DOCUMENT RESUME

ED 129 161   HE 008 249

TITLE   Undergraduate Enrollment Projections for New Jersey
                Institutions of Postsecondary Education 1976-1990.
INSTITUTION   New Jersey State Dept. of Higher Education,
                Trenton.
PUB DATE   [75]
NOTE   34p.
AVAILABLE FROM State of New Jersey Commission on Financing
                Postsecondary Education, 20 Nassau Street, Suite 250,
                Princeton, New Jersey 08540

EDRS PRICE   MF-$0.83 HC-$2.06 Plus Postage.
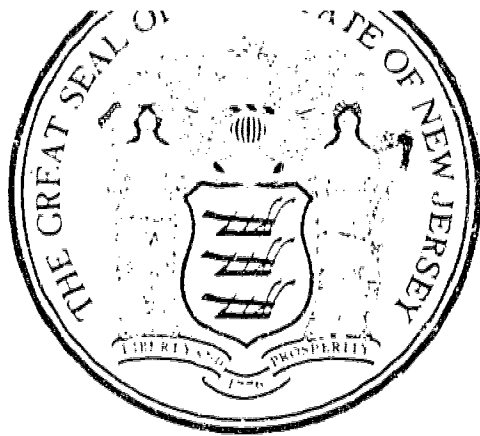DESCRIPTORS   *Enrollment Projections; *Enrollment Rate;
                *Enrollment Trends; Higher Education; *Post Secondary
                Education; *Public Policy; *Student Enrollment;
                Surveys; Tables (Data); Trend Analysis
IDENTIFIERS   *New Jersey

ABSTRACT
        Projections are presented of what will happen if
current trends in enrollments in New Jersey continue and current
policies are maintained. Enrollments are projected to 1990 for
full-time and part-time students in three collegiate sectors. The
projective methodology is a ratio technique that minimizes data
requirements and eliminates the need for making subjective judgments.
Projections indicate that: (1) the independent sector faces a serious
enrollment problem in the future as the public sector continues to
expand; (2) growth in all sectors will reach a peak between 1979-1982
and decline to 1990; and (3) some expansion is to be expected,
particularly in the public two-year sector. Policy issues raised by
these projections are: (1) whether present institutional capacities
are sufficient to deal with the peak enrollments projected; (2)
whether it is efficient to expand those segments of the postsecondary
system under its control while other segments deteriorate; (3)
whether the relationship between projected educational cost increases
for institutional and projected enrollments will contribute to a
future revenue-expenditure gap; and (4) what assumptions about change
seem reasonable, and what is desirable if these projections raise
areas of concern. (Author/KE)

UNDERGRADUATE ENROLLMENT PROJECTIONS

FOR NEW JERSEY INSTITUTIONS

OF POSTSECONDARY EDUCATION

1976 - 1990

COMMISSION ON FINANCING POSTSECONDARY EDUCATION
STATE OF NEW JERSEY

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A PUBLIC COMMISSION APPOINTED BY THE NEW JERSEY BOARD OF HIGHER EDUCATION

Introduction

States throughout the nation are becoming increasingly aware of and concerned about an almost inevitable decline in collegiate enrollments. Recent nationwide studies and special analyses in Indiana, New York and Wisconsin indicate that the long-term trend in declining enrollments will hold even if external forces such as the economy cause temporary upward adjustments. The Commission staff, based on the research described in this report, perceives a similar downward trend in New Jersey.

It should be emphasized that the projections presented in the following pages are indicative of what will happen if current trends continue and current policies are maintained. Therefore, if the enrollment trends depicted are not perceived to be in the State's best interest, it is imperative that policy-makers consider what adjustments can be made to alter the projected trends.

There are many factors that impact on enrollments, some of which can be controlled and others that are clearly beyond the control of policy-making bodies. Following are some of the primary factors in each category.

Factors that can be influenced include:

- Tuition charges at public institutions. There can be little doubt that low-tuition public institutions have dramatically expanded participation in postsecondary education over the last twenty-five years. A maintenance of this policy, in spite of rising educational costs, may help offset the declining enrollments projected for the future.

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- Admission standards at public institutions. New Jersey has made a major commitment to open access in public higher education by developing a two-year college system. It is possible, however, that some potential students who go out-of-state reject two-year colleges as a satisfactory alternative because of the perceived lack of prestige of an associate degree and because they know they want a four-year program. If admission standards were keyed to access at the state colleges and Rutgers, and limits on their size were removed, enrollments might be higher in the future than these projections indicate.

- Eligibility requirements for state financial aid. Guidelines could be altered in several instances to encourage greater participation. For example, the concept of supporting full-time students in total before providing assistance to any part-time students might be rethought. Although thorough analysis of the impact of such a change is not available, it would appear that financial aid targeted to help students who only need a little support first could increase enrollments over time. Other areas of state policy on aid eligibility which should be addressed with an eye toward their impact on enrollments include portability of aid, merit and need based programs, and loan guidelines.

- Development of a student aid system that reduces the tuition differential between independent institutions and public institutions. Some would claim that the result of such an approach would simply result in independent institutions taking students from public institutions. While this point is debatable, it is clear that it is desirable to nurture the independent sector so that it remains viable while only marginally inhibiting public sector growth. In addition, the tuitions charged to students leaving the state for postsecondary education are approximately equal to the tuitions charged by New Jersey's independent institutions. If the aid package were structured so that New Jersey's independent institutions had a significant price advantage over out-of-state institutions, they might well be able to compete in that market. A negative side of this policy is the elimination of student choice through the construct of an artificial and protectionist pricing structure.

Factors which should be recognized as influencing the impact of any policy decisions and which are beyond the policy-maker's control include:

- Birth rates that affect the number of future high school graduates who will be in the pool of potential students.

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- The relative attractiveness of a college education. Currently
  the (economic) benefits accruing to a degree-holder are offset
  by a relatively young, college-educated labor force that is
  already in place. Less tangible, but certainly important, are
  the feelings of potential students about the personal and social
  development resulting from a college experience.

- The highly competitive market in which New Jersey's institutions
  are located. Within two hundred miles of New Jersey an array
  of postsecondary education institutions exists that may be
  unmatched in the country in terms of diversity and overall
  quality.

- National and state economics which appear to have a significant
  impact on enrollments. This phenomenon holds true for all of
  higher education, including New Jersey institutions, in that
  two countervailing forces are at work. A bad economy reduces
  the amount of both family and tax-based support available to
  support students and institutions. However, a lack of
  attractive work alternatives leads individuals to seek collegiate
  education to either increase their skill base, to find better
  jobs, or to spend one or two years in a worthwhile and relatively
  inexpensive environment rather than take an undesirable job or
  accept public assistance.

The enrollment projections set forth in the following pages clearly

indicate that policy-makers must assess current and extrapolated trends,

evaluate their acceptability and implications, and consider how to

alter the controllable variables to change those trends. During this

process, it is essential that external, uncontrollable and frequently

offsetting variables be kept in mind. While it is a demanding task, it

is one that must be undertaken if a diversified and effective postsecondary

education system is to be maintained in the future.

ENROLLMENT PROJECTIONS

Information about the future is a critical need of policy makers
and planners as they make decisions in the present. Since the
magnitude of the postsecondary education system is generally determined
by a desire on the part of the population for the benefits it provides,
planning for the system is enhanced when future demand, as expressed
by enrollments, can be determined. This demand, however, reflects
the interaction between a myriad of variables affecting individual
choice, and a precise picture of demand requires a knowledge of those
variables and how they interact for every potential participant in the
system. Clearly, this knowledge is presently unavailable.

As an alternative, then, to predicting the future, the policy maker
can <u>project</u> the future. That is, by making certain assumptions, he can
extrapolate past trends into the future. These assumptions generally
reflect the specific interests of the planner, the state of any variables
under his control, and the technological constraints inherent in the
application of a given projective methodology to a specific set of data.
Thus, for the policy maker with different sets of assumptions, alternative
futures exist, providing him with the opportunity to manipulate the levels
of certain variables when a particular future is found to be undesirable.

By its very nature, information about the future is unstable.
Therefore, the choice of a particular technique by which to make these
projections depends, in part, upon the reliability of obtainable data
and the availability of techniques which maximize the use of good data.
Several techniques exist which, in general, extrapolate past enrollment
trends into the future, including cohort survival, ratio methods,
correlational analysis and Markov processes. All of these techniques
involve measuring relationships between certain variables over time,

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and each assumes that some trend in the data, determined through
lines of best-fit, exponential smoothing, or some other line generating
procedure, will continue into the future. Each of these requires data
of a different specificity and each makes certain assumptions or requires
the user to make certain judgments which limit the applicability of the
methodology.

Having surveyed these methods and weighed their various advantages
and disadvantages, an appropriate log-linear regression technique was
chosen as the projecting methodology. An explanation of this technique
and why it was chosen over other methods is set forth in Appendix A.

Once the work was completed to the point of determining the
regression equations, the projected enrollments were calculated for
collegiate sectors and full-time/part-time students. Final results
are displayed in Graphs 1 and 2 and Tables 1 and 2 (located at the
end of this brief narrative and prior to Appendix A). In these tables,
enrollments for the years 1969-1974 are actual numbers of students
while projected enrollments for the years 1975-1990 have been rounded
to the nearest one hundred students.

For full-time students, total enrollments are shown to peak in
1979, reflecting a continued growth in the public sectors until 1982
and a continuing decline in enrollments in the independent sector.
Between 1974 and 1982 enrollments in the two-year public sector will
grow by over 10,000 students. In the same period, enrollments in the
four-year public sector will grow by over 24,000 students, a gain of
roughly 33%.

For part-time students the timing of growth is similar, with a peak of close to 93,000 students reached in 1982, although the public two-year sector will grow dramatically while the four-year public sector will remain stable. The four-year independent sector is projected to decline gradually. For both full-time and part-time projections, an increasing number of births in 1969-1970 is seen as causing a short-lived increase in enrollments 18 years later with a substantial decline beyond that point to 1990.

Tables 3 and 4 indicate percentage changes in enrollments for selected time intervals. These tables demonstrate that the period of fast growth in higher education is over and that, for both full-time and part-time enrollments, growth will continue at a slower rate in the public sector for a short period of time, followed by a decline at an increasing rate. The four-year independent sector clearly is facing a difficult period as the rate of decline in enrollments increases.

Tables 5 and 6 indicate the proportion of total enrollments captured by each sector. For full-time students, the public two-year share of the total rises gently from 25% in 1975 to 30% in 1990. The public four-year institutions exhibit a more dramatic growth, increasing from 53% to 63% over the projection period. The remaining sector in this analysis, the four-year independents, is obviously hard hit by this combined growth in the public institutions, declining from 22% of the full-time total in 1975 to only 7% in 1990. The changing distribution

of part-time undergraduate enrollments is similar to, although less pronounced than, that of full-time students. The public two-year sector increases its share of students, while the public four-year sector maintains its share, and the independent sector declines.

Finally, Table 7 indicates the ratio of part-time FTE's to total FTE's (FTE's are calculated as 1 x full-time students plus 1/3 x part-time students). It is clear that changes in this ratio are expected to be moderate. The impact of these changes will be felt if funding formulas are based on FTE counts. To the extent that institutions adequately receive resources to cover their expenditures for part-time students, continued growth in part-time students would not be a liability to the public two-year sector.

In conclusion, the staff has projected enrollments to 1990 for full-time and part-time students in three collegiate sectors. The projective methodology has been a ratio technique which minimizes data requirements and eliminates the need for making subjective judgments. Data have been transformed to allow the use of log-linear regression techniques. Projections indicate that:

- the independent sector faces a serious enrollment problem in the future as the public sector continues to expand.
- growth in all sectors will reach a peak between 1979-1982 and, except for a brief period of growth later, decline to 1900.
- if past trends in part-time attendance continue, some expansion, particularly in the public two-year sector, is to be expected.

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These projections obviously raise several policy issues. Four which seem of primary importance are:

- Policy-makers need to assess whether present institutional capacities are sufficient to deal with the peak enrollments projected. If not, what are the relative merits of expansion vs. continued out-of-state migration of students?

- In light of the above, the state must determine whether it is efficient to expand those segments of the postsecondary system under its control while other segments, which could bear some of the anticipated burden without additional expansion, deteriorate.

- Planners might determine whether the relationship between projected educational cost increases for institutions and projected enrollments will contribute to a future revenue-expenditure gap, given present tuition policies and the configuration of student and institutional subsidy.

- Of those factors which influence the trends extrapolated here, which are likely to change, what assumptions about change seem reasonable, and what change is desirable if these projections raise areas of concern?

Table 1

Full-Time Undergraduate Student Enrollments

By Sector

	2-Year Public	4-Year Public	4-Year Independent	Total
1969	20,648	42,337	33,485	96,470
1970	24,477	50,029	34,709	109,215
1971	29,325	56,070	35,930	121,325
1972	30,547	63,750	35,221	129,518
1973	32,242	68,729	33,968	134,889
1974	36,017	74,099	32,918	143,034
1975	38,600	80,300	33,600	152,500
1976	40,100	83,600	32,200	155,900
1977	41,600	86,900	31,000	159,500
1978	43,400	90,700	30,000	164,100
1979	45,300	95,000	29,100	169,400
1980	45,100	94,600	26,800	166,500
1981	46,300	97,300	25,500	169,100
1982	46,800	98,500	23,900	169,200
1983	45,300	95,400	21,300	162,000
1984	44,200	93,100	19,100	156,400
1985	43,300	91,400	17,200	⁻¯1,900
1986	43,200	91,200	15,600	150,000
1987	45,000	95,000	14,700	154,700
1988	46,700	98,600	13,700	159,000
1989	43,800	92,600	11,500	147,900
1990	39,400	83,300	9,100	131,800

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Table 2

Part-Time Undergraduate Student Enrollments

By Sector

	2-Year Public	4-Year Public	4-Year Independent	Total
1969	17,326	26,853	18,430	62,609
1970	21,941	31,303	16,735	69,979
1971	25,253	32,946	14,445	72,644
1972	29,163	24,535	12,740	66,438
1973	33,938	27,913	12,122	73,973
1974	40,823	31,598	12,481	85,748
1975	39,600	31,300	12,600	83,500
1976	41,000	31,600	12,100	84,800
1977	43,300	32,000	11,600	86,900
1978	45,400	32,700	11,400	89,500
1979	47,700	33,500	11,100	92,300
1980	47,700	32,800	10,400	90,900
1981	49,200	33,200	10,100	92,500
1982	50,000	33,100	9,700	92,800
1983	48,500	31,600	8,900	89,000
1984	47,500	30,400	8,200	86,100
1985	46,700	29,500	7,700	83,900
1986	46,700	29,100	7,300	83,100
1987	48,700	30,000	7,200	85,900
1988	50,700	30,800	7,200	88,700
1989	47,600	28,700	6,400	82,700
1990	42,900	25,600	5,500	74,000

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Table 3

Percentage Change of Full-Time

Student Enrollments, By Sector

	2-Year Public	4-Year Public	4-Year Independent	Total
1969	20,648	42,337	33,485	96,470
	+74.4%	+75.0%	-1.7%	+48.3%
1974	36,017	74,099	32,918	143,034
	+25.2%	+27.7%	-18.6%	+16.4%
1980	45,100	94,600	26,800	166,500
	-4.0%	-3.4%	-35.8%	-8.7%
1985	43,300	91,400	17,200	152,000
	-9.0%	-8.9%	-47.1%	-13.3%
1990	39,400	83,300	9,100	131,800

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Table 4

Percentage Change of Part-Time

Student Enrollments, By Sector

	2-Year Public	4-Year Public	4-Year Independent	Total
1969	17,326	26,853	18,430	62,609
	+135.6%	+17.7%	+32.3%	+37.0%
1974	40,823	31,595	12,481	85,748
	+16.7%	+3.8%	-16.7%	+5.7%
1980	47,700	32,800	10,400	90,900
	-2.1%	-11.2%	-26.0%	-8.3%
1985	46,700	29,500	7,700	83,900
	-8.1%	-13.2%	-28.6%	-13.4%
1990	42,900	25,600	5,500	74,000

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Table 5

Percent of Full-Time Undergraduates in Each Sector

for the Years 1969-1990

	2-Year Public	4-Year Public	4-Year Independent
1969	21.4	43.9	34.7
1970	22.4	45.8	31.8
1971	24.2	46.2	29.6
1972	23.6	49.2	27.2
1973	23.9	51.0	24.4
1974	25.2	51.8	23.0
1975	25.3	52.7	22.0
1976	25.7	53.6	20.7
1977	26.1	54.5	19.4
1978	26.4	55.3	18.3
1979	26.8	56.1	17.2
1980	27.1	56.8	16.1
1981	27.4	57.5	15.1
1982	27.7	58.2	14.1
1983	28.0	58.9	13.1
1984	28.3	59.5	12.2
1985	28.5	60.2	11.3
1986	28.8	60.8	10.4
1987	29.1	61.4	9.5
1988	29.3	62.0	8.6
1989	29.6	62.6	7.8
1990	29.9	63.2	6.9

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Table 6

Percent of Part-Time Undergraduates in Each Sector

for the Years 1969-1990

	2-Year Public	4-Year Public	4-Year Independent
1969	27.7	42.9	29.4
1970	31.4	44.7	23.9
1971	34.8	45.4	19.9
1972	43.9	36.9	19.2
1973	45.9	37.7	16.4
1974	47.6	36.8	14.6
1975	47.4	37.5	15.1
1976	48.5	37.3	14.3
1977	49.8	36.8	13.3
1978	50.7	36.5	12.7
1979	51.7	36.3	12.0
1980	52.5	36.1	11.4
1981	53.2	35.9	10.9
1982	53.9	35.7	10.5
1983	54.5	35.5	10.0
1984	55.2	35.2	9.5
1985	55.7	35.2	9.2
1986	56.2	35.0	8.8
1987	56.7	34.9	8.4
1988	57.2	34.7	8.1
1989	57.6	34.7	7.7
1990	58.0	34.6	7.4

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Table 7

Ratio of Part-Time FTE's to Total FTE's

	2-Year Public			4-Year Public			4-Year Independent		
	1/3 PT	FTE	1/3 PT / FTE	1/3 PT	FTE	1/3 PT / FTE	1/3 PT	FTE	1/3 PT / FTE
1969	5,775	26,423	21.9	8,951	51,266	17.5	6,143	39,628	15.5
1970	7,314	31,791	23.0	10,434	60,463	17.3	5,578	40,287	13.8
1971	8,418	37,743	22.3	10,982	67,052	16.4	4,815	40,745	11.8
1972	9,721	40,268	24.1	8,178	71,928	11.4	4,247	39,468	10.8
1973	11,313	43,555	26.0	9,304	78,033	11.9	4,041	38,009	10.6
1974	13,608	49,625	27.4	10,533	84,632	12.4	4,160	37,078	11.2
1975	13,200	51,800	25.5	10,400	90,700	11.5	4,200	37,800	11.1
1976	13,700	53,800	25.5	10,500	94,100	11.2	4,000	36,200	11.1
1977	14,400	56,000	25.7	10,700	97,600	11.0	3,900	34,900	11.2
1978	15,100	58,500	25.8	10,900	101,600	10.7	3,800	33,800	11.2
1979	15,900	61,200	26.0	11,200	106,200	10.5	3,700	32,800	11.3
1980	15,900	61,000	26.1	10,900	105,500	10.3	3,500	30,300	11.6
1981	16,400	62,700	26.2	11,100	108,400	10.2	3,400	28,900	11.8
1982	16,700	63,500	26.3	11,000	109,500	10.0	3,200	27,100	11.8
1983	16,200	61,500	26.3	10,500	105,900	9.9	3,000	24,300	12.4
1984	15,800	60,000	26.3	10,100	103,200	9.8	2,700	21,800	12.4
1985	15,600	58,900	26.5	9,800	100,200	9.8	2,600	19,800	13.1
1986	15,600	58,800	26.5	9,700	100,900	9.6	2,400	18,000	13.3
1987	16,200	61,200	26.5	10,000	105,000	9.5	2,400	17,100	14.0
1988	16,900	63,600	26.6	10,300	108,900	9.5	2,400	16,100	14.9
1989	15,900	59,800	26.6	9,600	102,200	9.4	2,100	13,600	15.4
1990	14,300	53,700	26.6	8,500	91,800	9.3	1,800	10,900	16.5

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Appendix A

Cohort survival, the most common method used to project enrollments,
is essentially a technique by which individual populations are tracked
from birth through college. Birth, mortality, migration, high school
graduate rate, college-going rate, and survival rate in college can be
incorporated into this model to reflect a logical flow of persons into
and out of a pool of individuals attending college. The scope of data
elements required to project using this technique is substantial, and
in the use of certain variables--for instance the college-going rate
in 1985--one is forced to make subjective judgments. In addition, the
step-by-step approach becomes increasingly unstable as the estimates
made in one step impact on estimates made in later steps, magnifying
the total variance of the projection at each succeeding decision point.
One way in which this problem has been confronted has been to estimate
high and low levels for each decision point, carry these through the
projection, and produce several possible outcomes, normally with a
large spread between lowest and highest estimates. Interpreting these
results is often difficult and, unless the projector can assess the
impact of each variable at every decision point, he is unable to
determine which decision contributed most significantly to the outcome.

Both Markov analysis and correlation analysis require even more
detailed but equally reliable information in order to yield useful
results. While these methods can potentially provide a large amount
of specific information, the fact that the required input data was
either unavailable in sufficient detail or unreliable, in conjunction

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with a belief that the minimization of subjective judgments was highly desirable, led the Commission staff to reject these approaches as well. However, Appendix B does contain some findings based on a cohort survival technique.

The ratio method is appealing in that the data requirements are not overwhelming and its use is common. One driving force involved in determining potential demand for a service such as education is births some number of years prior to the time when that service is to be offered. Birth data has the real advantage of being accurate and, in the case of a service not offered until more than 18 years after birth, such data allows the planner to project demand 18 years into the future on the basis of firm information which is presently available. Therefore, it was determined that the ratio of enrollments to births should be the variable projected into the future. A flow chart of the projection model appears as Chart A1.

Actual number of births for the years 1947-1972 were provided by the New Jersey Department of Health and they were utilized in two ways. For the years 1947-1956, births served as input data, while for the years 1957-1972 the product of births and the projected ratio of enrollments to births yielded projected enrollments.

Lacking accurate data on enrollment classifications, that is by level or program, the single factor for projective purposes becomes the ratio of total enrollments to births 18 years prior to freshman class year, disaggregated by collegiate sector (public two-year, public four-year and independent four-year) as well as by full-time or part-time

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status. This data was available for the years 1965-1974 and is based
on all students attending New Jersey institutions. New Jersey students
attending institutions outside of the state are not included, while
out-of-state residents enrolled in New Jersey institutions are included.
This does not represent a large problem as long as the proportion of
New Jersey students is constant in each sector. The ratio of out-of-
state to total students for the four-year independent sector varies
from 27.3 to 36.6% over the years we used and is shown in Table A1.
For the other sectors, the proportion of out-of-state students is small,
below 8%, and is not a concern.

Using this method, the enrollment-births ratio is estimated for
years beyond 1975 by extrapolation along a line that "best-fits" the
data from 1965-1974. In fitting a line to the 1965-1974 data, several
methods have been proposed. Software limitations, the high R^2's
obtained,[1] and considerations of simplicity and reproducibility encouraged
the staff's use of log-linear techniques over the non-linear logistic
growth and straight-line methods used by other researchers. In
particular, log-linear regressions in which time (t=year-1965) was
logarithmically transformed were used for projecting ratios for all
sectors save the independent four-year institutions. The TSP (Time
Series Processor) package on an IBM 360/91 installation was employed.

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[1] R^2 is a statistic which indicates the amount of variance in the data
accounted for by the regression line. If the regression line "fits"
the actual data perfectly, the R^2 of the regression equation would
equal unity, the highest value attainable.

The equations for the best fitting line and the associated R^2, the
amount of variance accounted for, are shown in Tables A2 and A3.
Tables A4 and A5 show the relationship between actual enrollments,
rounded to the nearest one hundred, and enrollments projected by a
regression line calculated to best fit the ratio of enrollments to
births for the years 1969-1974.

In the case of the four-year public institutions, it came to the
staff's attention that some problems had existed in collecting data
for the years 1969-1971. In fact, some full-time students may have
been counted as part-time students if they attended evening classes.
Since it was determined that this situation could not be rectified,
that is, students could not be transferred from one status to another
at this time, a statistical procedure was chosen to test whether the
line of best fit, as calculated above, should be changed in either
the full-time or part-time projection for the public four-year sector.

A dummy variable was created for the years in question, entered
into the computer, and new regression lines were calculated. To determine
whether the projections including the dummy explained the data signifi-
cantly better than did the original projections, the Chow test was
employed.[1] It was determined that a significant improvement resulted
only for the part-time four-year public enrollment projections.

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[1] The test, based on the reduction in the sum of squared residuals caused
by the inclusion of the dummy variable, is an F ratio of that reduction
divided by the sum of residuals of the dummy equation, adjusted for the
appropriate degrees of freedom, as follows:

$$F = \frac{\dfrac{SSR_{original} - SSR_{dummy}}{r}}{\dfrac{SSR_{dummy}}{n-k-1}}$$

Where SSR = the sum of squared residuals
  r = degrees of freedom lost = 1
  $n-k-1$ = degrees of freedom in the original
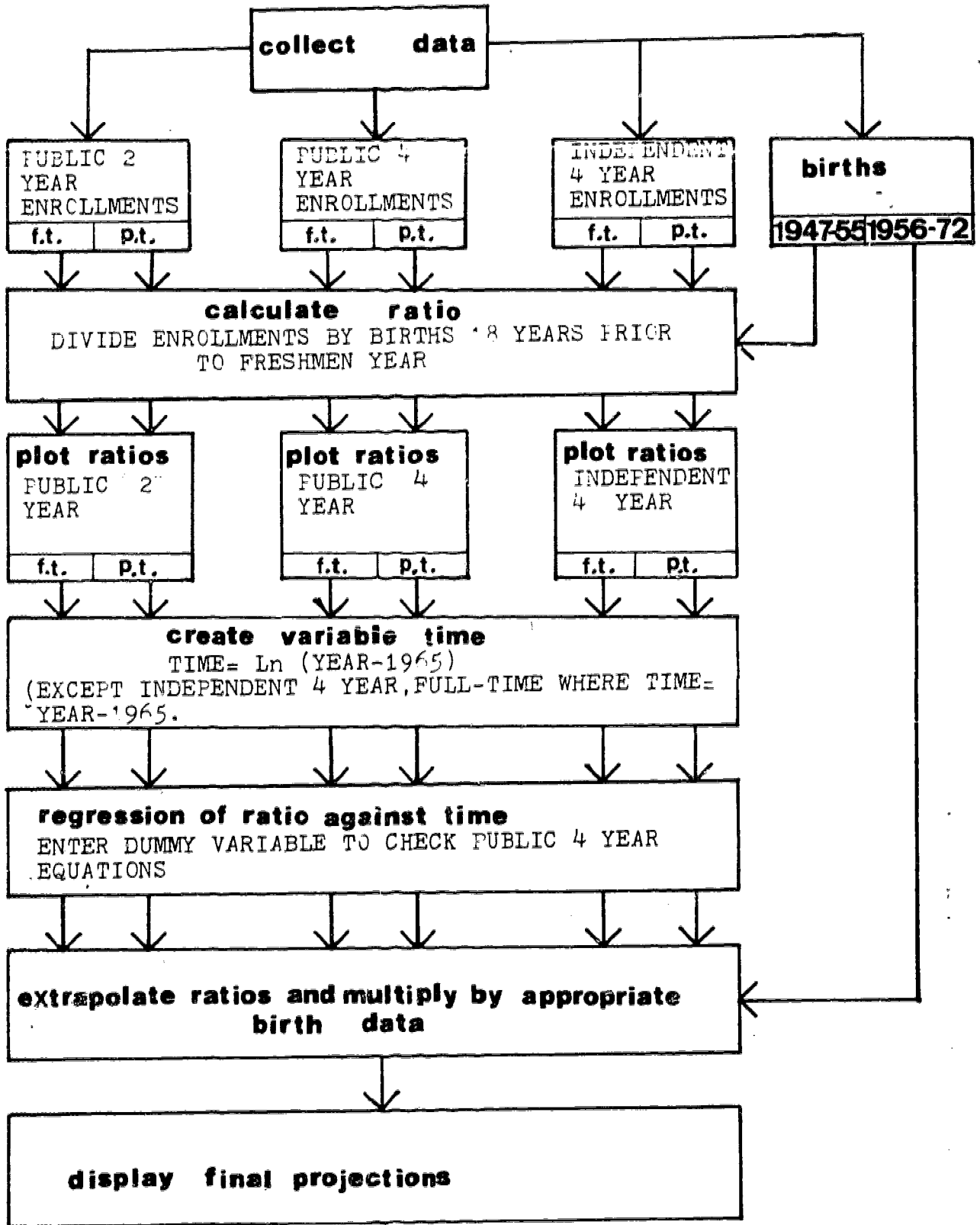 equation = 7

FLOW CHART OF PROJECTION METHODOLOGY

```
                    ┌──────────────────┐
                    │  collect   data  │
                    └──────────────────┘
        │               │               │               │
        ▼               ▼               ▼               ▼
┌─────────────┐ ┌─────────────┐ ┌─────────────┐ ┌─────────────┐
│ PUBLIC 2    │ │ PUBLIC 4    │ │ INDEPENDENT │ │  births     │
│ YEAR        │ │ YEAR        │ │ 4 YEAR      │ │             │
│ ENROLLMENTS │ │ ENROLLMENTS │ │ ENROLLMENTS │ ├──────┬──────┤
├──────┬──────┤ ├──────┬──────┤ ├──────┬──────┤ │1947- │1956- │
│ f.t. │ p.t. │ │ f.t. │ p.t. │ │ f.t. │ p.t. │ │  55  │  72  │
└──────┴──────┘ └──────┴──────┘ └──────┴──────┘ └──────┴──────┘
```

calculate   ratio
DIVIDE ENROLLMENTS BY BIRTHS 18 YEARS PRIOR
TO FRESHMEN YEAR

```
┌─────────────┐ ┌─────────────┐ ┌─────────────┐
│ plot ratios │ │ plot ratios │ │ plot ratios │
│ PUBLIC  2   │ │ PUBLIC  4   │ │ INDEPENDENT │
│ YEAR        │ │ YEAR        │ │ 4  YEAR     │
├──────┬──────┤ ├──────┬──────┤ ├──────┬──────┤
│ f.t. │ p.t. │ │ f.t. │ p.t. │ │ f.t. │ p.t. │
└──────┴──────┘ └──────┴──────┘ └──────┴──────┘
```

create variable time
TIME= Ln (YEAR-1965)
(EXCEPT INDEPENDENT 4 YEAR, FULL-TIME WHERE TIME=
YEAR-1965.

regression of ratio against time
ENTER DUMMY VARIABLE TO CHECK PUBLIC 4 YEAR
EQUATIONS

extrapolate ratios and multiply by appropriate
birth data

display final projections

Table A1

Relationship Between Out-of-State

and Total Enrollment in the

4-Year Independent Sector

Year	Out-of-State Students	In-State Students	Total Students	Out-of-State as Percent of Total Enrollment
1969	9,151	24,334	33,485	.273
1970	9,718	24,991	34,709	.280
1971	10,234	25,696	35,930	.285
1972	9,899	25,322	35,221	.281
1973	9,415	24,553	33,968	.277
1974	9,238	23,680	32,918	.281

Source: Department of Higher Education, Data Brief No. 5, December, 1974

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Table A2

Regression Equations

Full-Time Undergraduate Projections

Public 2-Year

$$y(t) = (.107336 \ln (t) + .051853) \times \text{births}_{(t-18)}$$

$$R^2 = .93$$

Public 4-Year

$$y(t) = (.239642 \ln (t) + .069688) \times \text{births}_{(t-18)}$$

$$R^2 = .99$$

Independent 4-Year

$$y(t) = (-.011176 \, t + .371410) \times \text{births}_{(t-18)}$$

$$R^2 = .88$$

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Table A3

Regression Equations

Part-Time Undergraduate Projections

Public 2-Year

$$y(t) = (.138910 \ln (t) - .013876) \times \text{births}_{(t-18)}$$

$$R^2 = .94$$

Public 4-Year

$$y(t) = (.017517 \ln (t) + .201584 + .047804 \text{ dummy*}) \times \text{births}_{(t-18)}$$

$$R^2 = .75$$

Independent 4-Year

$$y(t) = (-.045166 \ln (t) + .201331) \times \text{births}_{(t-18)}$$

$$R^2 = .82$$

* dummy = 1 for years 1969-71 and 0 for all others

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Table A4

Full-Time Undergraduate Projections

	Actual	Fitted
2-Year Public		
1969	20,600	21,100
1970	24,500	24,800
1971	29,300	27,500
1972	30,500	30,800
1973	32,200	33,300
1974	36,000	35,800
4-Year Public		
1969	42,300	42,300
1970	50,000	50,200
1971	56,100	56,200
1972	63,800	63,400
1973	68,700	68,700
1974	74,100	74,300
4-Year Independent		
1969	33,500	34,400
1970	34,700	34,800
1971	35,900	34,300
1972	35,200	34,700
1973	34,000	34,100
1974	32,900	33,700

Table A5

Part-Time Undergraduate Projections

	Actual	Fitted
2-Year Public		
1969	17,300	18,800
1970	21,900	23,100
1971	25,200	26,400
1972	29,700	30,300
1973	34,900	33,300
1974	40,800	36,300
4-Year Public		
1969	26,900	28,800
1970	31,300	30,600
1971	32,900	31,600
1972	24,500	27,900
1973	27,900	28,800
1974	32,500	29,900
4-Year Independent		
1969	18,400	17,000
1970	16,700	16,700
1971	14,400	16,100
1972	12,700	13,400
1973	12,100	13,000
1974	12,500	12,700

As part of the staff's investigation into various projective
techniques, some data were acquired which allowed us to utilize a
cohort survival methodology. Because the data were incomplete and
because survival rates appeared to be unstable, the methodology was
not employed in actually computing projections. However, the data
have been displayed in Table B1 since they reveal results which
raise questions about how the present higher education system
operates and point out difficulties in utilizing the cohort survival
technique.

One inference drawn from this display is that survival rates
between freshman and sophomore years are lower than between any other
contiguous years. In particular, the survival rates of sophomores in
county colleges is very low, although this may reflect the fact that
large numbers of students are enrolled in one-year terminal programs.
The high survival rates between sophomore and junior years, with
values greater than 1 in the public sector, imply a net transfer of
new students into the junior class. The fact that the figures do not
indicate which students dropped out after sophomore year and how many
new transfer students were added to the junior class make a determination
of a real persistence rate, that is an average number of years spent in
college by students, all but impossible. If such data were available,
a Markov process could probably be used to better advantage in any case.

Finally, the survival rate between junior and senior years is very high and always higher than the freshman to sophomore survival rate, implying that if a student can survive until junior year, his chances are high of becoming a senior and, one assumes, of graduating. It would appear, too, that transfer students survive well. Again, without better data it is impossible to determine whether transfer students or students who entered as freshmen survive better.

Table B1

Cohort Survival Rates in Various Collegiate Sectors

COUNTY COLLEGES

	1972	1973	1974	Average
FRESHMEN	19,687	21,787	24,843	
Survival Rate	.56245	.50773		.53509
SOPHOMORES	9,255	11,073	11,062	

RUTGERS AND NJIT

	1972	1973	1974	Average
FRESHMEN	6,016	6,680	7,347	
Survival Rate	.90326	.98892		.94609
SOPHOMORES	5,233	5,434	6,606	
Survival Rate	.97134	1.06275		1.01705
JUNIORS	5,435	5,083	5,775	
Survival Rate	.97811	1.00866		.99339
SENIORS	5,025	5,316	5,127	

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Table B1 - Continued

STATE COLLEGES

	1972	1973	1974	Average
FRESHMEN	9,836	10,542	13,599	
Survival Rate		.90738	.84936	.87837
SOPHOMORES	7,431	8,925	8,954	
Survival Rate		1.17480	.95867	1.06674
JUNIORS	8,076	8,730	8,556	
Survival Rate		.92162	.95418	.93790
SENIORS	7,124	7,443	8,330	

INDEPENDENT 4-YEAR COLLEGES

	1972	1973	1974	Average
FRESHMEN	10,504	9,436	9,164	
Survival Rate		.71673	.72743	.72208
SOPHOMORES	7,574	7,530	6,864	
Survival Rate		.93372	.93599	.93486
JUNIORS	7,271	7,072	7,048	
Survival Rate		.94169	.95164	.94667
SENIORS	7,012	6,847	6,730	

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SURVIVAL RATES IN TERMS OF FRESHMEN

RUTGERS AND NJIT

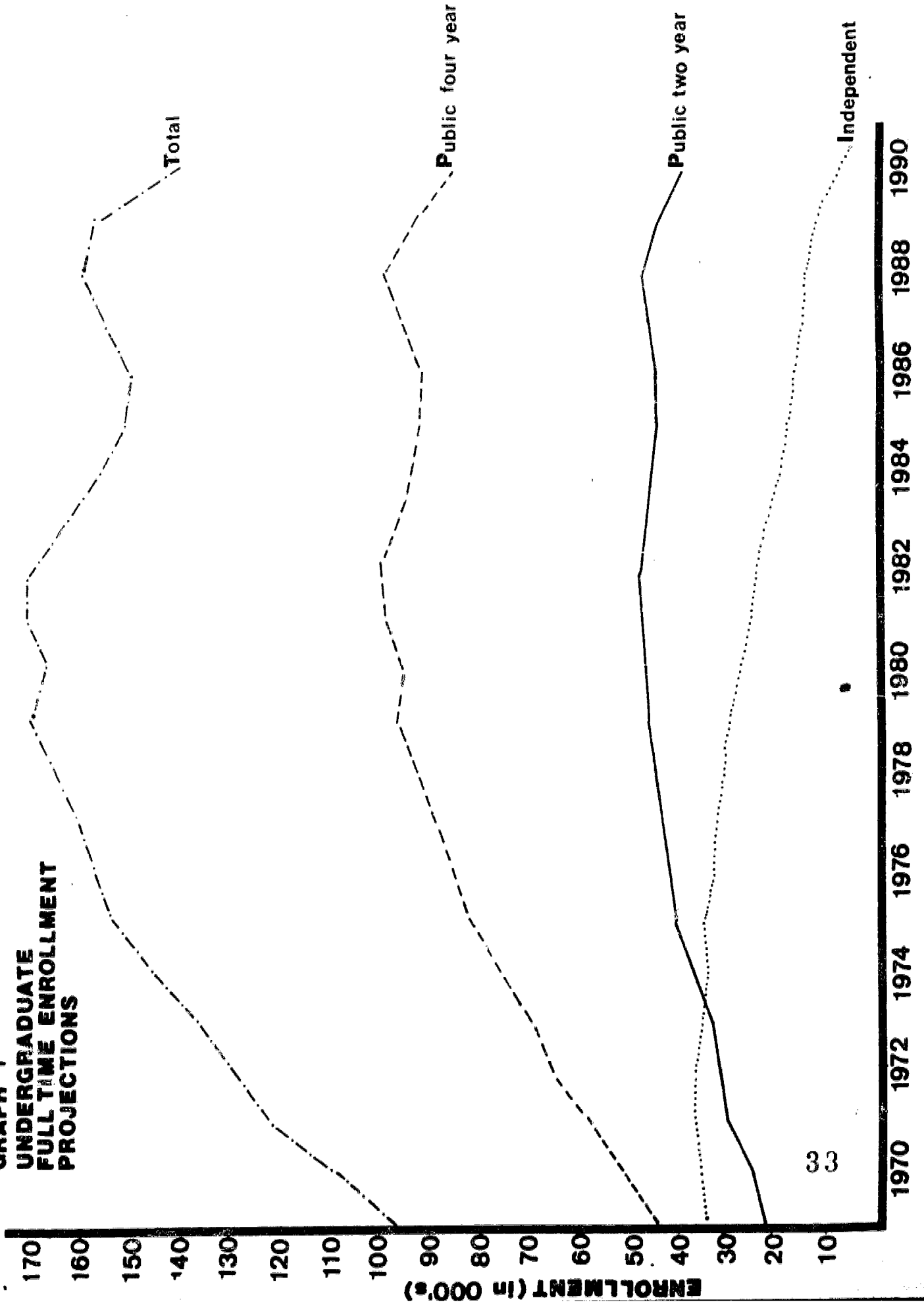| Freshmen | = 1.00000 x freshmen | = 1.00000 x freshmen |
Sophomores	= .94609 x freshmen	= .94609 x freshmen
Juniors	= 1.01705 x sophomores	= .96222 x freshmen
Seniors	= .99339 x juniors	= .95586 x freshmen

"Persistence" = 3.86417

STATE COLLEGES

Freshmen	= 1.00000 x freshmen	= 1.00000 x freshmen
Sophomores	= .87837 x freshmen	= .87837 x freshmen
Juniors	= 1.06674 x sophomores	= .93699 x freshmen
Seniors	= .93790 x juniors	= .87881 x freshmen

"Persistence" = 3.69417

INDEPENDENT 4-YEAR COLLEGES

Freshmen	= 1.00000 x freshmen	= 1.00000 x freshmen
Sophomores	= .72208 x freshmen	= .72208 x freshmen
Juniors	= .93486 x sophomores	= .67504 x freshmen
Seniors	= .94667 x juniors	= .63904 x freshmen

"Persistence" = 3.03616

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GRAPH 1
UNDERGRADUATE
FULL TIME ENROLLMENT
PROJECTIONS

Total

Public four year

Public two year

Independent

ENROLLMENT (in 000's)

170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10

1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990

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GRAPH 2
UNDERGRADUATE
PART-TIME ENROLLMENT PROJECTIONS

Total

Public two year

Public four year

Independent

ENROLLMENT (in 000's)

170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990

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G2