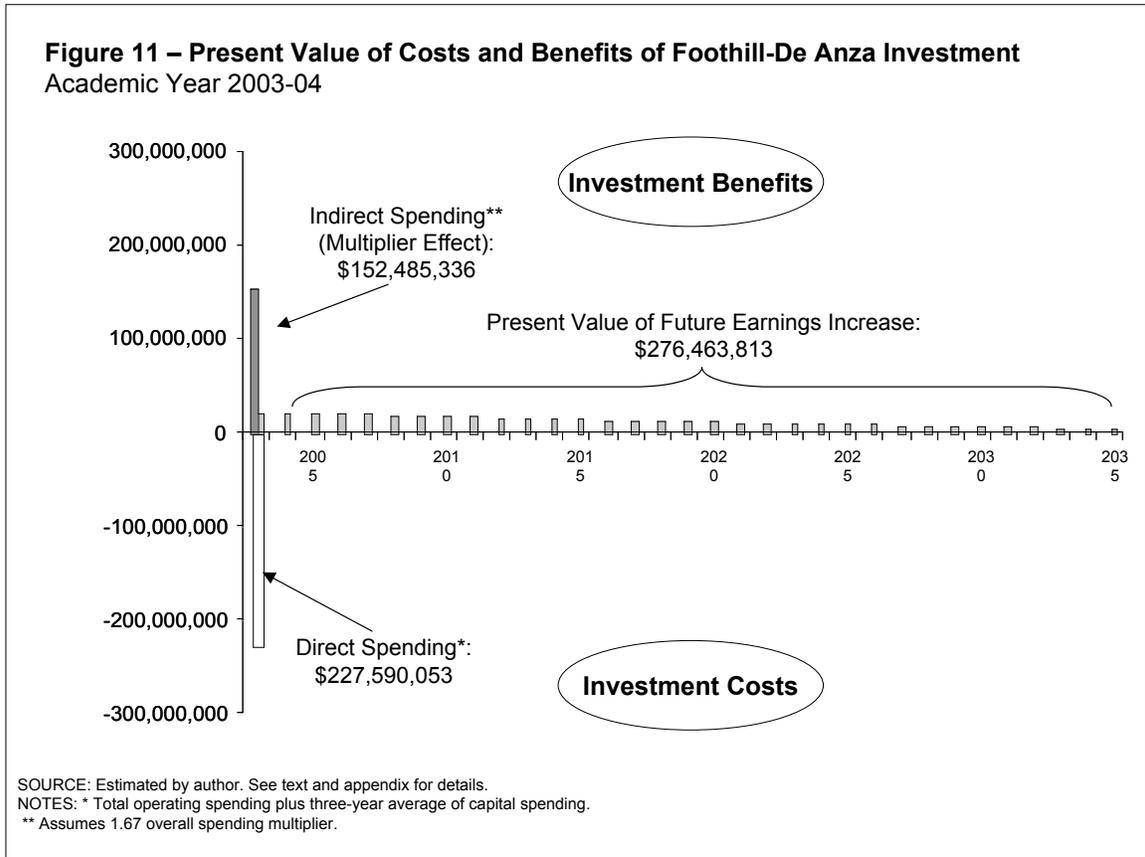
Figure 10 – Earnings Value of Total FHDA Credits Embedded in Local Workforce

Age of Worker in 2004	Total Embedded Credits, 2004	Estimated \$ Value of Embedded Credits (\$ millions)
less than 20	518,829	\$9.6
20 to 24	1,019,229	\$29.1
25 to 29	969,646	\$44.5
30 to 34	891,619	\$47.5
35 to 39	814,320	\$47.3
40 to 44	816,299	\$52.2
45 to 49	730,973	\$44.7
50 to 54	590,709	\$37.1
55 to 59	422,264	\$27.7
60 to 64	185,162	\$9.4
65 to 69	63,057	\$2.4
70 to 74	25,948	\$1.0
75 to 79	9,167	\$0.3
80 +	4,817	\$0.2
7,062,040 total credits		\$352.8 million total earnings

SOURCE: Estimated by author. See text and appendix for details.

Value of Investment in Foothill-De Anza

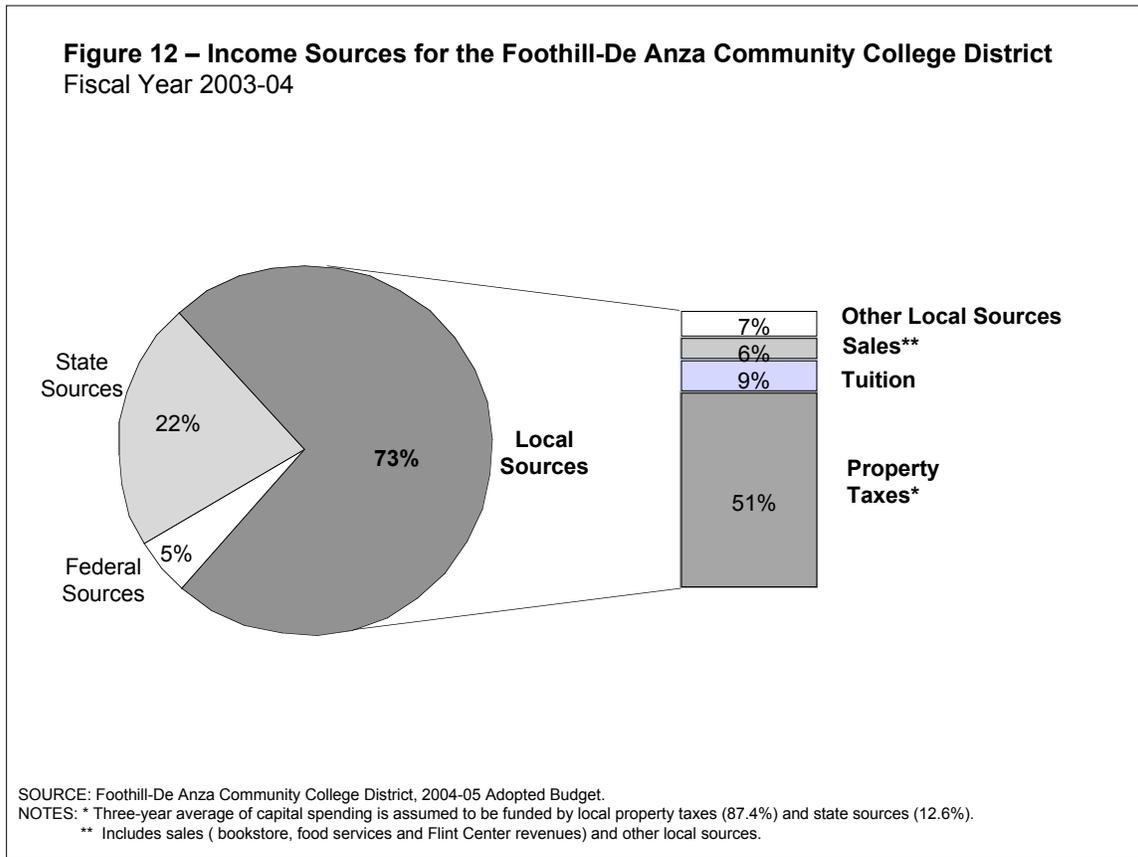
Figure 11 summarizes the major costs and benefits of one year of investment in Foothill-De Anza. During the 2003-04 academic year, more than 64,000 students were educated at Foothill and De Anza colleges. That same year, the district spent almost \$230 million on operations and capital improvements³: the total cost of one year of investment by the district. This report has identified two major benefits of this investment. First, as the direct spending reverberates throughout the local economy, each dollar of direct spending by the district creates an additional 67 cents of indirect spending. A total of \$152 million of indirect spending was created in 2003-04 through this multiplier effect. The second benefit is that the 64,000 students educated in that year are more productive and have greater earnings capacity every year for the rest of their working careers. The stream of increased earnings accruing to local alumni every year has a present value greater than \$276 million, or \$1.21 for each dollar invested during 2003-04. In total, each dollar spent by Foothill-De Anza generates \$1.88 in additional earnings within the local economy.



³ Since capital expenditures fluctuate widely over time, this figure reflects a three-year average. Actual capital expenditure during this year was larger than this average due to Measure E, the \$248 million bond approved by the community in 1999.

Figure 12 shows the sources of district revenue. Just over half of district revenue comes from local property taxes. Nearly one-quarter comes from the state government and a small fraction—six percent—comes from the federal government, primarily for student financial aid. Student fees and sales from the district’s bookstores, dining halls and the Flint Center generate a sizeable amount of local income as well. Overall, for every dollar that local property taxpayers invest in the district, other sources contribute 95 cents, for an almost one-to-one match.

As summarized in Figure 2, each dollar of local property taxes invested in Foothill-De Anza generates \$3.67 of additional earnings in the local economy.



References

Kane, Thomas and Cecilia Rouse (1995). "Labor Market Returns to Two- and Four-Year College." *The American Economic Review*; Volume 30, No. 3. June 1995.

Kane, Thomas and Cecilia Rouse (1999). "The Community College: Educating Students at the Margin between College and Work." *The Journal of Economic Perspectives*; Volume 13, No. 1. Winter 1999.

Leigh, Duane E. and Andrew M. Gill (1997). "Labor Market Returns to Community Colleges: Evidence for Returning Adults." *The Journal of Human Resources*; Volume 32, No. 2. Spring 1997.

Jacobson, Louis, Robert LaLonde and Daniel G. Sullivan (2005). "Estimating the returns to community college schooling for displaced workers." *Journal of Econometrics*, Volume 125, Issues 1-2, March-April 2005.

Appendix A: Indirect Effect Multipliers

Earnings multipliers—the amount of additional earnings generated in the local economy for every dollar spent by Foothill-De Anza—were included in the estimation of the indirect effects of direct spending by the district and its students. Since district spending is predominantly on salaries for faculty and staff who live in or near Silicon Valley, a dollar spent by the district is almost equivalent to a dollar spent on earnings. Thus, the multiplier will represent the dollar change in earnings of local households employed in any industry for each dollar change of earnings paid directly to workers employed by the district. The author was able to obtain two publicly-available estimates of this multiplier, which are summarized in Table A1. First, the California Technology, Trade and Commerce Agency published statewide multipliers for specific industries in its October 2002 report, “Using Multipliers to Measure Economic Impacts.” These multipliers are based on the 1997 benchmark input-output table for the nation and 1999 regional data using the RIMS II system. The earnings multiplier ranges from \$1.87 to \$1.99 in earnings generated in California for each dollar of college payroll. For the present analysis, however, a localized multiplier is more desirable. In a comparable study, economist and San Francisco State University Professor Michael Potepan estimates, based on the 1997 IMPLAN® economic impact modeling system, that every dollar of San Francisco State University spending generates between \$1.59 to \$1.77, depending on the type of spending, in total spending in the Bay Area economy. As expected, Potepan’s Bay Area multipliers are slightly smaller than those for the state overall, as larger geographic areas enable more incidents of re-spending of the original spending, thus generating higher multiplier effects. Because this present study is concerned with local rather than statewide effects, the author has adopted the narrower multipliers used by Potepan.

Potepan’s employment multipliers—the number of total jobs created in the local economy, both directly and indirectly, per \$1 million of direct spending—were also used to calculate indirect effects of district and student spending.

Table A1 – Sources of Multiplier Estimates

Source	Geographic Scope	Industry Scope	Earnings Multiplier	Employment Multiplier
Calif. Tech, Trade and Commerce Agency, 2002. “Using Multipliers to Measure Economic Impacts”	California	Colleges, Universities, Professional Schools	1.8734	N/A
		Private Libraries, Vocational Schools, Other Educational Services	1.9924	N/A
Michael Potepan, 2003. “An Economic Analysis of San Francisco State University”	San Francisco Primary Metropolitan Statistical Area (PMSA)	University	1.67 (Payroll)	20.8 (SFSU Spending)
			1.77 (Purchasing)	
			1.71 (Construction)	
			1.59 (Student Spending)	22.5 (Student Spending)

Appendix B: Human Capital Contribution Assumptions

This report has made several simplifying assumptions in order to estimate the impact of the Foothill-De Anza Community College District on the earnings of local alumni. This appendix discusses the overall methodology and key assumptions.

1. **Earned college credits.** The number of unduplicated students, total college credits earned, and average credits earned per student by age for each year from 1983-84 to 2004-05, as reported by the Foothill-De Anza Office of Institutional Research and Planning, is the basis for the estimation model. Since this data is not available for the years 1958-59 to 1982-83, fall headcount in these years was used to estimate the number of unduplicated students, assuming the ratio of fall headcount to students did not change during this time. Furthermore, it was assumed that the age distribution of students and the average credits per person in each age group did not change in this time period.
2. **Cohort projection.** Each “cohort” of students (i.e., a group of students attending Foothill-De Anza in the same year) was projected separately from the given year of attendance forward to 2004, in five-year increments. For example, for a given cohort attending in 1983, the number of credits possessed by 25-29 year olds in 1988 was estimated from the number credits possessed by 20-24 year olds in 1983. Because individual students can appear in multiple cohorts by attending Foothill-De Anza during more than one year, the number projected is that of total earned credits, not students. Each five-year projection step reduces the number of embedded credits by a fraction that varies with age. Computationally, the number of credits possessed after a projection step is equal to the number of credits before the projection step multiplied by an age-specific five-year survival rate. The age-specific survival rate is the product of the five-year migration survival rate and the five-year mortality survival rate. It was assumed that migration and mortality rates by age group do not change from 1983 to 2004.
 - a. **Migration.** The five-year migration survival rate is the fraction of individuals in an age group who do not move from Santa Clara County during that time period. The one-year cross-county migration rate for California overall was calculated from the 2004 American Community Survey, and a five-year cross-county migration rate was estimated. While the ideal migration measure would be the fraction of Santa Clara residents who leave per year, regardless of destination, this measure is not available; within-state, cross-county migration rates for California overall were used instead. The same migration rate was applied individuals in the same age group, regardless of sex, race and education level.
 - b. **Mortality.** Death is another channel through which credit-hours are lost from the local population. While mortality rates are insignificant up to age 45, mortality clearly becomes increasingly important with age. Survivorship the number of people that survive to a given age—was obtained from the Center for Disease Control (CDC) Vital Statistics program for all U.S. individuals in 2002 and the fraction of people in each age group that will die over the next five years calculated. This approach assumes that age-specific period mortality rates observed in a cross-section of individuals are comparable to the age-specific mortality rates experienced by a cohort. The same mortality rate is applied to individuals in the same age group, regardless of sex, race and education level.
3. **Labor Force Participation.** Not all alumni who still reside in the area actively participate in the labor force. To correct for this, the number of embedded credits

in each age group was multiplied by age-specific labor force participation rates to obtain the number of embedded credits active in the local workforce in each age group in each year. Labor force participation rates for each age group were obtained from a special tabulation of the 2000 U.S. Census 5% Public Use Micro Sample. The analysis was restricted to individuals living in the San Jose Metropolitan Statistical Area (MSA)—approximately equivalent to Santa Clara County—who had at least 12 years of schooling but had not yet obtained a bachelor's degree. The great majority of Foothill-De Anza students are in this category. To estimate the trend in credits embedded in the local workforce, participation rates are assumed to have remained unchanged from 1983 to 2004. While this assumption is very restrictive, it is reasonable for the most recent years for which the dollar value of embedded credits is calculated.

4. **Dollar Value of Embedded Foothill-De Anza Credits.** The total dollar value of credit-hours embedded in the local workforce was estimated by multiplying the total embedded credit-hours in each age group by an age-specific dollar value for each Foothill-De Anza credit. The latter was estimated by multiplying the average earnings for each age group by the return on a year of community college education and then dividing by the number of credit-hours in a year.
 - a. **Average earnings by age group.** Average earnings for each age group were obtained from a special tabulation of the above-mentioned 2000 U.S. Census 5% Public Use Micro Sample. The analysis was restricted to full-year (employed at least 50 weeks) workers living in the San Jose MSA who, again, had at least 12 years of schooling but had not yet obtained a bachelor's degree.
 - b. **Return to year of schooling.** Kane and Rouse (1999) survey several econometric studies of the returns to community college education. They conclude "each year of credit at a community college is associated with a 5-8 percent increase in annual earnings." Furthermore, Leigh and Gill (1997) and Jacobson, LaLonde, and Sullivan (2005) find that the earnings impact of community college education and retraining for displaced workers is comparable for older and younger individuals. Based on this evidence, it was assumed that a year of community college education increases earnings by six percent at every point in individuals' working careers and that this impact is the same at all ages.
 - c. **Dollar value of each Foothill-De Anza credit.** Forty-five credit-hours constitute one full year of college at Foothill-De Anza. Therefore, the dollar value of each credit was estimated separately for each group by: $(\$ \text{ value per credit}) = (\text{average earnings}) \times (6\% \text{ return/year}) / (45 \text{ credits/year})$.