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ABSTRACT

This report summarizes the most recent (December 1998) long-range statewide forecast of fall enrollment and average annual weekly student contact hours (WSCH) in California Community Colleges. The annual fall survey of college registrars shows that fall 1998 enrollment is up 1.8 percent over fall 1997. The office forecasting model projects an increase of 2.9 percent in fall 1999 enrollment statewide to 1,517,087, which would exceed the colleges' peak recorded in 1991. Further increases are forecast through the year 2005, pushing fall enrollments up by a total of 281,000 students, an increase of nearly 20 percent over this fall. The method used in this report is an econometric regression model to forecast fall enrollment. The structure and function of the model are explained in the attached Appendices A and B. Assumptions that drive future values for the model's five independent variables are student prices, financing, budget outlays, unemployment, and adult population. Recent increases in average student academic load -- largely the result of increasing high school graduate enrollment -- are projected to continue into 1999-2000, followed by use of a three-year moving average throughout the balance of the forecast period. These values are then used to derive total future WSCH. (VWC)

# Long-Range Statewide Enrollment and WSCH Forecast California Community Colleges

## December 1998





*Prepared by:*

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December 15, 1998 R&A Memo 98-21

To: Tom Nussbaum, Chancellor
Judy Walters, Vice Chancellor for Policy Development and MIS

From: Chuck McIntyre
Director of Research

Subject: **LONG-RANGE STATEWIDE ENROLLMENT AND WSCH FORECAST, DECEMBER 1998**

Enclosed is a summary and background on our most recent (December 1998) long-range statewide forecast of fall enrollment and average annual weekly student contact hours (WSCH) in California Community Colleges.

***Results***

Our annual fall survey of college registrars shows that Fall 1998 enrollment is up 1.8 percent over Fall 1997. From that level, the Office forecasting model projects

- *an increase of 2.9 percent in Fall 1999 enrollment statewide*

to 1,517,087, which would exceed the colleges' peak recorded in 1991 (page 3).

Further increases are forecast through the year *2005*, pushing fall enrollments up by a total of *281,000 students, an increase of nearly 20 percent over this fall*; an increase in participation rate from 61 students per 1,000 state adult population up to 64 per 1,000. (Note: This level is well below the rate of at least 73/1000 sought by the *2005 Task Force* and by the *Board of Governor's Strategic Response*. This is largely because our budget assumptions, explained below, do not include the 4 percent annual funding for growth recommended through 2005 in those policy recommendations. Without that funding, there will not be enough college "spaces" to meet a continuing, high demand.)

Our current forecast is only slightly higher than the Department of Finance's (DOF) latest projections:

| | *Chancellor's Office* | *DOF* |
|---|---|---|
| Increased enrollment from Fall 1998 to Fall 1999: | 2.9% | 2.7% |
| Projected headcount enrollment by 2005 | 1,756,250 | 1,737,316 |

***Method***

We use an econometric regression model to forecast fall enrollment. The structure and function of the model are explained in the attached Appendices A and B.

Assumptions which drive future values for the model's five independent variables are:

- *Student prices*: the enrollment fee decreases from $13 to $12 per unit in Fall 1998, then - along with other components of the student's price (transportation, child-care, books and supplies) - rises at the rate of the California CPI.

- *Financing:* current financing formulas with the apportionment growth cap continue.

- *Budget outlays:* follow from experience with Proposition 98 (1988), and from a cycling California economy: slowing by 1999, rising in 2003, slowing again in 2007; each downturn, however, is expected to be less severe than the 1991-94 recession.

- *Unemployment*: after declining in 1998, is assumed to be unchanged into 1999, as the recovery slows, and to rise and cycle beginning in 2000.

- *Adult population* continues to increase as forecast by DOF.

Recent increases in average student academic load (average annual WSCH per Fall headcount enrollment) - largely the result of increasing high school graduate enrollment - are projected to continue into 1999-2000, followed by use of a three-year moving average throughout the balance of the forecast period. These values are then used to derive total future WSCH.

If you have any questions or comments, please contact me at (916) 327-5887 or cmcintyr@cc1.cccco.edu or contact Chuen-Rong Chan, Research Specialist, at (916) 327-5886 or cchan@cc1.cccco.edu.

cc: Patrick Lenz
Fred Harris
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*Appendix A*

*Results of Chancellor's Office Forecast Model*

*California Community College Long Range Statewide Enrollment*

*Forecast, December 1998*

1. Model Numbers

2. Model Statistics

3. Model Estimate and Forecast of Fall Enrollment (graph)

4. Participation Rates and Model Residuals (graph)

5. WSCH Forecast

6. WSCH and WSCH/Enrollment (graph)

7. Values of Model's Independent Variables

8. Independent Variables: Ratio to 1970 (graph)

# California Community Colleges
## Long Range Statewide Enrollment and WSCH Forecast

### Model Numbers

| | Enroll. Actual | Adults | Student Price | District Budget | Cap | Unemploy | Enrollment Estimated | Enrollment Forecast | Rate %chg. | e Resid'l | %e |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1970 | 825154 | 13491 | 1328 | 2034987 | 0 | 558227 | 888141 | | | 62987 | 7.6% |
| 1971 | 837350 | 13740 | 1328 | 2069361 | 0 | 751759 | 943906 | | 1.5% | 106556 | 12.7% |
| 1972 | 921900 | 13986 | 1328 | 2120081 | 0 | 656000 | 958551 | | 10.1% | 36651 | 4.0% |
| 1973 | 1010900 | 14295 | 1328 | 2146667 | 0 | 624000 | 975906 | | 9.7% | -34994 | -3.5% |
| 1974 | 1137700 | 14642 | 1328 | 2296726 | 0 | 679000 | 1061221 | | 12.5% | -76479 | -6.7% |
| 1975 | 1287400 | 15040 | 1328 | 2469522 | 0 | 941000 | 1192309 | | 13.2% | -95091 | -7.4% |
| 1976 | 1257800 | 15466 | 1328 | 2623883 | 0 | 906000 | 1267454 | | -2.3% | 9654 | 0.8% |
| 1977 | 1321800 | 15899 | 1328 | 2713504 | 0 | 853000 | 1312516 | | 5.1% | -9284 | -0.7% |
| 1978 | 1159800 | 16395 | 1314 | 2753710 | 1 | 775000 | 1206342 | | -12.3% | 46542 | 4.0% |
| 1979 | 1248500 | 16850 | 1257 | 2765492 | 1 | 702000 | 1297433 | | 7.6% | 48933 | 3.9% |
| 1980 | 1383300 | 17361 | 1240 | 2667040 | 1 | 790000 | 1314343 | | 10.8% | -68957 | -5.0% |
| 1981 | 1430800 | 17716 | 1198 | 2616217 | 1 | 875000 | 1379226 | | 3.4% | -51574 | -3.6% |
| 1982 | 1354900 | 18101 | 1232 | 2452790 | 1 | 1210000 | 1331020 | | -5.3% | -23880 | -1.8% |
| 1983 | 1239381 | 18499 | 1242 | 2316393 | 1 | 1187000 | 1269977 | | -8.5% | 30596 | 2.5% |
| 1984 | 1144300 | 18864 | 1328 | 2402970 | 1 | 980000 | 1162854 | | -7.7% | 18554 | 1.6% |
| 1985 | 1175500 | 19304 | 1323 | 2354672 | 1 | 934000 | 1158148 | | 2.7% | -17352 | -1.5% |
| 1986 | 1225400 | 19784 | 1315 | 2426043 | 1 | 890000 | 1209939 | | 4.2% | -15461 | -1.3% |
| 1987 | 1264409 | 20305 | 1300 | 2437170 | 1 | 791000 | 1239082 | | 3.2% | -25327 | -2.0% |
| 1988 | 1336275 | 20856 | 1299 | 2532892 | 1 | 748000 | 1294134 | | 5.7% | -42141 | -3.2% |
| 1989 | 1407430 | 21472 | 1285 | 2732715 | 1 | 737000 | 1420204 | | 5.3% | 12774 | 0.9% |
| 1990 | 1505381 | 22086 | 1298 | 2875082 | 1 | 874000 | 1507351 | | 7.0% | 1970 | 0.1% |
| 1991 | 1515261 | 22476 | 1306 | 2861851 | 1 | 1172000 | 1554014 | | 0.7% | 38753 | 2.6% |
| 1992 | 1500393 | 22838 | 1316 | 2844065 | 1 | 1431000 | 1587595 | | -1.0% | 87202 | 5.8% |
| 1993 | 1376565 | 22987 | 1467 | 2787461 | 1 | 1441000 | 1353903 | | -8.3% | -22662 | -1.6% |
| 1994 | 1358687 | 23088 | 1463 | 2701311 | 1 | 1328000 | 1308197 | | -1.3% | -50490 | -3.7% |
| 1995 | 1336406 | 23210 | 1456 | 2753029 | 1 | 1209000 | 1325044 | | -1.6% | -11362 | -0.9% |
| 1996 | 1407335 | 23371 | 1432 | 2866059 | 1 | 1124000 | 1399136 | | 5.3% | -8199 | -0.6% |
| 1997 | 1449304 | 23773 | 1422 | 2980701 | 1 | 1005000 | 1456723 | | 3.0% | 7419 | 0.5% |
| 1998 | 1475000 | 24201 | 1409 | 3070122 | 1 | 942000 | 1519662 | | 1.8% | 44662 | 3.0% |
| 1999 | | 24639 | 1409 | 3131525 | 1 | 942000 | | 1517087 | 2.9% | | |
| 2000 | | 25073 | 1409 | 3194155 | 1 | 1012650 | | 1571264 | 3.6% | | |
| 2001 | | 25533 | 1409 | 3226097 | 1 | 1164548 | | 1626887 | 3.5% | | |
| 2002 | | 25998 | 1409 | 3226097 | 1 | 1281002 | | 1663346 | 2.2% | | |
| 2003 | | 26492 | 1409 | 3258358 | 1 | 1216952 | | 1684581 | 1.3% | | |
| 2004 | | 27033 | 1409 | 3323525 | 1 | 1095257 | | 1711906 | 1.6% | Change | |
| 2005 | | 27584 | 1409 | 3423230 | 1 | 985731 | | 1756250 | 2.6% | 281250 | 19.4% |
| 2006 | | 28146 | 1409 | 3525927 | 1 | 985731 | | 1820370 | 3.7% | | |
| 2007 | | 28704 | 1409 | 3596446 | 1 | 1084304 | | 1887052 | 3.7% | | |
| 2008 | | 29267 | 1409 | 3632410 | 1 | 1246950 | | 1949975 | 3.3% | | |
| 2009 | | 29844 | 1409 | 3632410 | 1 | 1371645 | | 1991907 | 2.2% | | |
| 2010 | | 30432 | 1409 | 3668734 | 1 | 1303063 | | 2017599 | 1.3% | 542599 | 37.4% |
| 2011 | | 31032 | 1409 | 3742109 | 1 | 1237910 | | 2059911 | 2.1% | | |
| 2012 | | 31643 | 1409 | 3854372 | 1 | 1176014 | | 2119651 | 2.9% | | |
| 2013 | | 32266 | 1409 | 3970004 | 1 | 1176014 | | 2191507 | 3.4% | | |
| 2014 | | 32902 | 1409 | 4049404 | 1 | 1234815 | | 2258241 | 3.0% | | |
| 2015 | | 33550 | 1409 | 4089898 | 1 | 1358296 | | 2319714 | 2.7% | 844714 | 58.3% |

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Source: Chancellor's Office, Research and Analysis Unit, 12/14/98.

# California Community Colleges
## Long Range Statewide Enrollment and WSCH Forecast

SUMMARY OUTPUT

**Model Statistics**

| *Regression Statistics* | |
|---|---|
| Multiple R | 0.96692 |
| R Square | 0.93494 |
| Adjusted F | 0.92079 |
| Standard I | 52884.4 |
| Observatic | 29 |

ANOVA

| | *df* | *SS* | *MS* | *F* | *ignificance F* |
|---|---|---|---|---|---|
| Regressio | 5 | 9.2E+11 | 1.85E+11 | 66.1 | 7.04E-13 |
| Residual | 23 | 6.4E+10 | 2.8E+09 | | |
| Total | 28 | 9.9E+11 | | | |

| | *Coefficient* | *tandard Er* | *t Stat* | *P-value* | *Lower 95%* | *Jpper 95%* | *wer 95.0* | *per 95.0%* |
|---|---|---|---|---|---|---|---|---|
| Intercept | 1343994 | 252731 | 5.317876 | 2E-05 | 821180.3 | 1866809 | 821180 | 2E+06 |
| Adults | 36.8846 | 8.34006 | 4.42258 | 2E-04 | 19.63189 | 54.1373 | 19.6319 | 54.137 |
| Price | -1435.1 | 225.061 | -6.37637 | 2E-06 | -1900.64 | -969.5 | -1900.6 | -969.5 |
| Budget | 0.42257 | 0.05559 | 7.601828 | 1E-07 | 0.307576 | 0.53756 | 0.30758 | 0.5376 |
| Cap | -148917 | 47883.7 | -3.10998 | 0.005 | -247972 | -49863 | -247972 | -49863 |
| Unemploy | 0.16564 | 0.05673 | 2.919954 | 0.008 | 0.04829 | 0.28298 | 0.04829 | 0.283 |

**Durbin Watson Statistic = 1.190 Signif. = +no -no**

| | t | P | Elasticity | Average |
|---|---|---|---|---|
| Enroll. | | | | 1462152 |
| Adults | 4.42 | 0.000 | 0.47 | 18,782 |
| Price | -6.38 | 0.000 | -1.30 | 1326 |
| Budget | 7.60 | 0.000 | 0.74 | 2557228 |
| Cap | -3.11 | 0.005 | -0.07 | 0.71 |
| Unemploy | 2.92 | 0.008 | 0.11 | 934714 |

**Adj.R2 = 0.921**
**F Ratio = 66.1**

Ave. % Off = 3.2%

| **Correlations:** | *Enroll* | *Adults* | *Price* | *Budget* | *Cap* | *Unemploy* |
|---|---|---|---|---|---|---|
| Enroll | 1.000 | | | | | |
| Adults | 0.779 | 1.000 | | | | |
| Price | 0.077 | 0.470 | 1.000 | | | |
| Budget | 0.879 | 0.761 | 0.307 | 1.000 | | |
| Cap | 0.659 | 0.786 | 0.004 | 0.597 | 1.000 | |
| Unemploy | 0.580 | 0.665 | 0.406 | 0.481 | 0.497 | 1.000 |



Source: Chancellor's Office, Research and Analysis Unit, 12/14/98.

# California Community Colleges
## Long Range Statewide Enrollment and WSCH Forecast

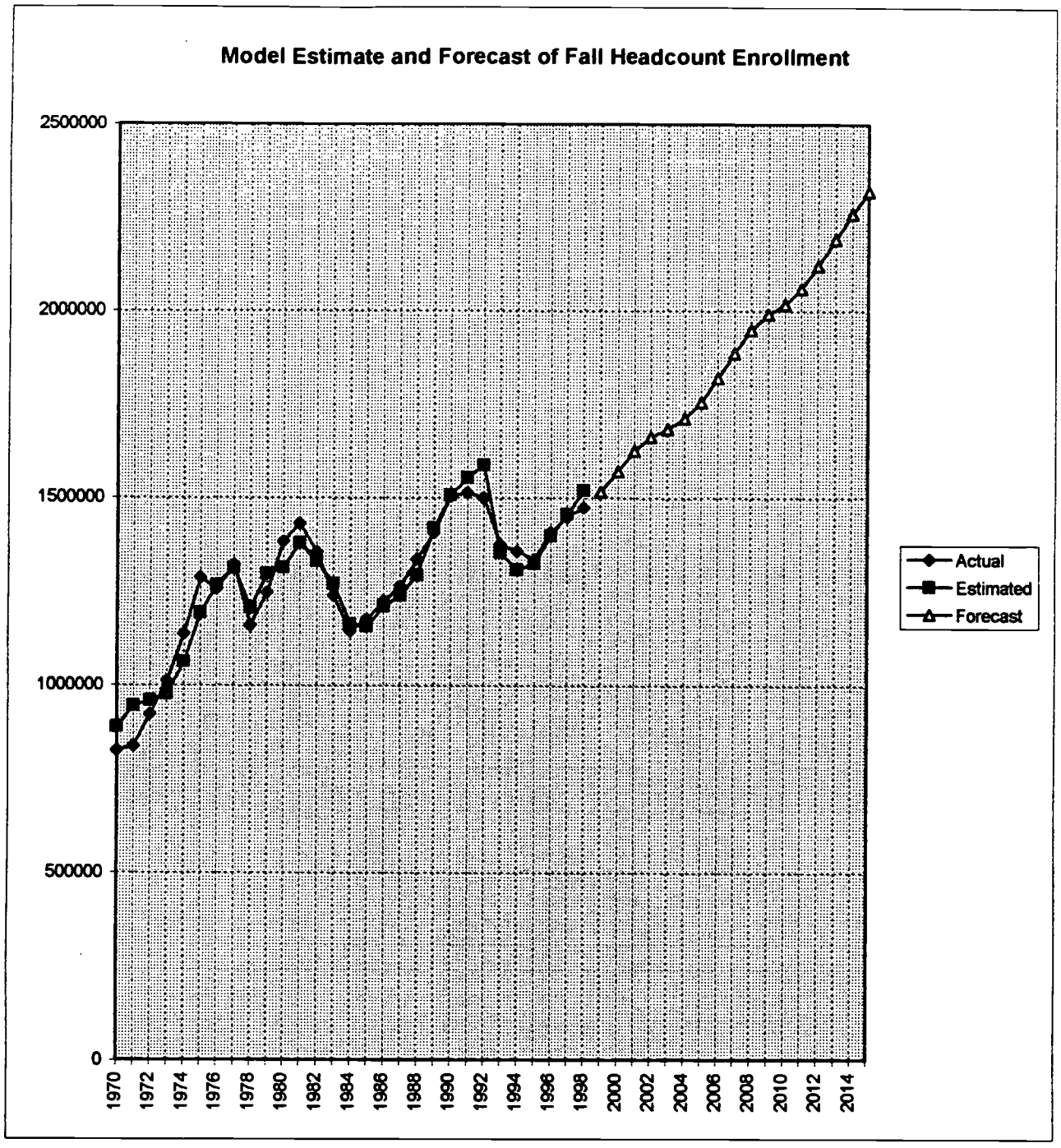
### Enrollment and Participation Rate

| | Actual | | | | Forecast | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Enrollment | % Chg. | Popul'n/ 1000 | E/1000P Actual | Population/ 1000 | | Enrollment | | E/1000P Forecast |
| 1970 | 825154 | | 13491 | 61.2 | | | | | |
| 1971 | 837350 | 1.5% | 13740 | 60.9 | | | | | |
| 1972 | 921900 | 10.1% | 13986 | 65.9 | | | | | |
| 1973 | 1010900 | 9.7% | 14295 | 70.7 | | | | | |
| 1974 | 1137700 | 12.5% | 14642 | 77.7 | | | | | |
| 1975 | 1287400 | 13.2% | 15040 | 85.6 | | | | | |
| 1976 | 1257800 | -2.3% | 15466 | 81.3 | | | | | |
| 1977 | 1321800 | 5.1% | 15899 | 83.1 | | | | | |
| 1978 | 1159800 | -12.3% | 16395 | 70.7 | | | | | |
| 1979 | 1248500 | 7.6% | 16850 | 74.1 | | | | | |
| 1980 | 1383300 | 10.8% | 17361 | 79.7 | | | | | |
| 1981 | 1430800 | 3.4% | 17716 | 80.8 | | | | | |
| 1982 | 1354900 | -5.3% | 18101 | 74.9 | | | | | |
| 1983 | 1239381 | -8.5% | 18499 | 67.0 | | | | | |
| 1984 | 1144300 | -7.7% | 18864 | 60.7 | | | | | |
| 1985 | 1175500 | 2.7% | 19304 | 60.9 | | | | | |
| 1986 | 1225400 | 4.2% | 19784 | 61.9 | | | | | |
| 1987 | 1264409 | 3.2% | 20305 | 62.3 | | | | | |
| 1988 | 1336275 | 5.7% | 20856 | 64.1 | | | | | |
| 1989 | 1407430 | 5.3% | 21472 | 65.5 | | | | | |
| 1990 | 1505381 | 7.0% | 22086 | 68.2 | | | | | |
| 1991 | 1515261 | 0.7% | 22476 | 67.4 | | | | | |
| 1992 | 1500393 | -1.0% | 22838 | 65.7 | | | | | |
| 1993 | 1376565 | -8.3% | 22987 | 59.9 | | | | | |
| 1994 | 1358687 | -1.3% | 23088 | 58.8 | | | | | |
| 1995 | 1336406 | -1.6% | 23210 | 57.6 | | | | | |
| 1996 | 1407335 | 5.3% | 23371 | 60.2 | | | | | |
| 1997 | 1449304 | 3.0% | 23773 | 61.0 | | | | % Chg. | |
| 1998 | 1475000 | 1.8% | 24201 | 60.9 | | | | | |
| 1999 | | | | | 24639 | | 1517087 | 2.9% | 61.6 |
| 2000 | | | | | 25073 | | 1571264 | 3.6% | 62.7 |
| 2001 | | | | | 25533 | | 1626887 | 3.5% | 63.7 |
| 2002 | | | | | 25998 | | 1663346 | 2.2% | 64.0 |
| 2003 | | | | | 26492 | | 1684581 | 1.3% | 63.6 |
| 2004 | | | | | 27033 | | 1711906 | 1.6% | 63.3 |
| 2005 | | | | | 27584 | | 1756250 | 2.6% | 63.7 |
| 2006 | | | | | 28146 | | 1820370 | 3.7% | 64.7 |
| 2007 | | | | | 28704 | | 1887052 | 3.7% | 65.7 |
| 2008 | | | | | 29267 | | 1949975 | 3.3% | 66.6 |
| 2009 | | | | | 29844 | | 1991907 | 2.2% | 66.7 |
| 2010 | | | | | 30432 | | 2017599 | 1.3% | 66.3 |
| 2011 | | | | | 31032 | | 2059911 | 2.1% | 66.4 |
| 2012 | | | | | 31643 | | 2119651 | 2.9% | 67.0 |
| 2013 | | | | | 32266 | | 2191507 | 3.4% | 67.9 |
| 2014 | | | | | 32902 | | 2258241 | 3.0% | 68.6 |
| 2015 | | | | | 33550 | | 2319714 | 2.7% | 69.1 |

3

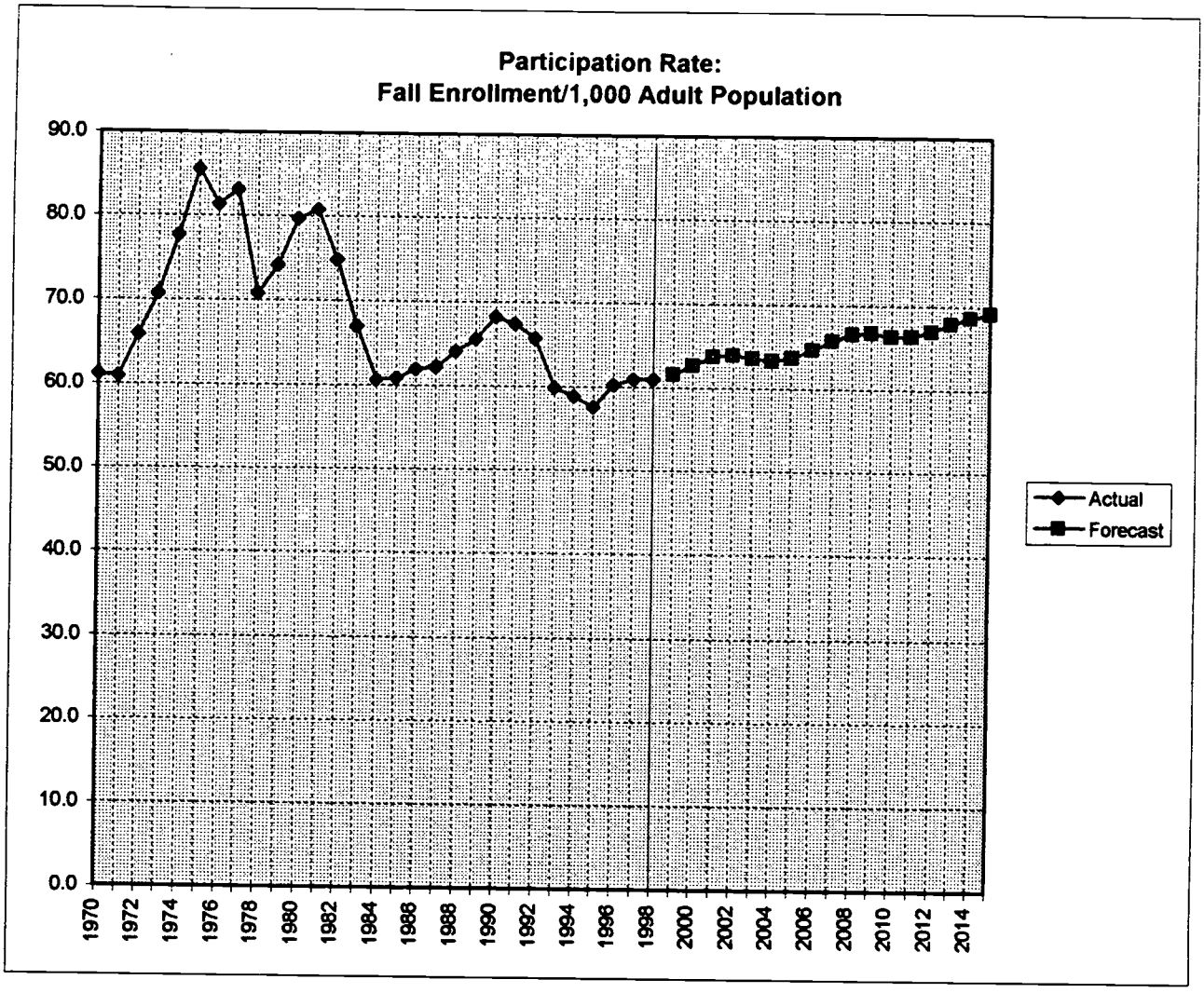
Source: Chancellor's Office, Research and Analysis Unit, 12/14/98.

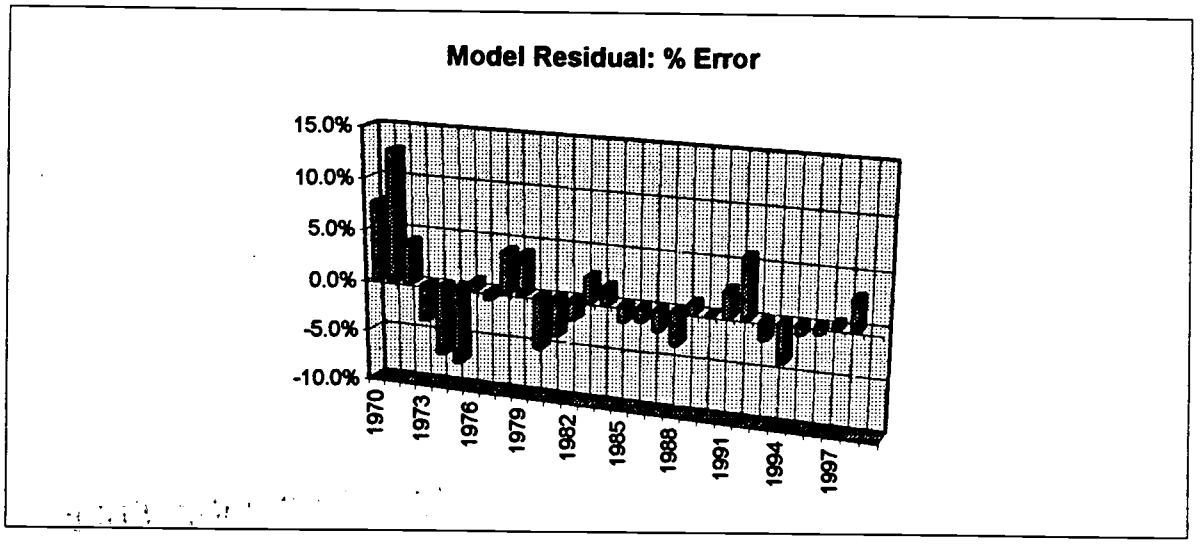
# California Community Colleges
# Long Range Statewide Enrollment and WSCH Forecast




Source: Chancellor's Office, Research and Analysis Unit, 12/14/98.

# California Community Colleges
# Long Range Statewide Enrollment and WSCH Forecast






Source: Chancellor's Office, Research and Analysis Unit, 12/14/98.

# California Community Colleges
## Long Range Statewide Enrollment and WSCH Forecast

### WSCH Forecast

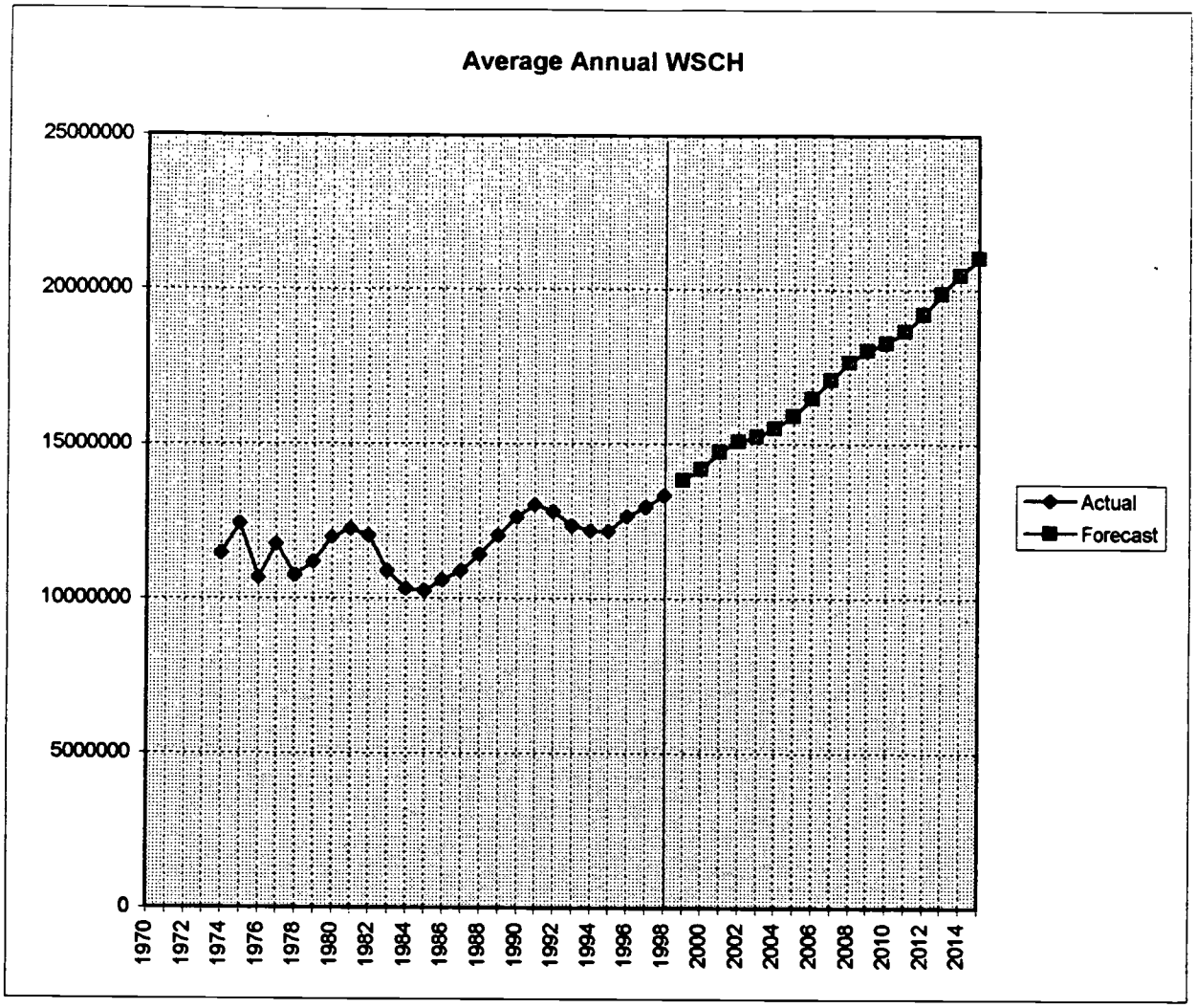
| | Enrollment | WSCH | | WSCH/Enrollment | | Enrollment | WSCH | |
|---|---|---|---|---|---|---|---|---|
| | Actual | Actual | % Chg. | Actual | Forecast | Forecast | Forecast | % Chg. |
| 1970 | | | | | | | | |
| 1971 | | | | | | | | |
| 1972 | | | | | | | | |
| 1973 | 1010900 | | | | | | | |
| 1974 | 1137700 | 11471235 | | 10.08 | | | | |
| 1975 | 1287400 | 12437516 | 8.4% | 9.66 | | | | |
| 1976 | 1257800 | 10675805 | -14.2% | 8.49 | | | | |
| 1977 | 1321800 | 11764613 | 10.2% | 8.90 | | | | |
| 1978 | 1159800 | 10741091 | -8.7% | 9.26 | | | | |
| 1979 | 1248500 | 11193259 | 4.2% | 8.97 | | | | |
| 1980 | 1383300 | 11979086 | 7.0% | 8.66 | | | | |
| 1981 | 1430800 | 12265547 | 2.4% | 8.57 | | | | |
| 1982 | 1354900 | 12050150 | -1.8% | 8.89 | | | | |
| 1983 | 1239381 | 10886592 | -9.7% | 8.78 | | | | |
| 1984 | 1144300 | 10315427 | -5.2% | 9.01 | | | | |
| 1985 | 1175500 | 10259029 | -0.5% | 8.73 | | | | |
| 1986 | 1225400 | 10586311 | 3.2% | 8.64 | | | | |
| 1987 | 1264409 | 10885462 | 2.8% | 8.61 | | | | |
| 1988 | 1336275 | 11419806 | 4.9% | 8.55 | | | | |
| 1989 | 1407430 | 12050009 | 5.5% | 8.56 | | | | |
| 1990 | 1505381 | 12641806 | 4.9% | 8.40 | | | | |
| 1991 | 1515261 | 13031434 | 3.1% | 8.60 | | | | |
| 1992 | 1500393 | 12812432 | -1.7% | 8.54 | | | | |
| 1993 | 1376565 | 12364674 | -3.5% | 8.98 | | | | |
| 1994 | 1358687 | 12198234 | -1.3% | 8.98 | | | | |
| 1995 | 1336406 | 12184626 | -0.1% | 9.12 | | | | |
| 1996 | 1407335 | 12661173 | 3.9% | 9.00 | | | | |
| 1997 | 1449304 | 12950941 | 2.3% | 8.94 | | | | |
| 1998 | 1475000 | 13339469 | 3.0% | 9.04 | | | | |
| 1999 | | | | | 9.12 | 1517087 | 13829850 | 3.7% |
| 2000 | | | | | 9.03 | 1571264 | 14191523 | 2.6% |
| 2001 | | | | | 9.06 | 1626887 | 14745925 | 3.9% |
| 2002 | | | | | 9.07 | 1663346 | 15087581 | 2.3% |
| 2003 | | | | | 9.06 | 1684581 | 15254679 | 1.1% |
| 2004 | | | | | 9.06 | 1711906 | 15515567 | 1.7% |
| 2005 | | | | | 9.06 | 1756250 | 15917139 | 2.6% |
| 2006 | | | | | 9.06 | 1820370 | 16493735 | 3.6% |
| 2007 | | | | | 9.06 | 1887052 | 17101168 | 3.7% |
| 2008 | | | | | 9.06 | 1949975 | 17670783 | 3.3% |
| 2009 | | | | | 9.06 | 1991907 | 18050053 | 2.1% |
| 2010 | | | | | 9.06 | 2017599 | 18283564 | 1.3% |
| 2011 | | | | | 9.06 | 2059911 | 18666766 | 2.1% |
| 2012 | | | | | 9.06 | 2119651 | 19208035 | 2.9% |
| 2013 | | | | | 9.06 | 2191507 | 19859335 | 3.4% |
| 2014 | | | | | 9.06 | 2258241 | 20464008 | 3.0% |
| 2015 | | | | | 9.06 | 2319714 | 21021068 | 2.7% |

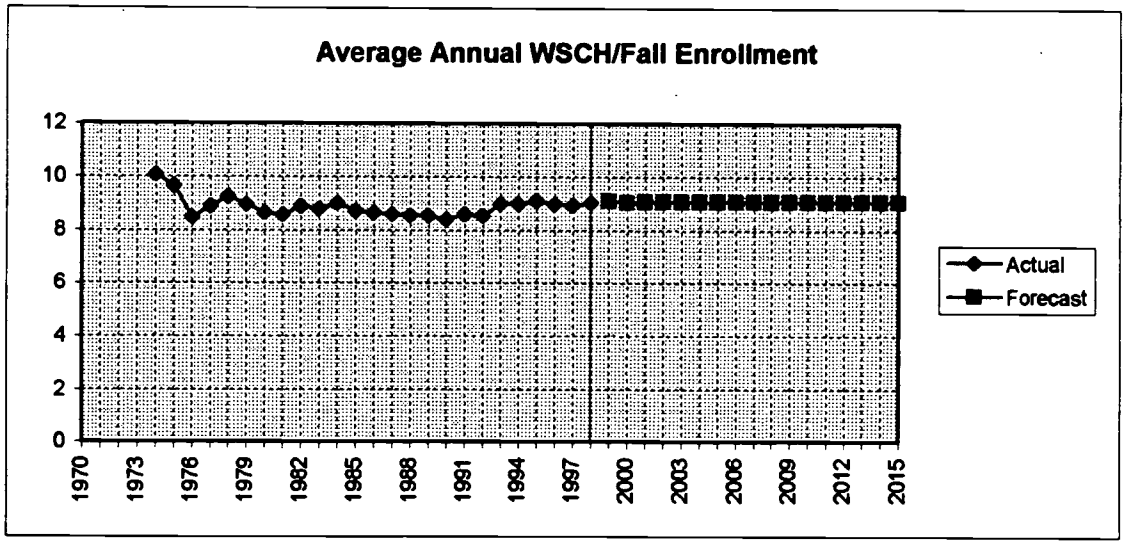




Source: Chancellor's Office, Research and Analysis Unit, 12/14/98.

# California Community Colleges
## Long Range Statewide Enrollment and WSCH Forecast






Source: Chancellor's Office, Research and Analysis Unit, 12/14/98.

# California Community Colleges
## Long Range Statewide Enrollment and WSCH Forecast

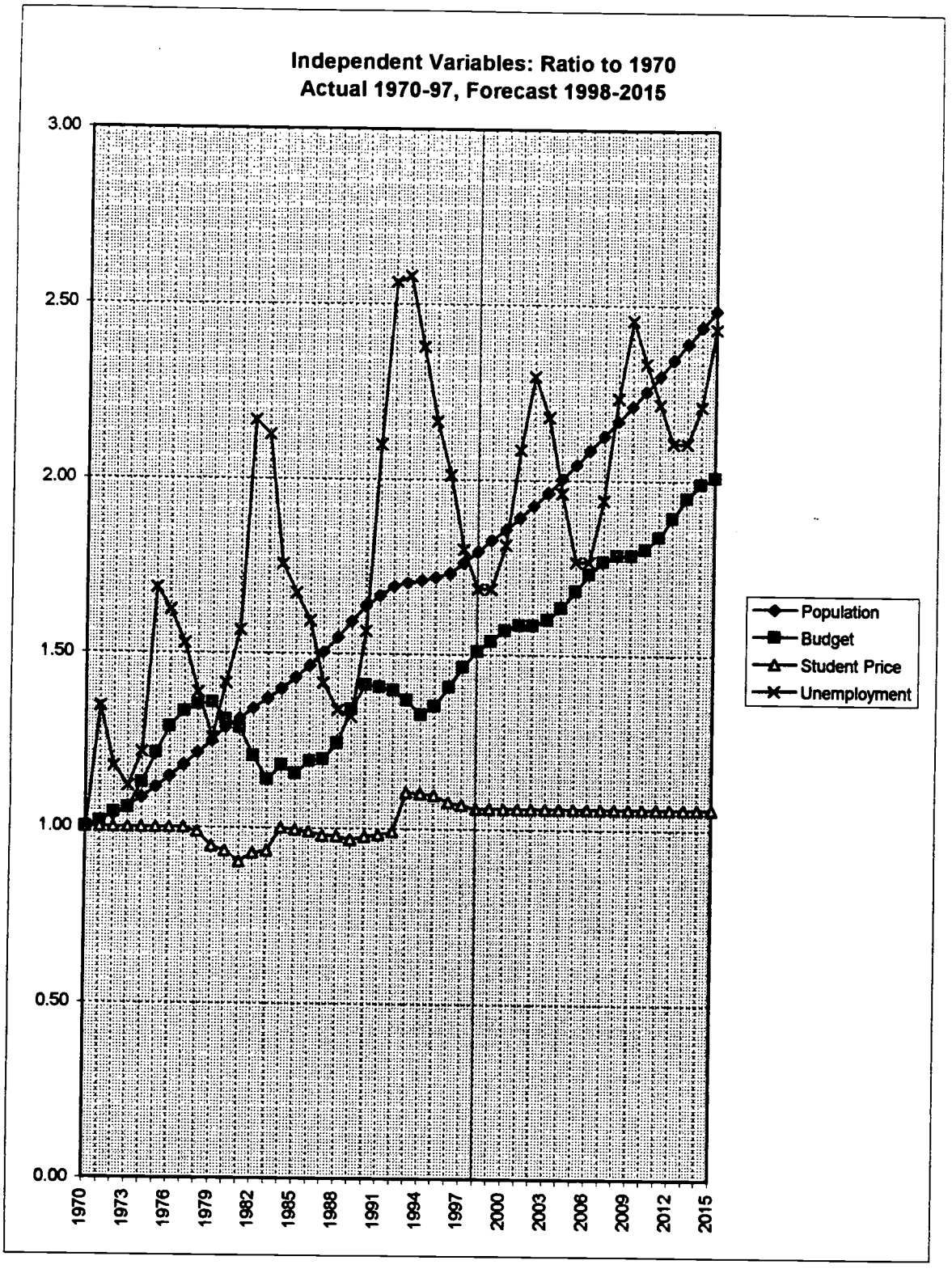
### Values (Actual and Projected) of Model's Independent Variables

| | WSCH | Enroll. | Popul'n. | Nominal Budget | Unemploy Number | Real Budget | Budget % Chg. | Popul'n. % Chg. | Real Price | % Chg. | Unemp % Chg |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1970 | | 825154 | 13490796 | 486047 | 558227 | 2034987 | | | 1328 | | |
| 1971 | | 837350 | 13739781 | 528656 | 751759 | 2069361 | 1.7% | 1.8% | 1328 | 0.0% | 34.7% |
| 1972 | 9341797 | 921900 | 13985774 | 575000 | 656000 | 2120081 | 2.5% | 1.8% | 1328 | 0.0% | -12.7% |
| 1973 | 10139125 | 1010900 | 14295418 | 625407 | 624000 | 2146667 | 1.3% | 2.2% | 1328 | 0.0% | -4.9% |
| 1974 | 11471235 | 1137700 | 14642320 | 743472 | 679000 | 2296726 | 7.0% | 2.4% | 1328 | 0.0% | 8.8% |
| 1975 | 12437516 | 1287400 | 15040154 | 881509 | 941000 | 2469522 | 7.5% | 2.7% | 1328 | 0.0% | 38.6% |
| 1976 | 10675805 | 1257800 | 15466183 | 996295 | 906000 | 2623883 | 6.3% | 2.8% | 1328 | 0.0% | -3.7% |
| 1977 | 11764613 | 1321800 | 15899143 | 1096797 | 853000 | 2713504 | 3.4% | 2.8% | 1328 | 0.0% | -5.8% |
| 1978 | 10741091 | 1159800 | 16395453 | 1185324 | 775000 | 2753710 | 1.5% | 3.1% | 1314 | -1.1% | -9.1% |
| 1979 | 11193259 | 1248500 | 16849804 | 1299273 | 702000 | 2765492 | 0.4% | 2.8% | 1257 | -4.3% | -9.4% |
| 1980 | 11979086 | 1383300 | 17360925 | 1393021 | 790000 | 2667040 | -3.6% | 3.0% | 1240 | -1.4% | 12.5% |
| 1981 | 12265547 | 1430800 | 17715732 | 1501521 | 875000 | 2616217 | -1.9% | 2.0% | 1198 | -3.3% | 10.8% |
| 1982 | 12050150 | 1354900 | 18100819 | 1500000 | 1210000 | 2452790 | -6.2% | 2.2% | 1232 | 2.8% | 38.3% |
| 1983 | 10886592 | 1239381 | 18499074 | 1481438 | 1187000 | 2316393 | -5.6% | 2.2% | 1242 | 0.8% | -1.9% |
| 1984 | 10315427 | 1144300 | 18864354 | 1606185 | 980000 | 2402970 | 3.7% | 2.0% | 1328 | 6.9% | -17.4% |
| 1985 | 10259029 | 1175500 | 19303782 | 1637764 | 934000 | 2354672 | -2.0% | 2.3% | 1323 | -0.4% | -4.7% |
| 1986 | 10586311 | 1225400 | 19784321 | 1736223 | 890000 | 2426043 | 3.0% | 2.5% | 1315 | -0.6% | -4.7% |
| 1987 | 10885462 | 1264409 | 20304568 | 1812419 | 791000 | 2437170 | 0.5% | 2.6% | 1300 | -1.1% | -11.1% |
| 1988 | 11419806 | 1336275 | 20855871 | 1939003 | 748000 | 2532892 | 3.9% | 2.7% | 1299 | -0.1% | -5.4% |
| 1989 | 12050009 | 1407430 | 21472238 | 2163698 | 737000 | 2732715 | 7.9% | 3.0% | 1285 | -1.1% | -1.5% |
| 1990 | 12641806 | 1505381 | 22085596 | 2387098 | 874000 | 2875082 | 5.2% | 2.9% | 1298 | 1.0% | 18.6% |
| 1991 | 13031434 | 1515261 | 22476371 | 2451227 | 1172000 | 2861851 | -0.5% | 1.8% | 1306 | 0.6% | 34.1% |
| 1992 | 12812432 | 1500393 | 22838297 | 2488246 | 1431000 | 2844065 | -0.6% | 1.6% | 1316 | 0.8% | 22.1% |
| 1993 | 12364674 | 1376565 | 22986716 | 2499692 | 1441000 | 2787461 | -2.0% | 0.6% | 1467 | 11.5% | 0.7% |
| 1994 | 12198234 | 1358687 | 23087986 | 2476793 | 1328000 | 2701311 | -3.1% | 0.4% | 1463 | -0.3% | -7.8% |
| 1995 | 12184626 | 1336406 | 23209752 | 2606104 | 1209000 | 2753029 | 1.9% | 0.5% | 1456 | -0.5% | -9.0% |
| 1996 | 12661173 | 1407335 | 23371191 | 2800864 | 1124000 | 2866059 | 4.1% | 0.7% | 1432 | -1.6% | -7.0% |
| 1997 | | 1449304 | 23773145 | | 1005000 | 2980701 | 4.0% | 1.7% | 1422 | -0.7% | -10.6% |
| 1998 | | 1475000 | 24201071 | | 942000 | 3070122 | 3.0% | 2.21% | 1409 | -1.0% | -6.3% |
| 1999 | | | 24638654 | | 942000 | 3131525 | 2.0% | 1.96% | 1409 | 0.0% | 0.0% |
| 2000 | | | 25072707 | | 1012650 | 3194155 | 2.0% | 1.93% | 1409 | 0.0% | 7.5% |
| 2001 | | | 25532657 | | 1164548 | 3226097 | 1.0% | 2.02% | 1409 | 0.0% | 15.0% |
| 2002 | | | 25998174 | | 1281002 | 3226097 | 0.0% | 1.97% | 1409 | 0.0% | 10.0% |
| 2003 | | | 26491911 | | 1216952 | 3258358 | 1.0% | 1.98% | 1409 | 0.0% | -5.0% |
| 2004 | | | 27032641 | | 1095257 | 3323525 | 2.0% | 1.99% | 1409 | 0.0% | -10.0% |
| 2005 | | | 27584432 | | 985731 | 3423230 | 3.0% | 1.94% | 1409 | 0.0% | -10.0% |
| 2006 | | | 28146297 | | 985731 | 3525927 | 3.0% | 1.97% | 1409 | 0.0% | 0.0% |
| 2007 | | | 28703594 | | 1084304 | 3596446 | 2.0% | 1.98% | 1409 | 0.0% | 10.0% |
| 2008 | | | 29267141 | | 1246950 | 3632410 | 1.0% | 1.96% | 1409 | 0.0% | 15.0% |
| 2009 | | | 29844029 | | 1371645 | 3632410 | 0.0% | 1.97% | 1409 | 0.0% | 10.0% |
| 2010 | | | 30432398 | | 1303063 | 3668734 | 1.0% | 1.97% | 1409 | 0.0% | -5.0% |
| 2011 | | | 31031503 | | 1237910 | 3742109 | 2.0% | 1.97% | 1409 | 0.0% | -5.0% |
| 2012 | | | 31642952 | | 1176014 | 3854372 | 3.0% | 1.97% | 1409 | 0.0% | -5.0% |
| 2013 | | | 32266374 | | 1176014 | 3970004 | 3.0% | 1.97% | 1409 | 0.0% | 0.0% |
| 2014 | | | 32901939 | | 1234815 | 4049404 | 2.0% | 1.97% | 1409 | 0.0% | 5.0% |
| 2015 | | | 33550144 | | 1358296 | 4089898 | 1.0% | 1.97% | 1409 | 0.0% | 10.0% |



Source: Chancellor's Office, Research and Analysis Unit, 12/14/98.

# California Community Colleges
## Long Range Statewide Enrollment and WSCH Forecast






Source: Chancellor's Office, Research and Analysis Unit, 12/14/98.

# *Appendix B*

## *Use of Econometric Regression Model to Forecast Enrollment*

The Chancellor's Office enrollment forecasting activity uses an econometric model to analyze community college data and measure parameters that help explain and predict enrollment:

$$E = a + b_1T + b_2P + b_3UN + b_4B + b_5F + e$$

where,

E = Student fall headcount enrollment

T = Student "out-of-pocket" price of enrollment: tuition, fees, transportation, child care, and books and supplies (price-adjusted)

P = Adult population

UN = Unemployment

B = Colleges' operating budgets (price-adjusted)

F = Colleges' financing mechanism

and, $a, b_1...b_5$ = regression parameters

e = model estimate errors or "residuals"

The first step is to "fit" this model to historic data so as to "estimate" past enrollment patterns. Time series analyses like this typically have a high "fit" since most variables are increasing over time. Consequently, we pay close attention to the model's errors or residuals. For this, the

- *Durban-Watson (DW) statistic:* helps explain enrollment trends that result from factors not in our model by measuring the pattern of model errors or "residuals." The closer DW is to the value 2, the less likely we are to have left out important factors.

Residuals may also be compared to actual enrollment to measure the relative *percent error* in the estimate for any given year(s).

Besides the model's overall fit, we assess the relative impact on enrollment, our dependent variable, of the different factors or independent variables. In this case, two measures are especially useful:

- *elasticity (e):* the percent change in, say, enrollment that results from a one percent change in an independent variable (such as fees, or unemployment), when the impact on enrollment of other variables in the model is held constant

- *t-value (t):* indicates the significance or statistical "fit" of each variable - how well each is related - to enrollment. The t value enables us to say, for instance, at a standard 95% confidence level, that the probability (P) < .01 means there is less than one chance in 100 that our results are due to purely random events.

Regression models may have certain inherent problems or *model errors*. Independent variables may be highly interrelated, relationships may not be linear, important variables may be missing, or the direction of causation sometimes isn't clear. Valid study must identify and correct such problems as they occur.

Also contributing to potential errors are data problems or *measurement errors*. Some data may not be measuring what we think they are, are measured incorrectly, or are missing. There is no one simple rule to correct for such problems; they must be addressed as they are encountered.

Once the form of the model has been validated, it is easily modified to produce forecasts.

The work described here is performed in a modified Excel spreadsheet utility. A major advantage to this is that once it is modified to add the necessary statistics and formats, the spreadsheet, in contrast to some other statistical utilities like SAS or SPSS, provides easy access to powerful and attractive graphics for effective presentation.

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