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ECONOMIC RESEARCH GROUP WORKING  
PAPER NO. 3

Long-Range University Planning in the  
Face of Variable Demands for  
Educated Manpower

By: Roger H. Bezdek



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LONG-RANGE UNIVERSITY PLANNING IN THE FACE OF  
VARIABLE DEMANDS FOR EDUCATED MANPOWER

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September 1, 1971

This work was supported in part by the Advanced Research  
Projects Agency of the Department of Defense and was monitored  
by the U.S. Army Research Office-Durham under Contract No.  
DAHCO4-72-C-0001.





## Abstract

This paper develops an empirical methodology whereby the detailed occupational manpower requirements likely to be generated by alternate economic futures may be related to demands for college-educated manpower on a regional or statewide basis. Several different concepts for the supply of and demand for educated manpower are discussed and it is emphasized that the effective demand (demand backed up by an allocation of resources) is the most important variable which must be considered in educational planning. National manpower demands are generated under several different assumptions for 1975 and 1980 and these alternate occupational requirements are translated into demands for degree recipients from the Illinois system of higher education in the coming decade. The forecast demands are compared with the projected supply of degree recipients from Illinois in 1975 and 1980 and the resulting supply and demand imbalances are then estimated for each academic discipline. Large surpluses are forecast for most degree areas under all assumptions and the implications of this for the state's long-range plans for higher education are discussed.



## Introduction

In long-range university planning, consideration of future demands for college educated manpower is important for two reasons. First of all, a generally tight budget situation will make it increasingly necessary for educators planning to institute or expand graduate or undergraduate programs to convince trustees and legislators that there is a need for additional professional and skilled personnel in particular program areas. Secondly, educational institutions making long-range plans must accept the responsibility for assessing the social and vocational opportunities their graduates will face.

The seemingly boundless optimism of the 1960's with regard to job requirements and opportunities for those who completed undergraduate and graduate programs has been recently called into question. But, as yet, very few rational guidelines have appeared to replace this philosophy of unlimited educational expansionism. This paper is written, then: 1) to emphasize the necessity for considering future requirements for professional and technical manpower in long-range university planning, 2) to suggest a methodology for relating variable manpower demands, corresponding to alternate economic and social futures, to demands for college graduates on a regional or statewide level, and 3) to illustrate the empirical application of this technique by analyzing the supply of and demand for college degree recipients from the State of Illinois in the coming decade.

## I. SOME QUESTIONS RELATING TO THE SUPPLY OF AND DEMAND FOR EDUCATED MANPOWER

The supply of college-educated manpower may be conceptualized much more easily than the demand. Minimum informational requirements for any type of higher educational planning include projections of numbers and types of degree recipients anticipated within the forecast period. These estimates will be based on present enrollments by discipline and degree program, historical and contemporary trends in college enrollment and student choice, and, most importantly, the availability of financial resources within the planning period. Anticipated supply, then, is only tentative; nevertheless, these projections must be regarded as an important starting point in the planning process.

For Illinois, the two forecast target years chosen for analysis here are 1975 and 1980. The projected supply of academic manpower is, then, the projected number of baccalaureate, master's, doctorate, or professional degree recipients in these years from all public and private institutions of higher learning in Illinois. To a large degree this represents those persons completing a major phase of their education who will either be entering the job market or preparing to further their education.

The concept of demand is much more nebulous than that of supply. Accurate determination of the number of degree recipients whose skills will be required in various fields in a given target year is extremely difficult, but several possible approaches exist.

In a recent study prepared for the Russell Sage Foundation's Commission on Human Resources and Higher Education, John Folger, Helen Astin, and Alan Bayer distinguish between the demand for college-educated manpower and the need for such persons:

The concept of demand has proved even more troublesome than the concept of supply. Too often, projections have tended to confuse demand (the number of jobs that can be financed with current or future funds) with the need (the number of persons in a field who will be required to produce a given level or amount of service judged to be desirable). The distinction is between social ideals (what people feel ought to be done) and economic realities (what people are able to pay for).<sup>1</sup>

But, having made a perfectly valid distinction, the authors go on to base far too much of their argument on society's need for college-educated manpower.<sup>2</sup> In one important sense, social need for particular areas of educated manpower can be valuable in the planning process. To the degree that social standards, priorities, and objectives indicate a future willingness to invest necessary resources in a particular area, these standards can be useful in the educational planning process. But such an approach must be taken cautiously. To begin with, any definition of society's need is inherently subjective and, therefore variable--dependent upon the person or group setting the social standards. If one chooses ambitious enough social standards, society's need for educated manpower can always be forecast as outstripping the projected supply in almost any discipline. More seriously, even if some set of widely accepted social standards were agreed upon, this would still be a questionable concept upon which to base educational planning.

In distinguishing between society's need for technical and professional manpower and the demand for such persons, Folger, Astin, and Bayer have confused demand--the desire or wish for something--with effective demand--demand backed up by the allocation of resources. The crucial factor which must be considered is the likely level of effective

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<sup>1</sup>Folger, Astin, and Bayer [6], p. 29.

<sup>2</sup>Ibid , pp. 29-34.

demand in the specified target year. Society's anticipated need for college-educated manpower must be considered in the planning process only to the degree that this need may be supported financially in the future. It is in this sense that the concept of demand must be interpreted and this is the sense in which it is used here.

## II. STATEWIDE SUPPLY AND DEMAND PROJECTIONS FOR COLLEGE-EDUCATED MANPOWER

### A. Projected Supply

Estimates of the projected supplies of degree recipients, categorized by discipline and degree level as well as by institution and the state as a whole, are available for Illinois from the U.S. Office of Education. The projected total supply of degree recipients in the coming decade from all public and private institutions of higher education in Illinois is used in this study as the basic supply data. Trends developed in the last decade for degree production in 23 academic areas are summarized in Table 1 along with indications of the anticipated supply of degree candidates within each of these academic areas in 1975 and 1980.<sup>3</sup>

These estimates, the most recent available, are based on assumed levels and distributions of expenditures for higher education in Illinois in the coming decade and on assumed availability of students. They are valid only to the degree that these assumptions are correct.<sup>4</sup> In any case, they represent reasonable indications of the plans for expansion by the Illinois system of higher education in the coming decade, and they can serve as the basis for a critical analysis.

### B. Projected Demand

Having obtained initial supply projections, it is necessary to determine how forecasts of the demand for college-educated manpower within different fields may be derived. For disciplines from which a large

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<sup>3</sup>This information is also available in greater detail classified by type of degree and degree granting institution; see [16].

<sup>4</sup>The methods by which these supply projections were developed are discussed in greater detail in Bezdek, Folk, Graziano, and Russell [3].

Table 1

Illinois Degree Production: Selected Years and Projected 1975 and 1980

Fields of Study	1960 (actual)	1965 (actual)	1969 (actual)	1975 (predicted)	1980 (predicted)
1. Agricultural Science	376	544	985	894	876
2. Fine Arts	2,092	2,634	4,287	5,281	5,859
3. Biological Science	1,008	1,539	2,239	3,888	4,439
4. Health Professions	1,468	1,460	1,952	2,736	2,934
5. Veterinary Medicine	48	65	78	90	97
6. Mathematical Science	788	1,467	2,086	3,964	4,582
7. Engineering	2,064	2,216	2,884	4,132	4,610
8. Physical Science	718	777	1,349	1,615	1,829
9. Physics	351	427	521	780	875
10. Education	4,588	7,111	10,557	13,219	14,438
11. Physical Education	751	996	1,502	1,803	1,985
12. Humanities	2,359	3,806	5,193	7,597	8,609
13. Commerce	2,727	3,634	6,404	6,892	7,564
14. Home Economics	345	354	758	761	825
15. Library Science	183	230	387	688	771
16. Social Work	162	309	464	547	625
17. Economics	393	564	890	1,191	1,365
18. Communications	159	250	442	668	761
19. Languages	388	918	1,458	2,605	2,997
20. Social Science	2,121	3,961	7,166	9,947	11,379
21. Labor & Industrial Relations	62	57	59	136	155
22. Psychology	563	1,097	2,365	3,077	3,583
23. Law	553	755	819	1,174	1,212
Total	24,267	35,171	54,845	73,685	82,284

Source: Projections of State of Illinois and National Degrees and Enrollments by Broad Areas of Study and Educational Degree [16].



portion of advanced degree recipients enter college teaching, demands for degrees can be forecast by relating requirements to the projected numbers of open academic positions.<sup>5</sup> But in most fields the majority of degree recipients traditionally find employment outside of academia; therefore, to determine the demand for college-educated manpower, the level of both academic and nonacademic requirements must be taken into account.

The demand for degree recipients in various fields is, in reality, a demand for manpower in occupations related to those fields. Estimates of the future requirements for professional and technical manpower must be derived and then related to requirements for academic degrees. In this study, 23 academic disciplines were considered. The specific occupations to which these relate are given in Table 2. The problem faced here, then, was twofold: to determine the overall employment demands likely to exist in 1975 and 1980 for the occupations listed in Table 2 and to translate these occupational manpower requirements into demands for academic degrees from colleges and universities in Illinois.

Manpower forecasting is presently inexact. Recent work by this author has indicated that the requirements for many occupations vary with specified changes in the economic assumptions underlying employment forecasts. Specifically, it was found that occupational manpower requirements may be significantly influenced by shifting national goals and priorities as reflected in expenditures on different public and private economic programs and activities.<sup>6</sup> Therefore, to estimate the demands for degree recipients from Illinois in 1975 and 1980, it is necessary

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<sup>5</sup>This is essentially the method which Alan Cartter used in [4] to forecast a rather pessimistic outlook for the employment opportunities for doctorate recipients in most fields throughout the 1970's.

<sup>6</sup>See Bezdek [1] and Bezdek and Scoville [2].

Table 2

Academic Disciplines Considered and Related Occupations

<u>Fields of Study</u> <sup>a</sup>	<u>Related Occupations</u> <sup>b</sup>
1. Agricultural Science	Agricultural Scientists High School Teachers, Agriculture College Teachers, Agriculture and Related Fields
2. Fine Arts	Work in Arts, Entertainment Designers, Exc. Design Draft Architects College Teachers, Fine Arts
3. Biological Science	Biological Scientists High School Teachers, Biology College Teachers, Biological Science
4. Health Professions	Dentists Nurses, Professional Optometrists Osteopaths Pharmacists Physicians and Surgeons Technicians, Medical, Dental College Teachers, Health Professions Other Medical, Health Workers
5. Veterinary Medicine	Veterinarians College Teachers, Veterinary Medicine
6. Mathematical Science	Mathematicians Statisticians and Actuaries High School Teachers, Math College Teachers, Math
7. Engineering	Engineers, Chemical Engineers, Civil Engineers, Electrical Engineers, Industrial Engineers, Mechanical Engineers, Metallurgical Engineers, Mining Engineers, Aeronautical College Teachers, Engineering Other Engineers, Technical
8. Physical Science	Chemists Geologists, Geophysicists High School Teachers, Physical Science College Teachers, Physical Science Other Natural Scientists

<u>Fields of Study</u> <sup>a</sup>	<u>Related Occupations</u> <sup>b</sup>
9. Physics	High School Teachers, Physics College Teachers, Physics Physicists
10. Education	Teachers, Elementary Teachers, High School, Ind. Arts, Special Education Teachers, College, Education Teachers, Others
11. Physical Education	High School Teachers, P.E. College Teachers, P.E.
12. Humanities	High School Teachers, English College Teachers, Philosophy, English, Religion, Theology and History
13. Commerce	Accountants and Auditors Creditmen Purchasing Agents Managers, Office, Prop., NEC. High School Teachers, Business College Teachers, Business
14. Home Economics	High School Teachers, Home Ec. College Teachers, Home Ec. Dietitians, Nutritionists
15. Library Science	Librarians College Teachers, Library Science
16. Social Work	Social Workers College Teachers, Social Work
17. Economics	Economists College Teachers, Economics
18. Communication	Editors and Reporters College Teachers, Communication
19. Languages	High School Teachers, Foreign Languages College Teachers, Foreign Languages and Literature

Table 2  
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<u>Fields of Study</u> <sup>a</sup>	<u>Related Occupations</u> <sup>b</sup>
20. Social Science	High School Teachers, Social Studies College Teachers, Social Studies Other Social Scientists
21. Labor and Industrial Relations	Personnel and Labor Relations Workers College Teachers, Labor and Industrial Relations
22. Psychology	Psychologists College Teachers, Psychology
23. Law	Lawyers and Judges College Teachers, Law

<sup>a</sup>Areas of academic study considered for analysis

<sup>b</sup>Occupational employment categories generating demand for degree recipients.

Source: University of Illinois Office of School and College Relations

to estimate on the basis of several possible economic and social futures the projected national manpower demands likely to exist in those years.

The methodology used to determine the sensitivity of occupational manpower demands to shifting national priorities and expenditure programs involved the use of a large-scale economic input-output model capable of consistently generating detailed employment requirements corresponding to different specified sets of economic assumptions.<sup>7</sup> In this model, changing national priorities enter the system as changes in the expenditures allocated to different types of public and private economic activities. Due to the unique requirements which different economic activities have for the outputs of various industries, these shifts in the distribution of expenditures generate alternate direct and indirect industrial output requirements. The changes in output requirements from all industries generate shifts in industrial employment and these, in turn, generate changes in occupational manpower demands through the occupational distribution of employment within different industries. While some important questions still remain concerning this type of large-scale interindustry manpower modeling, at the present time this does appear to be the most rational and efficient method for obtaining the kind of alternate occupational-employment requirements data desired here.

Separate sets of manpower demand estimates were not generated independently for use in this study. Rather, a two-step procedure was employed whereby occupational manpower requirements for the years in question generated on the basis of alternate economic futures were first obtained and then modified and checked against results derived from computerized sensitivity analyses conducted with the general model. These

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<sup>7</sup>The workings of this manpower demand generating model are detailed in Bezdek [1] and Bezdek and Scoville [2].

employment estimates were then fit to the necessary detailed occupational subcategories listed on the right-hand side of Table 2. Four alternate estimates of the level and distribution of national employment requirements within the 23 degree-occupation categories were derived for 1975 and one set of estimates was obtained for 1980. These employment estimates are given in Table 3.

The first set of occupational employment requirements for 1975 was derived from employment data originally estimated by the Bureau of Labor Statistics.<sup>8</sup> The assumptions under which this first set of estimates was developed were those judged by the Bureau of Labor Statistics to be the ones most likely to persist within the forecast period and this set of manpower requirements has accordingly been labeled the "1975 Status Quo" alternative. These employment estimates were developed under the following broad assumptions concerning the economic environment in the mid-1970's: no major event would substantially alter the rate and nature of economic growth in the near future, scientific and technological advances of recent years would continue at about the same rate, economic and social relationships and patterns would continue to change at the same rate as in the recent past, and defense expenditures (in constant dollar terms) between 1965 and 1975 would increase at about the same rate as during the 1955-1965 period.<sup>9</sup> Thus while these estimates are constantly being revised, the occupational employment requirements given in the first column of Table 3 represent those which would exist in 1975 if recent trends continue and if the status quo is maintained in the near future.

The second set of occupational manpower requirements was calculated from data derived from the assumption that a large-scale policy of disarmament would be in effect in the United States in the mid-1970's

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<sup>8</sup>See U.S. Department of Labor, Bureau of Labor Statistics [12].

<sup>9</sup>Ibid., p. 4.

Table 3

Alternate National Manpower Demands: 1975 and 1970

Fields of Study	1975				1980
	Status Quo <sup>a</sup>	Disarmament <sup>b</sup>	High Cold War <sup>c</sup>	National Goals <sup>d</sup>	Status Quo <sup>e</sup>
1. Agricultural Science	62	59	66	70	70
2. Fine Arts	963	975	951	1,009	1,014
3. Biological Science	224	219	230	245	251
4. Health Professions	2,189	2,443	2,136	2,681	2,762
5. Veterinary Medicine	28	29	26	34	33
6. Mathematical Science	264	242	286	288	312
7. Engineering	1,472	1,263	1,655	1,921	1,519
8. Physical Science	309	302	313	350	344
9. Physics	84	76	89	91	99
10. Education	1,748	1,818	1,719	2,000	1,956
11. Physical Education	107	109	106	112	118
12. Humanities	287	289	285	327	312
13. Commerce	9,660	9,421	9,698	10,889	11,187
14. Home Economics	111	116	110	119	121
15. Library Science	131	148	125	161	159
16. Social Work	220	267	200	279	296
17. Economics	38	37	40	44	41
18. Communications	129	128	130	137	138
19. Languages	100	99	100	118	111
20. Social Science	216	219	209	226	230
21. Labor and Industrial Relations	192	190	197	217	210
22. Psychology	57	58	57	61	61
23. Law	324	336	320	371	339
Total	18,916	18,857	18,644	21,947	21,683

Table 3

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- <sup>a</sup> Manpower requirements generated by the Bureau of Labor Statistics' "most likely" set of economic assumptions for 1975.
- <sup>b</sup> Manpower requirements generated by a transfer of arms expenditures to domestic welfare programs.
- <sup>c</sup> Manpower requirements generated by increases in government defense and defense related expenditures.
- <sup>d</sup> Manpower requirements generated by ambitious simultaneous pursuit of national goals and priorities.
- <sup>e</sup> Manpower requirements generated by the Bureau of Labor Statistics' "most likely" set of economic assumptions for 1980.



and that the funds freed by the arms reduction would be allocated to domestic welfare programs. The manpower requirements estimated for this "Disarmament" alternative were derived from research conducted into the employment effects of defense expenditures and disarmament policies by a number of individuals.<sup>10</sup> Thus the occupational employment demands listed for the "Disarmament" alternative in Table 3 are those likely to result by 1975 from a transfer of defense-oriented expenditures to educational programs, social welfare payments, health programs, anti-poverty programs, and so forth.

The third set of employment estimates for 1975 was developed on the assumption of increased cold war tensions in the near future and a consequent large increase in defense expenditures. The data for the "High Cold War" alternative, listed in column three of Table 3, were derived from findings reported previously by this author and others.<sup>11</sup> Here, social welfare, public service, and anti-poverty programs receive less emphasis than in the previous case, while military expenditures are set at much higher levels.

The fourth set of manpower demands for 1975 was calculated largely from more aggregative employment estimates derived by Leonard Lecht of the National Planning Association.<sup>12</sup> Lecht assumed an ambitious effort on the part of this nation to achieve all of its stated national goals and objectives within the coming decade, and for this "National Goals" alternative expenditures on virtually all types of programs and activities

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<sup>10</sup>See Bezdek [1], Bezdek and Scoville [2], and Frumkin [8].

<sup>11</sup>Ibid.

<sup>12</sup>Lecht [10].

were increased substantially. Accordingly, the employment requirements listed in the fourth column of Table 3 are those likely to be generated by an ambitious concentration by the United States on all of its national priorities.

Finally, a set of occupational manpower requirements for 1980 was developed from additional work recently completed by the Bureau of Labor Statistics.<sup>13</sup> The Bureau of Labor Statistics developed their 1980 employment estimates in a manner similar to that used to generate 1975 employment, only the basic relationships involved pertain to 1980. Once again, the most plausible assumptions were used and the estimates in column five of Table 3 are labeled the "1980 Status Quo" forecasts.

In translating national manpower projections into requirements for educated manpower from Illinois, it was recognized that the job market which Illinois degree recipients enter is essentially national in character, in that Illinois degree recipients are not restricted to employment opportunities within the state, and that in many fields educated manpower from Illinois represents a significant portion of the national total. Variations in the demand for degree recipients at the national level were assumed to be reflected in commensurate changes in demands for degree recipients from Illinois. This assumption made it possible to relate fluctuations in the demand for technical and professional manpower at the national level to changes in requirements for degree recipients from Illinois colleges and universities.

In disaggregating national degree requirements to the statewide level, two interdependent factors were taken into account. First of all, it was assumed that the Illinois labor force would maintain throughout the 1970's approximately the same general relation to the national labor force

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<sup>13</sup>See U.S. Department of Labor, Bureau of Labor Statistics [13] and [14].

that it has had in the recent past. Then taking into account the trends in recent years of the degree-to-worker ratios for all levels of degrees and for all fields of employment, these trends were projected to the target years 1975 and 1980. This permitted the determination on a gross basis of the general levels of demand for degree recipients by field and type of degree from Illinois generated by each economic model in the years in question.

However, it was also necessary to consider increments in Illinois degree production as they related to annual changes in the national labor force. To do this, demand functions of the general type  $X_{ij}^I(t)$  were defined, where  $X_{ij}^I(t)$  represents the ratio of j-level degree recipients from Illinois in field i in year t to the change in national manpower in field I in year t. The various  $X_{ij}^I(t)$ 's were plotted over the past two decades to obtain historical trends relating to the incremental demands for degree recipients from Illinois in the various fields and degree levels. Extrapolation of these demand functions to the target years provided additional information relating to the potential increases in demand for Illinois graduates under different assumed economic conditions.

These methods clearly revealed the national character of the demand for Illinois graduates and the manner in which this demand is influenced by both the gross level of employment and the incremental changes in employment requirements within specific fields. Together they permitted the estimation of the approximate levels of requirements likely to exist for Illinois graduates in 1975 and 1980 under the pursuit of alternate types of economic and social priorities.

## III. RESULTS: POTENTIAL IMBALANCES IN SUPPLY AND DEMAND

Having derived alternate estimates of the demand for degrees from Illinois colleges and universities in 1975 and 1980, it was possible to compare these with the supply projections of Illinois degree recipients to determine if the supply of and demand for college-educated manpower from Illinois were likely to be in equilibrium in the coming decade. The estimated demand for Illinois degrees under each of the alternate economic assumptions for 1975 and 1980 was subtracted from the projected supply in these years and the difference was then expressed as a percent of the projected supply. This yielded an indication of the percent excess supply likely to exist under each assumption. Absolute and percent excess supplies were computed for each discipline and degree level corresponding to each economic assumption for 1975 and 1980. The results have been summarized in Table 4 which shows the percent excess supply of total degrees in each of 23 academic disciplines under four economic assumptions for 1975 and under the "Status Quo" assumption for 1980.<sup>14</sup> In this table, a positive excess supply indicates a forecast surplus of Illinois degree recipients; a negative excess supply indicates that demand will likely exceed supply.

Table 4 presents some interesting and potentially very significant results, especially the widespread prevalence of positive excess supplies throughout. Under the "Status Quo" alternative, the most likely set of assumptions, the findings indicate that the Illinois system of higher education may in the near future be producing an oversupply of degree recipients at most levels for virtually all disciplines. This is also the case under the "Disarmament" and "High Cold War" alternatives, although

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<sup>14</sup> Preliminary versions of these results classified by type of degree were reported in Bezdek, Folk, Graziano, and Russell [3].

Alternate Projected Percent Excess Supplies of Degree Recipients: 1975 and 1980<sup>a</sup>

Fields of Study	1975				1980
	Status Quo	Disarmament	High Cold War	National Goals	Status Quo
1. Agricultural Science	-8.5	-3.3	-15.5	-22.5	-20.7
2. Fine Arts	20.0	19.0	20.8	16.2	20.6
3. Biological Science	14.1	16.3	11.8	6.0	11.0
4. Health Professions	6.6	-4.2	8.9	-14.4	4.0
5. Veterinary Medicine	7.8	-4.4	13.3	-12.0	1.8
6. Mathematical Science	21.9	28.4	15.4	14.8	26.8
7. Engineering	18.6	30.3	8.5	6.7	24.5
8. Physical Science	15.2	17.1	14.1	4.0	13.2
9. Physics	12.3	20.8	7.1	5.2	5.4
10. Education	20.9	16.0	21.1	9.0	19.0
11. Physical Education	16.0	14.4	16.8	12.1	12.0
12. Humanities	27.8	27.3	28.3	17.7	28.2
13. Commerce	19.7	21.8	19.9	9.5	15.6
14. Home Economics	14.7	10.8	15.5	8.5	7.7
15. Library Science	24.7	14.9	28.1	7.4	30.0
16. Social Work	11.7	-7.2	19.8	-12.0	9.6
17. Economics	25.7	28.4	21.6	13.6	22.7
18. Communications	34.1	34.6	33.5	25.2	38.0
19. Languages	34.2	34.8	34.2	22.5	36.1
20. Social Science	21.2	20.1	23.4	17.2	25.0
21. Labor and Industrial Relations	26.4	26.1	24.4	19.2	21.6
22. Psychology	27.1	25.0	27.1	21.9	17.7
23. Law	7.8	4.3	8.7	-5.7	8.7
Total	23.1	23.0	22.6	11.1	19.2

<sup>a</sup>Surplus of degree recipients within each discipline which would result in 1975 and 1980 under each hypothesized economic alternative. Surpluses expressed as percent of total projected supply within appropriate discipline in the target year.

here some variations exist in the size and distribution of degree surpluses. The "High Cold War" alternative is especially interesting, for it indicates that even in the event of a high level of defense spending in the near future, by 1975 Illinois may still be producing an oversupply of degree recipients in such defense-related disciplines as physics, engineering, and mathematics.

Examination of the "1975 National Goals" alternative is also instructive. It indicates that even if the nation were to embark upon an extremely ambitious effort to achieve all of its national priorities within the coming decade, by 1975 the State of Illinois may still be producing more degree recipients than required in most fields. This result is most ominous, for the assumptions under which the "National Goals" alternative was initially formulated are totally infeasible, requiring an impossibly large increase in both the gross national product and the total size of the national labor force.<sup>15</sup> Finally, the situation forecast for 1980 is hardly more reassuring, for it appears that by 1980 the oversupply of graduates in many fields may even worsen.

In general, for 1975 the oversupply of degree recipients from Illinois may at best amount to eleven percent of the total supply; at worst the excess supply may exceed twenty-three percent. For 1980 the oversupply of Illinois degree recipients is forecast as amounting to about one-fifth of the total supply.

While the detailed results classified by degree level are not included here, it is worth noting that substantial variation in the excess supply situation occurred for all levels of most disciplines. For instance, although slight excess supplies of degree recipients are forecast here for the health professions under several alternatives, the

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<sup>15</sup>See chapters 1 and 3 of Lecht [10].

demand for persons possessing professional health degrees greatly exceeded the supply under all alternatives for both 1975 and 1980. Similarly, the projected oversupply of advanced degrees, and especially doctorates, in many cases substantially exceeded the average for the discipline. For 1980 this latter result did not improve; the total excess supply of persons receiving doctorates in that year is predicted to reach twenty-six percent, and in some disciplines the oversupply of doctorates may exceed fifty percent.

#### IV. INTERPRETATION AND IMPLICATIONS OF THE FINDINGS

The purpose of this paper has been to stress the importance of manpower forecasting in the formulation of long-range university expansion plans and to illustrate a methodology whereby the employment requirements generated by alternate economic and social futures could be used as a general guide to educational planning on a regional or statewide basis. Before attempting to generalize on the findings and the methodology presented here, it is important to emphasize the qualifications to which this analysis is subject.

To begin with, the methodology employed to relate national manpower demands to requirements for areas and levels of degrees is, admittedly, somewhat imperfect. For this methodology not only converted an essentially definitional relationship between national employment and Illinois degree outputs into an analytic one but it also assumed that this relationship was structurally invariant over the limited range of employment variation considered. Further, the alternate projections of national occupational employment requirements derived here are of varying and indeterminate degrees of accuracy. Although these employment estimates were revised to take into account the most recent data available, in several cases the basic employment estimates are several years old. And in fitting the generated manpower demands to the necessary occupation-degree categories, some distortion was probably introduced into the analysis. Finally, the supply projections used were merely estimates, portions of which are already out of date. These projections fail to take into account adjustments which have very recently been set in motion, they do not recognize trends towards inter-disciplinary programs or reorientations of existing degree programs and, of course, they cannot take into



account any trends which may set in later in the decade. They simply represent best-guess estimates of the structure and level of degree outputs likely to be forthcoming from Illinois in the near future.

Nevertheless, keeping the above qualifications in mind, some interesting and potentially significant implications do emerge from the analysis and findings reported here.

First of all, it seems clear that future changes in the economic environment can exert substantial effects upon the potential requirements for technical and professional manpower and these, in turn, can significantly influence the level and structure of demand for college-educated persons. Here the economic changes hypothesized pertained to shifts in the distribution of national expenditures among competing resource uses reflecting alternate national goals and priorities. These alternate economic futures were seen to have considerable impacts on the demand for educated manpower both nationally and from the State of Illinois. Other alternate types of changes may also be introduced into the analysis: alternate patterns of shifting technological and productivity relationships will have important effects on future manpower requirements as will specified patterns of displacement in the occupational composition of employment.

The results presented here should at the very least raise some serious questions concerning the theory that the generally tight job market presently confronting college graduates and advanced degree recipients is merely a transitional phenomenon. At present, the degree to which the findings reported here can be generalized is not entirely clear. Nevertheless, the optimistic predictions of the Bureau of Labor Statistics to the contrary, this evidence does add weight to the hypothesis that the market for highly educated and specialized manpower can be

saturated--even in the United States.<sup>16</sup>

While overall surpluses of college-educated manpower may be in the offing for Illinois and other states, it is important to recognize that these surpluses will, to a degree, be structural in nature. While a surplus is forecast for most degree levels and disciplines, for certain academic areas and types of degrees the demand may continue to exceed the supply. For university administrators grappling with tight budgets, one implication of this may not be too pleasant, for in some cases an optimal planning policy may require a redistribution of available university funds in favor of certain disciplines at the expense of others.

In general, reliable methods must be devised both to more accurately predict the future effective demand for college trained manpower and to relate these national demands to requirements from individual regions, states, and educational institutions. The methodology illustrated here represents one possible approach to this problem and the results derivable even at this preliminary stage of the analysis can be useful. The data required are not excessive and are probably available for most regions and states.

More specifically, in relation to the State of Illinois, I would be extremely hesitant to recommend any type of policy change or reorientation on the basis of findings reported here. But I would recommend that a much more substantial in-depth study of the factors influencing the supply of and demand for educated manpower in Illinois in the coming decade be undertaken. At the very least, in view of the massive surplus of degree recipients forecast here, the state must take a critical look at its plans for educational expansion in the 1970's, as summarized in

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<sup>16</sup>The continuing optimism of the Bureau of Labor Statistics is evident in the latest edition of the Occupational Outlook for College Graduates [15], and this bulletin lists very few occupations for which the employment opportunities throughout the 1970's are not given as being "excellent" or "very good."

Table 1.<sup>17</sup>

In conclusion, it is always dangerous to visualize higher education merely as another industry "producing" educated persons in the same manner that another industry might produce automobiles, televisions, or ball bearings. Certainly there are many other goals and criteria which should guide rational long-range educational planning, and it is not clear exactly how important a variable manpower forecasts should be in the planning process. However, analysis of society's requirements for educated manpower must be considered by educational planners at some point. For, if universities do not willingly elect to consider this problem early in the planning process, then consideration of these issues may be forced upon them at a later date by the callous workings of the labor market.

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<sup>17</sup>Data on projected supply more recent than those presented in Table 1 indicate that degree outputs for most disciplines are running considerably ahead of the levels originally predicted. Thus it is possible that the surpluses of degree recipients forecast here for 1975 and 1980 may be rather conservative estimates.

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## DOCUMENT CONTROL DATA - R &amp; D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) Center for Advanced Computation University of Illinois at Urbana-Champaign Urbana, Illinois 61801		2a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	
		2b. GROUP	
3. REPORT TITLE ECONOMIC RESEARCH GROUP WORKING PAPER NO. 3      Long-Range University Planning in the Face of Variable Demands for Educated Manpower			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Research Report			
5. AUTHOR(S) (First name, middle initial, last name) Roger H. Bezdek			
6. REPORT DATE September 1, 1971		7a. TOTAL NO. OF PAGES 30	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO. DAHCO4 72-C-0001		8a. ORIGINATOR'S REPORT NUMBER(S) CAC Document No. 13	
b. PROJECT NO. ARPA Order No. 1899		8b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c.			
d.			
10. DISTRIBUTION STATEMENT Copies may be obtained form the address given in (1) above.			
11. SUPPLEMENTARY NOTES None		12. SPONSORING MILITARY ACTIVITY U.S. Army Research Office-Durham Duke Station Durham, North Carolina	
13. ABSTRACT This paper develops an empirical methodology whereby the detailed occupational manpower requirements likely to be generated by alternate economic futures may be related to demands for college-educated manpower on a regional or statewide basis. Several different concepts for the supply of and demand for educated manpower are discussed and it is emphasized that the effective demand (demand backed up by an allocation of resources) is the most important variable which must be considered in educational planning. National manpower demands are generated under several different assumptions for 1975 and 1980 and these alternate occupational requirements are translated into demands for degree recipients from the Illinois system of higher education in the coming decade. The forecast demands are compared with the projected supply of degree recipients from Illinois in 1975 and 1980 and the resulting supply and demand imbalances are then estimated for each academic discipline. Large surpluses are forecast for most degree areas under all assumptions and the implications of this for the state's long-range plans for higher education are discussed.			

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Economics Applications Social and Behavioral Sciences Education and Welfare						























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