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Economics of Education. Part 4. Social, Public and Fiscal Returns from Higher Education in Japan.

Keith J. Morgan

Contents

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Introduction

Education enjoys a special status in modern society. It is seen to be both popular and good for us. During this century, provision for education has expanded in all countries, with legislation extending both the range of ages for compulsory education and opportunities for advanced education. In Japan, where education is compulsory to the age of 15, participation rates since the 1950's have doubled for upper secondary schools and quadrupled for universities and colleges. The costs of this expansion have been substantial; in Japan, between the 1950's and 1990 the increased expenditure amounted to 1.4% of g.d.p [equivalent to ¥ 6 trillion in 1990 i.e. a quarter of the total expenditure on education]. Despite this, and even in times of financial stringency, no government seriously contemplates reduction in the scale or scope of national provision. This arises from an evident correlation between increased access to education and substantial social benefits, notably the generation of wealth. To individuals the advantage takes the form of increased earnings; public and social benefits become evident as higher standards of service accessible through government and in greater affluence within the community.

Consequently, both private and public aspirations may be satisfied through extended access to education, sufficiently to encourage all governments to sustain, if not to increase, levels of provision. Nevertheless, there exists a finite limit to educational expenditure. For each national community, that part of g.d.p. devoted to education is not available for other desirable purposes; and by the law of diminishing returns, at some point the perceived benefit from additional education will be less than that from an alternative use. Moreover, if public resources are used, the relative advantage to the community should be sufficient to justify their use irrespective of the private benefit to individuals.

These issues assume particular significance in determiming the provision of higher education. Costs of provision increase progressively from elementary to university level education (Table 1). Conversely, some measures of its benefits decrease in the same sequence; by itself this is not critical, provided the benefits remain sufficiently high to justify the level of expenditure. In terms of earnings this seems to be so: it is generally observed that, on average, more

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education corresponds to higher earnings and increasingly to better career prospects[1]. However, even in societies with mass higher education, admission to universities remains selective. To the extent that universities are supported publicly, this implies the use of revenues from tax-payers, not all of whom will have had direct benefit of university education. In such cases useful tests for the use of public resources might be the relative benefits of extending access to schools rather than universities and of the social rather than the private benefits of university education [2].

Table 1. Relative Unit Costs for Education in Japan. [a]

Year	School			Junior College	University
	Elementary	Lower Secondary	Upper Secondary		
1960	1.0	1.4	1.8	3.1	7.4
1990	1.0	1.1	1.2	1.5	2.9

[a] Total uncorrected costs divided by number of students.

For Japan, such considerations need modification. Participation in school education is already effectively complete at all levels, with rates of 95% for upper secondary schools following compulsory attendance through elementary and lower secondary schools [3]. There is therefore little opportunity to expand access within the school system. Moreover, expansion of the system over the past 30 years has reduced the differentials between relative unit costs for the different levels of education (Table 1). This has been largely achieved by accommodating a 4-fold increase in the proportion of students in higher education with a less than 2-fold increase in the proportion of expenditure. A substantial contribution to this has been provided by the relative growth of private education, which has accommodated 80% of the increase of student numbers in universities and 94% of the increase in junior colleges [4].

Given these constraints it is of interest to analyse the economic costs and benefits in Japan from higher education at its two levels – junior college and university, distributed over three sectors – national, public and private. The analysis presented in subsequent sections shows that comparison of the contributions of the three sectors is limited by the extent to which they form a coherent rather than a competitive system. This does though allow the economic benefits to be assessed nationally in terms of three measures: the social, public and fiscal returns from higher education.

Costs

The three sectors of education in Japan are separately constituted. The private sector is substantially autonomous and is largely governed and funded through private school corporations; national institutions are established and funded directly through the Ministry of Education, Science and Culture; and local public institutions are provided through local and prefectural government. For elementary and secondary education, the local public sector is dominant but for higher education the private sector constitutes the largest component. In 1991, private universities contained 73% of all university students with 24% in national universities and 3% in public universities; while private junior colleges contained 92% of junior college students with national and public junior colleges having 4% each. Figures for expenditure by each sector on universities and colleges are collected and published annually [3,5,6]. For comparison it is convenient and conventional to use average costs per student (unit costs). Unit costs estimated from the published total figures for expenditure and student numbers for each sector and for the total systems are given in Table 2 (a).

The results show substantial variations in the unit costs for universities but before they can be regarded as significant, a number of anomalies needs to be corrected. The problems arise from inclusion of extraneous expenditures and from differences in funding and accounting practices between the sectors.

The costs incurred by universities and colleges conventionally cover the full scope of their diverse activities – teaching, research and service to the community. In some of these activities, notably research and service work, a range of facilities is provided which is not directly associated with the processes of university education. The major sources of these extraneous expenditures are hospitals and research institutes associated with universities. The hospitals contribute essential teaching facilities for education in medicine, dentistry and other health-related disciplines but also provide wider clinical services to the community. It would be inappropriate for the costs of the clinical services to be included in the costs of providing the educational programmes. The clinical services generate substantial income, but it would be inadequate simply to identify the difference between expenditure and income as educational costs as this would conceal possible cross-subsidies [7]. The preferred alternative was to make an arbitrary but conservative estimate of costs based on the identified expenditure on hospital teaching staff and for corresponding levels of support staff, consumables and maintenance. Similarly, research institutes associated with universities contribute to the dual functions of teaching and research. As distinct from university departments and faculties, their primary purpose lies in research and it would be inappropriate for the explicit costs of this research to be included in the costs of university education. Again no clear separation of costs is available.

An arbitrary assignment of the full costs of teaching and other staff to the costs of university education, but excluding the costs of equipment, maintenance and other consumables, was judged to be reasonable. The extent of these corrections is shown in Table 2; the adjustments for hospitals and research institutes together reduce the apparent unit costs for universities by about 25% (38% for public universities) [8].

The second problem arises from the different financial situations of the sectors. For expenditure on consumables, the differences are largely only those of the sources of revenue: essentially these are tuition charges for the private institutions and a combination of tuition charges and capitation subsidy for the national and public institutions. In contrast, for capital investment in land, buildings and equipment there are significant differences: the national and public colleges and universities receive designated grants; private colleges and universities use a combination of borrowing, subsidy (grant aid) and internal capital either from reserves or revenue. Accordingly, the expenditures of the private institutions show explicit provision for the costs of borrowing and repayment of loans, costs which are carried in other accounts for the national and public institutions. For purposes of comparison it is necessary to remove this inconsistency. This may usefully be done by considering capital expenditure in two categories.

The smaller is that providing for equipment and books. Although expenditure on these goods provides a fairly constant proportion of total expenditure, it does show annual variation, while the benefits extend over a number of years. Conventionally both the benefits and costs of capital assets are regarded as diminishing uniformly throughout their effective lives. A convenient alternative, more appropriate for universities and colleges, is to regard the benefits and annual costs as constant over their effective lifetimes [9]. The costs comprise the initial purchase price and the annual interest charges on this capital. A standard rate of 8% was assumed for the cost of borrowing capital by the private institutions; borrowing by government agencies is usually at a small discount by virtue of the lower perceived risk and a notional rate of 7% was used for the national and local public institutions. With the further assumption of an effective lifetime of 7 years for equipment and books, annual costs of these capital goods were estimated [10]. These costs are combined with the corrected costs of consumables and designated "Operating Costs" in Table 2.

The much larger component of capital spending is devoted to the costs of accommodation: buildings and land. Continuing benefits over a long lifetime of these assets and wide annual variations in expenditure on them make it inadequate to equate their true costs with those incurred in a given year. Two alternative methods can be used to provide an estimate of true annual costs of land and buildings: (1) by aggregating the annual costs of capital committed to land and buildings, including depreciation over an effective lifetime; or (2) by identifying a shadow rental for the use of the properties. Both methods present difficulties for universities

Table 2. Average Costs for Higher Education in Japan (1991) (¥ million)

	Universities				Junior Colleges			
	Private	National	Public	Total	Private	National	Public	Total
(a) Apparent Total Costs								
Consumables								
Universities and Colleges	1,453,369	867,112	122,924	2,443,405	356,286	17,676	32,507	406,469
Hospitals	687,715	479,655	124,752	1,292,122	-	-	-	-
Institutes	13,808	64,210	1,839	79,857	-	-	-	-
Total	2,154,892	1,410,978	249,515	3,815,385	356,286	17,676	32,507	406,469
Total Expenditure	2,967,380	1,610,372	334,566	4,912,318	570,492	20,583	37,900	628,975
Apparent Unit Costs[a]	1.87	3.21	5.37	2.28	1.25	1.17	1.71	1.26
(b) Estimated Educational Costs								
(1) Consumables								
Universities and Colleges	1,453,369	867,112	122,924	2,443,405	356,286	17,676	32,507	406,469
Hospitals [b]	28,930	128,308	7,939	165,177	-	-	-	-
Institutes [c]	5,594	49,138	1,420	56,152	-	-	-	-
Total	1,487,893	1,044,558	132,283	2,664,734	356,286	17,676	32,507	406,469
(2)Capital								
Equipment and Books Annual Charge [d]	93,262	66,241	9,533	169,036	26,267	2,205	2,261	30,733
Total Operating Cost	1,581,115	1,110,799	141,816	2,833,730	382,553	19,881	34,768	437,202
(c) Unit Costs [a]								
Operating Cost per Student	1.00	2.21	2.28	1.32	0.84	1.13	1.57	0.88
Accommodation Cost per student[e]	0.30	0.31	0.41	0.31	0.25	0.19	0.37	0.25
Total Cost per Student	1.30	2.52	2.69	1.63	1.09	1.31	1.94	1.13

[a] student numbers are full-time, degree course students: universities, private, 1,587,006; national, 501,703; public, 62,276; junior colleges, private, 457,833; national, 17,619; public, 22,107.
[b] Consumable costs include expenditure on teaching staff, educational and research expenses, and expenditure on other staff and maintenance costs in the same proportions as are found in university accounts viz 50% and 25% respectively of teaching staff costs. Essentially the deleted costs are those described as medical staff costs and maintenance and other costs.
[c] Consumable costs include expenditure on academic and other staff together with maintenance assessed at 25% of total staff costs. Educational and research expenses are assigned to research costs of the institutes.
[d] Costs include all expenditures on books but deductions were made for items of equipment: for universities and hospitals, half the expenditure on educational and research equipment was deemed to be for specialised research equipment and was deducted; expenditure on all equipment for institutes and on all other equipment for hospitals was deducted. All expenditure associated with buildings and land was excluded and treated separately under accommodation costs.

Capital costs were assessed at 8% pa for private institutions, 7% pa for national and public institutions and were depreciated over 7 years.
[e] Based on imputed rent.

and colleges. On the one hand there are uncertainties about the effective lifetime of buildings (many are demolished, restructured or replaced before the expiry of their assumed life; others acquire the status of heritage and an apparently indefinite existence), property is acquired for non-educational purposes, and information on subsidies, endowments, gifts and sales of property is limited. On the other hand, there is little commercial guidance for imputed rental values of academic accommodation, and a varying mix of permanent, temporary and multi-purpose property has been used. Despite these limitations, both these methods are, in principle, applicable across all three sectors. With reasonable (and conservative) assumptions they yield two sets of estimates showing acceptable agreement (The procedures and assumptions used are discussed below in the section devoted to Accommodation Costs). Corresponding values, expressed as unit costs per student are designated "Accommodation Costs" in Table 2. The proportion of costs devoted to the physical infrastructure is about 20% for both universities and colleges.

(a) Operating Costs.

The processes of education are labour intensive. Over half of total costs and two-thirds of operating costs in both universities and colleges is spent on staff: employing teachers accounts for 40% of operating costs, and other staff for 25%. These proportions apply to all three sectors. But the large differences in operating costs per student (unit costs) between the sectors imply substantial differences in the ratios of numbers of students to numbers of staff, and in particular to the numbers of academic teaching staff (s/s ratio). In 1991 the s/s ratios were 22.6 for private, 9.4 for national and 9.1 for local public universities [12]; and for junior colleges, 23.1, 12.7 and 10.7 respectively.

The s/s ratios have differing historic roots. National and public institutions receive annual subsidies calculated from a formula which implicitly assumes a low s/s ratio; whereas funding of the private institutions is largely determined by the level of tuition and other fees. Over time the s/s ratios have changed: by 15% in the last decade – decreased for private and increased for national and public universities. Even so it would be wrong to expect the ratios to converge to a common value.

The differences in s/s ratios between university sectors apply generally across individual subject areas, but variation in academic and professional expectations generates differences between subject areas that are much wider. These may be conveniently expressed as relative student load factors [13] (Table 3). These differences yield notable inequalities: 38% of all students enroll in the area of the social sciences and it provides 17% of all academic staff; in contrast, medicine and dentistry enroll 3.8% of all students but account for 24% of all academic staff.

Table 3. Distribution of student Load and Numbers over Subject Areas within University Sectors (1991)

	Relative Student Load Factors [a]			Distribution of Student Numbers			
	University Sectors			University Sectors			Total
Subject Areas [b]	Private	National	Public	Private	National	Public	%
Humanities	0.97	0.78	0.69	17.7	6.4	19.6	15.1
Social Science	0.56	0.46	0.35	46.0	14.9	35.2	38.4
Science	1.66	1.08	1.30	2.6	7.2	4.7	3.7
Engineering	0.93	0.80	1.06	17.4	30.8	12.6	20.4
Agriculture	1.11	1.08	1.13	2.2	7.6	3.0	3.5
Medicine [c]	9.04	3.48	3.50	2.3	7.6	9.1	3.8
Health	1.48	0.97	0.92	2.6	1.5	3.1	2.3
Home Economics	1.08	0.63	0.92	2.1	0.3	4.8	1.8
Education	0.63	0.85	-	3.2	19.2	2.2	6.9
Art [d]	1.36	0.90	1.17	2.9	0.7	4.4	2.4
Others	0.70	0.57	0.95	1.1	3.7	1.3	1.7
University	1.0	1.0	1.0	100	100	100	100
University s/s ratio	22.6	9.4	9.1	-	-	-	-

[a] For each university sector SLF is given by the proportion of academic staff in a given subject area divided by the proportion of students in that area. The product of SLF and s/s ratio for the university sector gives the s/s ratio for the subject area.
[b] Subject areas as designated by the Ministry of Education.
[c] Includes dentistry.
[d] Includes music, art, design.

The relative balance between subject areas makes evident a major difference between the university sectors. The two larger sectors are effectively complementary. Despite enroling less than a quarter of all students, the national universities contain two-thirds of all students of education, about half of all agriculture, medical, and science students, and one third of all engineering students. In contrast, the private universities have over 80% of all students in the humanities, social sciences, health, home economics, and the arts. Combination of this complementarity with the differences in s/s ratios between subject areas indicates that the three sectors are effectively performing different roles in the national provision of higher education. It follows that direct comparison of s/s ratios — and consequently of operating costs — is inappropriate for consideration of operational efficiencies.

A basis for cross - sectoral comparison can be found if it may be assumed that student load factors in each sector (Table 3) are stable — that if in a given subject area more students were enrolled, more staff would be appointed to sustain the existing load factors. Then it becomes possible to estimate the numbers of staff in each sector that would correspond to similar subject distributions of their student populations over the different subject areas. On this basis, if the distribution of students between the different subject areas in the national universities followed that of the private universities but the load factors remained unchanged, their total s/s ratio would rise to 12.2.

For a more general comparison, the average proportions of enrolments across all universities (Table 3) provides a convenient basis. While retaining the existing student load factors and the total student enrolment in each sector, comparable numbers of staff can be estimated. The results (Table 4) effectively correct for the effects of differing "subject mix" in the three sectors. They indicate substantial changes for each sector in the numbers of staff and in the resultant s/s ratios: increases to 10.6 and 10.4 for the national and public universities, and a decrease to 20.3 for the private universities [14].

A further adjustment can be applied for the variation in numbers of postgraduate students between the sectors and the subject areas. It is conventionally suggested that postgraduate students require greater commitment of teaching time than undergraduates: to allow for this, in estimating their demands on time and resources, postgraduate students are commonly allocated a load factor double that for undergraduate students [15]. Although the proportion of postgraduate students is small (5%), their distribution is not uniform either amongst the sectors or the subject areas. Two-thirds of postgraduate students are enrolled in national universities and over half are engineering, medical or science students, all areas with high student load factors. By doubling the student load factor for postgraduate students, estimates of weighted s/s ratios were obtained for each subject area in each of the sectors. These ratios were used to estimate the numbers of teachers that would be needed to sustain the existing s/s

Table 4. Estimates of the Effects of Changing the Distribution of Subject Mix and Postgraduate Student Load for Universities.

	University Sectors			
	Private	**National**	**Public**	**Total**
	Numbers of Academic Staff			
(a) Change to average subject mix	+ 8,125	− 9,562	− 976	− 2,413
(b) Change to average postgraduate load	+ 1,431	− 950	− 170	+ 310
Total Change	+ 9,556	− 10,512	− 1,146	− 2,102
	Cost (¥ million)			
Change in Academic Staff Costs	+ 87,571	− 89,331	− 10,250	− 12,010
Change in Operating Costs	+302,927	−265,448	− 31,353	+ 6,126
Change in Operating Unit Costs	+0.19	−0.53	−0.50	0.00
Resultant Operating Unit Costs	1.19	1.69	1.77	1.32

ratios for a distribution of load in accord with that found for the whole system. The results (Table 4) indicate corresponding adjustments of about 2% to the number of teaching staff.

The consequences of translating these changes of staff numbers into costs are substantial. Changes in the costs for numbers of academic staff vary from reductions of 19% for national universities to increases of 14% for private universities. To these must be added accompanying changes in other staff costs and other consumables. The totals (Table 4) indicate changes of about 20% if each sector were to provide academic programmes with a common subject mix corresponding to the overall average but retaining its existing student load factors: reductions in unit operating costs of about ¥0.5 million for national and public universities; and an increase of ¥0.19 million for private universities. Despite retaining the differences in student load factors, the changes accompanying reduction of academic programmes to this common base account for about two-thirds of the difference in operating costs between private and national universities.

An apparent difference in operating costs of about 40% between national and public universities and private universities remains. This may be attributed to the smaller s/s ratios and hence higher costs of the national and public universities; inadequate attribution of research and teaching costs may also contribute (see the discussion of teaching and research costs below). There is though no reason to expect that costs in the three sectors should converge. In America costs differ substantially between public and private universities, with the smaller private sector being substantially more expensive [15]. The roles required of the different sectors and the balance between them are largely determined by political factors: rapid growth to satisfy national aspirations at costs acceptable to government could only be achieved by

encouraging private sector developments in areas where elasticity of demand would permit an acceptable investment. A direct consequence of this is the predominance of courses with low student load factors (Table 3) in the private sector. The balance provided, largely by the national universities but locally also by public universities, is an equally necessary condition to enable the whole university system to meet national requirements.

The possibility of generating savings by increasing the proportion of enrolment in private universities remains. Even without consideration of its impact on other university activities or the largely unquantified effects on quality of education, current evidence suggests that savings from reducing s/s ratios are likely to be limited. Indeed, as the national and public universities represent a quarter of total enrolment, the results in Table 4 indicate that complete elimination — or privatisation — of these sectors could only reduce overall costs by 10%: with a differential of 40% in unit costs between the sectors, a reduction of a tenth in the national and public sectors would reduce overall costs by 1%. Moreover, it is unlikely that even this limited level of savings could be achieved. The private sector, though not the national or public sectors, charges fees related to costs as indicated by the student load factors (Table 3) [16]. In the absence of accompanying changes in earnings structures, it is not obvious that without substantial additional subsidies and scholarships, elasticity of demand would sustain expected levels of graduates for the professions, especially those needing post-graduate experience. Given the levels of return generated by the existing system (see below), it seems unlikely that economic or political advantage could reside in seeking fundamental structural change to a system which is no longer in a period of rapid expansion.

(b) Accommodation Costs

Universities and colleges are generally characterised by their impressive buildings and estates. Together universities and colleges in Japan have some 150,000 hectares of land and 46 million square metres of floor space in buildings [5]. The vast majority of the land, 148,000 hectares designated as university land, is an area which has increased by less than 1% over the past 40 years. As an asset, its value has appreciated at about 10% per annum, comfortably in excess of the costs of the capital invested in it and of inflation [17].

Unfortunately, it is difficult to recognise this as a financial dividend derived from the educational functions of universities and colleges. The national universities hold 90% of the land [5], most of it being held by a very small number of national universities, and with just two of them holding 75% — University of Hokkaido (50%), University of Tokyo (25%). The land is regarded primarily for research purposes, typically as experimental forests, for agricultural, ecological or environmental study; or generally as held in trust for the nation. The actual areas of land devoted to educational activities, excluding research, hospital and social purposes

Table 5. Land and Building Space used by Universities and Colleges for Educational Purposes

	Universities				Junior Colleges			
Land(m^2/student)	Private [a]	National	Public	Total	Private	National [a]	Public	Total
Building Land	18.1	51.9	49.7	26.9	14.3	19.9	40.0	15.7
Recreation	16.5	16.3	18.9	16.5	12.7	5.3	30.1	13.2
Total	34.6	68.2	68.6	43.4	27.0	25.2	70.1	28.9
Buildings floor space(m^2/student)								
Lecture Rooms	1.8	2.0	2.5	1.9	2.3	1.7	3.4	2.3
Laboratories	1.3	3.7	3.2	1.9	1.6	3.3	4.2	1.8
Libraries	0.9	1.3	1.8	1.0	0.6	0.8	1.4	0.6
Offices	4.6	8.6	9.1	5.7	4.2	4.7	9.1	4.4
Halls	0.2	0.2	0.5	0.2	0.2	0.04	0.1	0.2
Gymnasia	1.0	0.8	1.9	1.0	0.9	0.1	2.6	0.9
Total [b]	9.8	16.6	18.8	11.7	9.7	10.8	23.0	10.2
Accommodation Costs								
(a) Capital Costs[c] ¥(million)/student								
Land	0.05	0.03	0.10	0.05	0.06	0.03	0.03	0.06
Buildings	0.16	0.24	0.38	0.19	0.17	0.08	0.20	0.17
Total	0.21	0.27	0.48	0.23	0.23	0.11	0.23	0.23
(b) Imputed Rent[d,e] ¥(million)/student								
Land	0.14	0.07	0.10	0.12	0.08	0.02	0.07	0.08
Buildings	0.16	0.24	0.32	0.18	0.16	0.17	0.29	0.17
Total	0.30	0.31	0.42	0.30	0.24	0.19	0.37	0.25

[a] Information relating to building and space usage in the national institutions has been limited since 1981. The extent of new building has been estimated from expenditure; figures for usage assume that the total space available in 1991 is distributed in proportions similar to those for 1981.
[b] Space provided for research rooms is not included. It is distributed: universities, private, 1.1; national, 4.7; public, 3.1; junior colleges, private, 0.7; national, 2.2; public, 2.1m^2 per student.
[c] The cost of capital for building was depreciated over 40 years; for convenience, the cost for land purchase was depreciated over 25 years: the difference in cost is small. Costs of borrowing were set at average historic values: 8% for private institutions, 7% for national institutions.
[d] Construction costs at 1991 prices were estimated from the extent and cost of new building over a period of 30 years to be ¥0.28 million/m^2 for private and national institutions, institutions and ¥0.31 million/m^2 for public institutions.
[e] Imputed rents assume that buildings depreciate at 2.5% pa. Building rents were set at 8.5% of depreciated capital value for private institutions, 7.5% for national and public institutions; ground rents were set at 2% and 1% respectively using current prices for land designated for public facility use (schools, parks, hospitals, athletic grounds).

is much smaller at 10,779 hectares: this still represents 43 square metres for each university student and 29 square metres for each junior college student (Table 5). In contrast to the total land-holdings, these areas, designated as land for buildings and recreational purposes, have increased as student numbers have increased over the past forty years. Except for recreational space in universities, there is no clear indication that recognisable "norms" exist for these uses of land; the amounts per student have varied considerably over time, increasing in the private sector but decreasing for national institutions. The costs of this land represent one part of the costs of the "physical infra-structure" necessary for education.

The other part of "physical infra-structure" is provided as buildings, services and access facilities. Subtracting the space occupied by the associated hospitals, research institutes, residential and other accommodation, the space available in 1991 for educational purposes in universities and colleges was respectively about 29.2 and 5.5 million square metres [5]. Expressed as space per student, there are large differences between the three sectors (Table 5) with national universities and public universities and colleges providing about twice as much floor space as the private sector [18]. The differences are least where demands on space are directly affected by the numbers of students: generally similar provision is found in lecture rooms, libraries, halls and gymnasia. Smaller provision of laboratory space in the private universities is in part attributable to the smaller proportion of their laboratory-based courses (27%) in comparison with the national universities (56%). Much larger differences appear for activities largely dependent on academic staff numbers. The lower s/s ratios of the national universities and public universities and colleges are reflected in the larger provision for offices and research rooms when expressed as space per student; in terms of space per member of academic staff the differences are much smaller although the national universities and colleges provide about 60% more research space than the private institutions.

Just as differing student load factors affect operating costs, so variation in space provided for different functions can be expected to modify accommodation costs. Elemental construction costs for countries overseas [19] identify wide variation the prices of building lecture rooms, laboratories, libraries, offices and halls. Large costs can occur with specialised research laboratories. However, by analogy with the criteria used for operating costs, in estimating the costs of educational space, it would be appropriate to exclude space explicitly designated for research. Accordingly neither the space nor the costs of research rooms should be included in the estimates. This provides a further simplification. By excluding research rooms, the overseas construction cost estimates for the other spaces are effectively constant over the three sectors (+/−5%): essentially, larger laboratory space in the national sector compensates for larger lecture room space in private institutions.

The costs of this accommodation − land and buildings − can be estimated in two ways: (1)

in terms of the annual cost of the capital that resides in it; and (2) as the annual rent required to obtain access to this quantity of space. The two should, in principle, give similar answers; in practice this is unlikely to be realised because of errors in estimation and limitations in the data available. Thus, while the cost of capital can readily be estimated, the amount of capital invested is not known accurately; conversely, while the amount of space used is known, there is little guide to market prices for its rent.

(1) Capital Costs. Annual accounts provide figures for capital expenditure on land and buildings. However, these figures include the costs of buildings for social and other non -academic purposes; and for land added to the stock held for research, environmental and ecological purposes and for commercial purposes. This leads to an overestimate of the capital provided for educational purposes. Counterbalancing this are the additions to capital by bequests, donations, and subsidized sale or transfer of land and buildings. In the absence of any alternative, it is assumed that the net effect of these components is not large. Then estimation of the cumulative annual costs of the capital invested in buildings and land over the past 30 years can be made by the method used for capital equipment [20]. The results are in Table 5.

(2) Imputed Rents. Areas of land and buildings provided for educational purposes are reported annually in the Schools Basic Survey. Rental values are determined by a combination of costs of construction and land, modified by market demand. Comparison of elemental construction costs for university and college buildings with those for commercial buildings could provide a basis for imputing academic rental values. Although available overseas [19], such data do not exist in Japan. As an alternative, average building costs for universities and colleges can be estimated by relating the reported expenditure on new buildings to its aggregate floor area; distortions due to time-lags and annual fluctuations are minimised by extending the comparison over a number of years. The relationship of cumulative floor areas of new buildings and expenditure (inflated to 1991 prices [21]) over the past 30 years is linear and indicates construction costs of about ¥0.3 million per m^2 for universities and colleges (This is rather higher than the reported average construction costs for public service and educational buildings in 1991, ¥ 0.21 million per m^2, but close to the costs for steel frame, reinforced concrete structures, ¥ 0.29 million per m^2, now used as standard for university and college buildings [21]). By allowing for annual depreciation of the value of buildings at the rate of 2.5%, rents to cover these costs could be estimated: for private universities and colleges it is assumed that an appropriate yield would be 8.5%; for national and public institutions, by virtue of their preferential borrowing status, a yield of 7.5% was assumed (Table 5).

While costs of public building show relatively small variation across the country, land values vary substantially [17]. Prices of land sold for public facility use differ by factors of up to 50 between Tokyo and non-metropolitan areas (1991). Current average values for land occupied

by universities and colleges were estimated from the average price of land sold for public facility use in each prefecture and the proportion of students in each sector in that prefecture. Private universities and colleges have a high proportion of their students in high cost locations – in the Tokyo area, 51% and 30% respectively; and a further 19% and 22% in the Kinki region. It follows that the average unit costs of land for the private universities are slightly more than double those for the national universities despite the much larger areas available to each student in national universities. The value of land, unlike that of buildings, does not normally depreciate over time: indeed, over the 30 years previous to 1991 it had appreciated at an average annual rate of 10%. Consequently, land rents are normally low. On an assumption that a commercial rent might yield 2%; and that the preferential rate for the national and public institutions might be 1%, imputed rents for use of land were obtained (Table 5) [22].

Despite the limited data and the broad assumptions made, the two procedures for estimating accommodation costs yield results that are remarkably similar. The larger component derives from buildings. The two estimates of the costs of buildings are closely similar; this may be attributed to use of the same expenditure data both for capital costs and for calculation of imputed rents from building costs [24]. Wider differences in the estimated costs of land may reflect understatement of real capital costs through the effects of gifts and subsidies.

Together, buildings and land represent about 20% of total costs, so the effects of differences in the two estimates become small (+/−3%) and well within the uncertainties implicit in the analysis. Conservatively, the generally larger values for imputed rents are adopted for purposes of comparison (Table 2) and calculation of rates of return.

Benefits

Education provides well recognised benefits [1]. For the individual they appear as both enjoyment of consumption and investment – the immediate rewards of student life, its durable consequences and access to careers of higher rewards. For society as a whole, benefits lie similarly in the cultural and democratic advantages of an informed community and in a literate, skilled and productive work force. In both cases it is the second component, that of investment in human capital, which can be identified with economic advantage; the extrinsic, non-monetary benefits are usually regarded as free goods even though their personal and social value may be substantial.

Direct economic benefits are quantified as earnings. This measure serves both individuals and society as a whole: not merely do earnings and related payments constitute 70% of national income, they also reflect the level of national productivity. The extent of benefit is conveniently expressed as a rate of return which balances the costs of education with the net present value

of subsequent earnings, effectively identifying the costs as an investment and the earnings as a yield on that investment [25,26].

The return is usually considered in terms of the additional earnings available to those with additional education. On this basis, the relative rate of return, r, is given by

$$\Sigma w_n(1+r)^{-n} = \Sigma c_n(1+r)^{-n}$$

where w_n and c_n are the differences in earnings and costs in year n. To identify specific benefits from university and college education, comparison is made with the earnings of those who entered the work force after completing their education at the level of upper secondary school (senior high school).

Average earnings for upper secondary school leavers, college and university graduates working in industry are given in the annual Basic Survey on Wage Structure [27]. This survey provides current average levels of earnings by age of employee. Using these figures to obtain relative rates of return is likely to give a significant under-estimate of actual returns. Advances in productivity can be expected to increase future earnings: if experience of the past 30 years were to provide a guide to the future, actual earnings might increase by about 2% per annum (in real terms)[28].

The additional costs of education for college and university graduates fall into two categories. Direct costs constitute the payments required to provide access to education. Where the costs are the fees and tuition charges paid by or for students, the return is the rate of private return. The costs of providing educational facilities, established in the first part of this paper, are effectively borne by society as a whole and provide the basis for estimating a social return; a narrower set of costs, that part of the total costs supplied by government subsidy, gives a public return. In addition there are indirect costs, essentially the costs to the individual and society of the earnings and production foregone, implicit in the extended period of education. These indirect costs are common to estimates of rates of private, social and public return and generally constitute the larger component of costs [29]. A related set of benefits and costs measured as the effects of earnings and subsidies on the revenue and expenditure from taxation can be used to estimate a rate of fiscal return. The following sections report and discuss estimates of rates of social, public and fiscal return from education in universities and junior colleges.

(a) Social Returns

The rate of social return provides an estimate of the average return to society for the total extra investment in higher education. As such it is valid only in terms of the returns averaged for all graduates over all junior colleges or all universities. Results using the direct costs from Table 2 and earnings over a working life to retirement at the age of 60 are given in Table 6.

Table 6. Rates of Social, Public and Fiscal Return for University and College Graduates (1991)

	Rates of Return[a]					
	Universities			Junior Colleges		
	Social [bdf] %	Public [cdf] %	Fiscal [ceg] %	Social [bdf] %	Public [cdf] %	Fiscal [ceg] %
(1)Full employment to retirement at the age of 60						
All graduates [h]	6.6	8.0	6.2	8.0	10.3	8.4
Men	6.0	7.2	6.1	3.8	5.0	5.7
Women	8.0	9.9	6.5	8.9	11.5	9.1
(2)Current Levels of participation in the labour-force [i]						
All graduates [h]	6.2	7.5	5.9	5.7	7.7	6.4
Men	5.9	7.1	6.0	3.7	4.9	5.6
Women	5.4	7.0	4.1	6.2	8.5	6.5

[a] Rates of return based on average earnings and taxes relative to those for upper secondary school leavers.
[b] Direct costs as given in Table 2.
[c] Direct costs of identified subsidies to universities and colleges: universities, ¥0.69 million/student; junior colleges, ¥0.20 million/student.
[d] Indirect costs identified as earnings of upper secondary school leavers foregone during the period of higher education less assumed part-time earnings of ¥0.3 million pa.
[e] Indirect costs identified with loss of tax revenue from earnings foregone.
[f] Average earnings taken from [27].
[g] Additional tax revenue from graduates comprising income, residence and sales tax, was estimated for earnings in excess of those for upper secondary school leavers. Income tax was assessed by means of the simplified employment income and income tax tables (1991) with the assumption that all allowances and deductions are credited to the base earnings; residence tax was assumed to be charged at the rate of 10% of additional taxable earnings; and sales tax at the rate of 3% was estimated for 85% of the additional after-tax earnings.
[h] Earnings for All Graduates were obtained by adding relative earnings for men and women weighted according to their proportion in the population or the labour-force.
[i] Current participation rates were taken from [34]. For men graduates, rates remain at 98-9% up to the ages of 55-9, 96%; 60-4, 80%; for women, rates fall from ages 20-4, 93%; to 25-9, 73%; 30-4, 53%; 35-9, 54%; 40-4, 60%; 45-9, 62%; 50-4, 60%; 55-9, 53%; 60-4, 43%.

The results are similar to those reported for other OECD economies[2] and are close to those reported in early studies which were restricted to men university graduates only [30]. Two characteristics of the calculated rates are immediately evident: (1) they satisfy the criterion of reasonable return on investment [31]; and (2) the social returns are somewhat smaller (about 80%) than the rates of private return reported previously [30,32].

The complementary roles adopted by the private, public and national sectors precludes any simple comparison between the rates of return derived from the variation in costs, but it is of interest to note the restricted range of their spread. The nominal social rates of return for university graduates are 7.0% for private universities, 5.6% for national universities and 5.4%

for public universities on assumption of retirement at the age of 60; similarly, for junior colleges the rates of return are 8.1%, 7.6% and 6.7% respectively. For men and women graduates separate examination of the wider differences in their rates of return is justified by their origins, essentially from differences in earnings rather than direct costs. This allows a third characteristic of social rates of return to become evident: that the rates for women are substantially larger than those for men [33]. The social rates for men university graduates (6.0%) – though not for the smaller number of junior college graduates (3.8%) – adequately meet the criterion of a satisfactory economic return. Despite the lower earnings of women, the rates for women graduates are substantially higher (8.0%. 8.9%). Part of the difference arises from smaller indirect costs due to the lower earnings of women upper secondary school leavers; but the major component is provided by the rather closer approach to equal pay achieved by women university and junior college graduates which increases the earnings differential with upper secondary school leavers [34].

An assumption of employment to retirement at the age of 60 is useful in indicating the maximum returns available. In practice, participation in the labour-force is more restricted: for the population of working age in Japan it is about 94% for men and 65% for women. Rates of participation vary also with age and level of educational attainment [35]. For men university graduates, participation is effectively complete (98-99%) over the age-range 25-54; for women university graduates, participation decreases rapidly from 93% at the age of 24 to 53% at the age of 30 and remains in the range 53-62% to the age of 60. Such lower rates of participation are reflected in the effective rates of social return (Table 6). The values for men show only small changes; but those for women university graduates are reduced by more than one third and become smaller than those for men. These rates of return appear to be only marginally attractive as a basis for economic investment for society. Women graduates of junior colleges provide a significant exception to this, clearly identifying the value of their contributions and their continuing attraction to students [33].

There may well be pressures in the future to increase and extend participation. The effects of an ageing population and a declining labour-force could be reduced by deferring retirement: extension of working life to the age of 65 would increase rates of return by *ca.* 0.3%. Larger effects arise if participation by women increases. There is already statistical evidence of changes in the pattern of employment of women graduates [36]. Over the period 1991-1995 the proportion of those aged 30-34 working in industry has increased by 25%, despite little growth in the economy. If this trend were to continue so that participation rates rose to 75-80% over the age range 35-55 (effectively halving the current gap between participation rates for men and women), then rates of return would increase to 6.8% for university and 7.6% for junior college graduates. This change would clearly be financially beneficial but the social cost in terms of

family life, and particularly in provision of child care, would be considerable. One hypothetical variation would be to consider extending participation in the labour-force but with a gap over the age range 35-44: this would leave social returns at 5.0% and 5.7% respectively, a cost society might well regard as acceptable.

Table 7. Effects of changes in employment practices on rates of social return for women graduates (1991).

	Rates of Social Return [abd]			
	Existing Levels of Earnings [f]		Increased Levels of Earnings [j]	
	University Graduates	Junior College Graduates	University Graduates	Junior College Graduates
Full Employment to Retirement at the age of 60	8.0%	8.9%	7.0%	5.9%
Current Levels of Participation[i]	5.4%	6.2%	4.5%	3.6%
Increased Participation [k]	6.8%	7.6%	5.8%	4.8%
Increased Participation with break over age range 35-44 [l]	5.0%	5.7%	4.3%	3.2%

Footnotes [a] to [i], as for Table 6.
[j] Illustrating partial move towards equal pay by halving the difference between the earnings of women and men both for graduates and for upper secondary school leavers.
[k] Rates of participation in the labou-force by women increased to halve the current gap between the rates for women and men viz age, participation rate: 20-4, 95%; 25-9, 85%; 30-4, 75%; 35-9, 80%; 40-4, 80%; 45-9, 80%; 50-4, 75%; 55-9, 60%; 60-4, 60%.
[l] Participation rates increased as in [k] but with gap in earnings over the age range 35-44.

A factor which might be expected to lead to increased participation in the labour-force will be implementation of policies of equal opportunity and the consequent provision of equal pay and merit-based rewards. If, as appears to have happened generally overseas, graduates selectively move more rapidly towards pay equality than school leavers there would be initial increases in rates of return. Subsequently, as the effects percolate through to school leavers, the effects will be, perversely, to increase earnings but to reduce rates of return for women graduates through both increases in indirect costs and decreases in the earnings differentials with upper secondary school leavers. In the limit, returns for women will be reduced to those for men for employment over a full period to retirement at the age of 60; and with correspondingly lower returns for lower rates of participation. The effects of such changes are illustrated in Table 7. The results emphasise that to optimise the effects of implementation of equal opportunity, important social issues about the effects of increased participation of women in the work force will need to be addressed and policy priorities identified.

(b) Rate of Public Return

An alternative measure of quantifiable benefits is provided by identifying as the direct cost, the amount of public money spent by government in subsidising higher education. For national and public universities and junior colleges this is the full cost less the fees paid for tuition and other charges; for private universities and colleges it is the amount of explicit subsidies provided. Effectively, these subsidies from public funds are the obverse of the direct costs paid on behalf of students and used in calculating rates of private return.

Fees and other charges paid for students to national and public universities constitute 16% and 14% respectively of costs; conversely, subsidies provided to private universities amount to about 12% of the institutional costs. Over all universities, the public costs (excluding those expressly associated with research or clinical work) amount to ¥1,476,420 million (1991) or ¥0.686 million per student. It is noteworthy that this represents only 42% of the total direct costs. For junior colleges, the amounts borne by public funds are smaller, ¥0.198 per student, 18% of institutional costs. It provides a special feature of Japanese higher education that over the whole system, less than 40% of the direct costs is carried by taxpayers, leaving 60% for "parents".

The smaller public costs lead to rates of public return (Table 6) which are significantly higher than the social rates: for universities generally by a factor of about 1.25, and of about 1.35 for junior colleges. Moreover the rates of return, for all graduates and separately for men and women, all show satisfactory financial returns: for women, returns remain close to 6% even for current levels of participation combined with partial further movement towards equal pay. Recognition of these financial returns provides useful criteria at two levels. In consideration of priorities, it allows acceptable public investment to be identified – with nominal returns of over 6%, any argument that the country can no longer afford to subsidise higher education would clearly be inappropriate. It also offers a basis for policy decisions in relation to relative levels of public and private funding of the costs. Over the past 25 years the rate of private return has fallen so that it is now slightly less than the rate of public return. This has been achieved both by increasing the level of fees in the national and public institutions and by reducing subsidies to the private sector, reversing the trend over the period 1955-75 [29] rather than through changes in the relative sizes of the sectors. In consequence, the distribution of costs, which in 1966 were roughly one-third to "parents", two-thirds to "taxpayers", has now been inverted.

(c) Fiscal Return

There are severe limitations to the utility of public rates of return in determining policy priorities. A major factor is that investment in education, even though the yield may be

attractive, represents a long-term commitment. The capital has to be provided well before benefits emerge and there is no possibility of recovering the capital by "privatizing" the asset. Neither of these fits easily into political processes or annual budgets. Moreover, there may be some doubt about the use of earnings as a measure of return on public investment.

Fiscal return provides an alternative measure which explicitly addresses these matters. In estimating fiscal returns, costs are defined by the direct and indirect charges on taxation revenue: subsidies to the institutions and the amount of tax foregone from students continuing in education; fiscal benefits are assessed as the tax paid on the extra income earned by university and college graduates. The data necessary for these calculations also provide the basis for estimates of annual revenue cash flows for higher education.

For both university and junior college graduates, the rates of return (Table 6) are close to financially acceptable levels with the sole exception of women university graduates at current levels of participation. These rates are clear confirmation that, at its present levels, government investment in higher education is both prudent and financially more beneficial than the majority of major public works projects. As with the social and public returns, the estimated rates will be expected to increase over time both through increased participation and a continuing increase of affluence over the cross-sectional earnings levels. In this instance though, the limitation of the cross-sectional earnings data is useful as it provides access to an estimate of the current additional taxes paid by university and college graduates. The differences in average earnings and taxes between graduates and upper secondary school leavers multiplied by the numbers of graduates of each age-range in the work-force provides approximate estimates of the additional earnings and the consequent extra taxes paid by graduates (Table 8). The figure of ¥4.33 x 10^{12} can be regarded as a fiscal measure of the value- added by higher education to these graduates. As such it constitutes an annual source of revenue to be set against the cost of the annual subsidy to higher education. With the exclusions discussed above, the subsidy amounts (1991) to ¥1.58 x 10^{12}, about a third of the revenue. In terms of cash flow, the substantial surplus suggests that higher education is to be regarded not as a cost centre but rather as a profit centre. Of course, a suggestion that revenue and subsidy can be related would be politically unacceptable to any government but it renders difficult in Japan the argument, sometimes heard elsewhere, that the nation cannot afford to sustain levels of educational subsidy [37].

It is useful to place these figures for higher education in a general context of subsidy and revenue for all education (Table 8). Total public and private expenditure on education, science and culture was assessed at ¥27.38 x 10^{12} in 1991; of this, ¥15.72 x 10^{12} constitutes a direct charge on government (excluding support for social education, administration, hospitals and scientific research)[3,6]. This subsidy is distributed, 70% to compulsory education (elementary

Table 8. Estimates of Taxation Revenues and Subsidies for Education in Japan, 1991.

	Subsidies Expenditure from National Budget [a] ¥×10¹²		Revenue Receipts from Additional Tax Payment[b] ¥×10¹²	
Post-compulsory Levels of Education				
Upper Secondary	3.21	(20%)	4.89	(12%)
Higher Education				
Universities	1.48	(9%)	3.99	(10%)
Junior Colleges	0.10	(1%)	0.34	(1%)
Total	4.78	(30%)	9.22	(22%)
Compulsory Levels of Education	10.93	(70%)	32.28	(78%)
Total	15.72	(100%)	41.50	(100%)

[a] Does not include the cost of tax allowances for contributions to or earnings of educational corporations.
[b] Estimate of total individual taxes paid corresponding to the average additional earnings above those achieved by those from the next lower level of education. Income tax was assessed by means of the simplified employment income and income tax tables (1991) with the assumption that all allowances and deductions are credited to the base earnings; residence tax was assumed to be charged at the rate of 10% of additional taxable earnings; and sales tax at the rate of 3% was estimated for 85% of the additional afte tax earnings to allow for savings.

and lower secondary schools) and 30% to post-compulsory education — of which two thirds (20%) is directed to the upper secondary level and one third (10%) to higher education. Given that school attendance is virtually complete to the end of the upper secondary level and that half of all school leavers proceed to higher education, this represents a fairly uniform distribution of subsidy across all educational levels. Elsewhere, in both developed and under-developed economies, it is commonly accepted that the higher costs of university and college education attract disproportionately higher levels of government subsidy. The balance now achieved in Japan is the complement to displacement of the burden of higher education costs, in accord with market principles, from taxpayers to parents and students. As might be expected, the flow of revenue from higher education exceeds that from the upper secondary school level, although if all schools are taken together, the two match. In the future, as the number of university and college graduates continues to rise, and the number of women graduates participating in the labour-force increases, the balance will necessarily swing to show a greater proportion of revenue from higher education.

Teaching and Research

Making proper allocation of costs is a problem familiar to all enterprises that generate

diverse products. The problem appears to be peculiarly complex for universities and colleges. Clearly they provide a diversity of products and services; but as a matter of principle many argue that the production processes are intrinsically inseparable. This applies particularly to the relation between the two major products, graduates and research; and to two of the major activities, teaching and research which are seen as constituting a nexus.

Attempts to identify separately teaching and research costs in higher education systems have been notably unsuccessful [38]. One result is to find the full costs of universities and colleges attributed either to teaching or to research, with the implication that all other activities constitute free goods. Yet the evident costs for research work are now routinely identified by institutions both for internal budgetary purposes and as a basis for charging for commissioned work [39].

In Japan, costs associated with research work in universities and colleges are reported in the annual Survey of Research and Development [40]. Total expenditure on research is identified as (1991) ¥1.90 x 10^{12} and ¥0.25 x 10^{12} for universities and colleges respectively: staff costs constitute over 70% of these totals. Effectively these staff costs represent the entire costs of the full-time academic staff and about 40% of the costs of all other staff. While the commitment of academic staff to research is beyond doubt, the time they can devote to research is self-evidently less than 100%. For purposes of international comparison, a figure of 50% has been used [41] and this proportion, high by international standards [42], is supported by a recent survey in national universities [43].

With the assumption that half of the time of academic staff in all universities can be attributed to research, a rough estimate of the costs of research carried in universities' general expenditure of ¥1.08 x 10^{12} can be derived; this constitutes about 30% of the assessed total expenditures [44]. The residual, obtained by subtracting this expenditure from the institutional costs in Table 2 offers estimates of universities teaching costs. Expressed as unit costs per student these are:

private universities, ¥0.91 million;
national universities, ¥1.67 million;
public universities, ¥1.78 million;
all universities, ¥1.11 million.

By using these costs, estimates of the actual rates of return from university teaching can be derived. For current levels of participation in the work-force, rates of social return are 6.2% for women, 6.5% for men, and 6.8% for all university graduates, approximately 1.1 times greater than those in Table 6 (and similarly higher for other rates). Further, by adjusting

teaching costs for the three sectors to those for a common mix of subjects (cf. Table 4), it is also possible to use a common base for comparison of sectoral costs. For provision of teaching according to the national average mix of subjects but with the existing sectoral student load factors, unit teaching costs become [45]:

private universities, ¥1.074 million;
national universities, ¥1.29 million;
public universities ¥1.42 million.
all universities ¥1.13 million

It appears that, for the national universities, the component of costs attributable to research constitutes a third of their overall costs, and provision of their more expensive "subject mix" adds 20% to their total costs. In contrast, in the private universities, research costs form a slightly smaller component of the unit costs at 30% and the balance of subjects allows costs to be 15% less than would be needed for the national average. Together these two factors give overall costs (Table 2) which, for the national universities, are effectively double the teaching costs but are only one fifth greater for the private sector. The traditionally expensive, high quality teaching said to be provided by the national universities, appears to be derived from an increase of teaching costs of about 20% over the teaching costs of the private university sector; with the higher costs of the national universities residing largely in the expensive mix of the courses they teach and in higher expenditures on research.

References and Notes

[1] M.Blaug, An Introduction to the Economic of Education, Allen Lane (1970).
[2] G.Psacharopoulos, Return to Investment in Education, Policy Research Working Paper, WPS 1067, World Bank (1993).
[3] Statistical Abstract of Education, Science and Culture, Ministry of Education, Science and Culture, Japan (1993) and other years.
[4] The proportion of cost carried by the private sector increased as follows: universities, 1960, 33%; 1990, 59%; junior colleges, 1960,71%; 1990, 89%; upper secondary schools, 1960, 17%; 1990, 27%. Small increases are shown for lower secondary and elementary schools. Over the same period, participation rates increased for universities from 8% to 25%; junior colleges, 2% to 12%; and upper secondary schools, 58% to 95% [3].
[5] Schools Basic Survey, Ministry of Education, Science and Culture, Japan (1992) and other years.

[6] Survey on Financing of Private Schools and Universities, Ministry of Education, Science and Culture, Japan (1992) and other years.

[7] Excluding capital and loan charges, total expenditure incurred and income received in hospitals associated with universities in 1991 was (¥, billion) private, (expenditure) 687, (income) 749; national, 480, 407; public, 125,100

[8] The primary economic benefits derived from universities and colleges are usually identified with the formation of graduates. It is the costs and benefits associated with this educational process that are considered here. The total contributions from universities and colleges also include additional benefits from research and service work. In principle, these benefits can also be assessed and will increase the social, public and fiscal returns discussed below.

[9] H.M.Levin, Cost-Effectiveness, Sage (1983).

[10] The annual charge is given by multiplying the aggregate capital costs over the lifetime (n years) by the factor $r(1+r)^n/\{(1+r)^n-1\}$ where r is the rate of interest. In 1991, long-term lending rates were 7.9%, close to the median value of 7.6% for the previous decade. Rates since 1991 have fallen but it would be unwise to expect them to remain at the current low values (4.4%). An effective lifetime for capital goods has traditionally been set at 10 years[11] but recent experience suggests this is now unrealistic for both equipment and books. In practice, the annual costs are insensitive to the assumed lifetime showing a variation of 0.5% between 5 years and 10 years.

[11] see e.g. H.Muta, Higher Education, 14, 269 (1985).

[12] Academic staff numbers are taken as full-time staff plus full-time equivalent of part-time staff (estimated on the basis of average full-time earnings). A number of staff listed as performing library, administrative and academic services are excluded from the total used for calculation of s/s ratios.

[13] A student load factor provides a measure of the apparent weighting in terms of academic resources for a student in a given subject area relative to those in the whole university. Applied to the three university sectors it is given by the proportion of academic staff in a given subject area divided by the proportion of students in the area separately for each sector; the product of relative student load factor and the s/s ratio for each university sector gives the s/s ratio for the subject area in that sector.

[14] Similar information is not conveniently accessible for Junior Colleges; nor is it relevant as the statistical predominance of private colleges precludes any useful comparisons between the sectors.

[15] H.R.Bowen, The Costs of Higher Education, Jossey Bass (1980).

[16] In the private sector, income needs to be related directly to expenditure. From the available data there appears to be a good linear relationship between total fees and student load

factor. Perhaps not surprisingly, the only major deviation is provided by the largest single subject area, social science, for which fees are substantially larger than those suggested by the apparent relative load.

[17] Japan Real Estate Institute, Average Prices of Ordinary Forest Prime Land, Price of Agricultural Land, and Index of Urban Land Prices quoted in Japan Statistical Yearbook, Statistics Bureau, Management and Coordination Agency, Tokyo (1992) and other years.

[18] The range of areas is similar to that reported for colleges and universities in the U.S.A. but there it is students in the private universities who enjoy larger provision of space than those in public universities [15].

[19] e.g. Spon's Architects and Builders Price Book, ed D.Langdon and E.Staff, E and F.N. Spon, 1992; European Construction Cost Handbook, ed D.Landon, R.S.Means (1994); Australian Construction Handbook, Rawlinson (1991).

[20] Although the total holding has changed little, substantial net purchases of undeveloped land have occurred over the past 20 years − 30 million m^2 for the national universities, 8 million m^2 for private universities. Despite their extent, if these areas can be regarded as forest land, its relatively low price, less than 0.02% of the price of land sold for public facility uses [17], would have limited its cost to less than 4% of total land purchases over this period. Quantifying the extent of subsidy and gift appears impossible: there is abundant anecdotal evidence of the provision of land to private universities and colleges by local government, though its scale must be limited.

[21] Ministry of Construction, Survey of Construction Work Started quoted in Japan Statistical Yearbook, Statistics Bureau, Management and Coordination Agency, Tokyo (1992) and other years.

[22] Similar calculation of office rents indicates that these imputed rents provide reasonable estimates. From comparison of building costs overseas [19], offices are more expensive to build than universities. Medium-rise offices cost about 75% more than universities. If a similar factor applies in Japan, the basic construction cost for offices would be ¥0.49 million/m^2. Buildings in Tokyo are more expensive than the national average due to a combination of higher costs and a concentration of prestige buildings in the capital city: government buildings show costs higher by *ca* 25%, commercial buildings by 75%[21]. For offices this would increase average costs to ¥0.86 million/m^2 with a corresponding rent of ¥73,000/m^2. The average cost of land for commercial use in the Tokyo area (1991) was ¥6.9 million/m^2 [17]. By assuming each 1 m^2 of floor area in a medium-rise office requires 0.15m^2 of land, then a ground rent at 2% would be ¥20,000/m^2 (of office space) giving a total rent of ¥93,000/m^2 (equivalent to ¥25,600/ tsubo/month). According to data in the Office Market Report [23], the weighted average rent for offices distributed as are the private universities in the Tokyo metropolitan

area would have been ¥91,000/m² (¥25,000/tsubo/month). Outside Tokyo, the corresponding figures would be: building costs, ¥0.49 million/m ², land cost, ¥0.5 million/m², total rent, ¥40,000/m² (¥11,400/tsubo/month) again in good agreement with the available data [23].

[23] Office Market Report '91, Ikoma Data Service System (1992).

[24] Most university and college buildings have been completed during the past 30 years. Assuming annual depreciation of 2.5%, the value of buildings in all three sectors is close to 70% of current (1991) construction costs. The extent of new building is clearly a consequence of the rapid expansion of both colleges and universities over this period. It is though noteworthy that expenditure on new buildings and land has continued at a high level since 1991. The conventional image of old buildings, especially for the national universities, is clearly superficial; these figures suggest that a major problem may be inadequate provision for maintenance of both buildings and estates.

[25] T.W.Schultz, The Economic Value of Education, Columbia University Press (1963).

[26] G.S.Becker, Human Capital Princeton University Press (1964).

[27] Basic Survey on Wage Structure, 1991, Ministry of Labour, Japan (1992) and other years.

[28] From the data on average earnings ([27],1966-1991), a man starting work as a university graduate in 1966 could have expected a rate of private return of 8.7% and of social return of 6.8%, assuming retirement at the age of 60. By 1991, having become about 48, the achieved levels of average earnings correspond to a private return of 9.8% and a social return of 7.9%.

[29] H.Muta, Allocation of Educational Resources in Japan, ed S.Ichikawa, National Institute for Educational Research, 51 (1978); M. Kaneko, Financing Higher Education in Japan, R.I.H.E. (1989).

[30] M.Yano, Allocation of Educational Resources in Japan, ed S.Ichikawa, National Institute for Educational Research, 103 (1978); S.Umetani quoted in G.Psacharopoulos, Comparative Education, 17, 321 (1981); K.Okachi, quoted in G.Psacharopoulos, J.Human Resources, 58) (1985).

[31] What constitutes a reasonable return is determined by the market and and may change substantially over time. For convenience it is assumed arbitrarily that an apparent return in the region of 6% might be considered satisfactory, given the probability that real earnings will increase over time and that extrinsic benefits will make significant contributions.

[32] K.J.Morgan, Bulletin of the University of Electro-Communications, 8, 221 (1995).

[33] K.J.Morgan, Journal of Tsuda College, 27, 197 (1995).

[34] Two thirds of the difference (2.0%) between the rates of return for men and women university graduates is due to differences in relative earnings, one third to differences in the indirect costs of earnings foregone. For junior college graduates 90% of the larger difference in rates (5.1%) is attributable to differences in relative earnings (cf. M.Kaneko, Enrollment

Expansion in Postwar Japan, R.I.H.E. (1987)).

[35] 1990 Population Census of Japan, Statistics Bureau, Management and Coordination Agency, Tokyo (1994).

[36] reference [27], 1995.

[37] An intensive study of the returns from one American university reaches, similar conclusions. B.Bluestone, UMass/Boston, An Economic Impact Analysis, University of Massachusetts (1993).

[38] K.Clayton, The Measurement of Research Expenditure in Higher Education, School of Environmental Sciences, University of East Anglia (1987).

[39] see e.g. The Costing of Research Projects in Universities, Committee of Vice-Chancellors and Principals, London (1988); Grant Policy Manual, National Science Foundation Washington (1989); Realizing the Potential, University Research Committee, Royal Society of Canada, Ottawa (1991); Public Sector Research Costing and Pricing, Coordination Committee on Science and Technology, Canberra (1992).

[40] Report on the Survey of Research and Development, Statistics Bureau, Management and Coordination Agency, Japan (1992).

[41] J.Irvine, B.R.Martin and P.A.Isard, Investing in the Future: An International Comparison of Government Funding of Academic and Related Research, Edward Elgar, (1990).

[42] E.L.Boyer, P.G.Altbach and M.J.Whitelaw, The Academic Profession — an International Perspective, The Carnegie Foundation for the Advancement of Teaching, Princeton (1994).

[43] K.J.Morgan, Research in Higher Education, 25, 277 (1996).

[44] Expenditure (1991) on R&D recorded as self-financed by universities [40] is used as the base for estimating the component of operating costs attributable to research. Deductions were made for half the costs of labour and the costs of buildings and land, proportionately adjusted for the ratio of self-financed to total research expenditure. Further deductions were made for the costs of equipment, already discounted in estimating university operating costs. Accommodation costs, as imputed rents, were arbitrarily assigned as research costs for half of the building space provided for laboratories, libraries and offices; costs for designated research space have already been excluded from the estimates of the accommodation costs in Table 5. No adjustment was made for the imputed rental costs of land.

[45] Proportionate adjustments were made to the estimated research costs for the changes in staff numbers and subtracted from the costs previously identified as accompanying the changes in numbers of teachers.

教育の経済（その4）

－日本の高等教育の社会的・公共的・財政的収益性－

キースJ．モーガン*

日本の高等教育は，40年間継続して成長してきた。政府によって多大な投資がなされたが，成長の大部分は私学セクターによるものであった。国立および公立セクターの費用は，私学セクターと比べてかなり高い。この違いは主として，相互に競合的というよりも補完的と思われるこれら3セクターが果たす役割の違いによるものである。学生－教員比率，研究への支出，そして複合的要因から生じる運営費の違いが，数量的に検証される。資本費用および帰属地代の双方をもとに査定される設備費については，差異が少なく，全費用に占める割合は常に小さい。高等教育から得られる経済的便益は，依然として魅力的である。大学の社会的収益率は6.6%，公共的収益率は8.0%，財政的収益率は6.2%である。短期大学の収益率はさらに高いのだが，女子労働力の有業率が低いために，実際には減じられている。卒業者による収入のフローは，高等教育に対する1年間の補助金額を遙かに越えている。その理由は，部分的に，納税者よりもむしろ親が現在負担している費用の増大によるものである。その結果の1つとして，政府補助金は，もはや高等教育へと傾斜していない。

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