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A STUDY OF EDUCATIONAL EXPENDITURES IN KENYA 1963-1975

A Dissertation

Presented for the

Doctor of Education

Degree

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ABSTRACT

In recent years, government expenditures on education in Kenya have been growing at 20 to 25 percent a year. Meanwhile, the government revenue has been increasing at about 17 percent a year. If these trends were allowed to continue, within 15 to 20 years, education would consume the entire governmental budget. There are several factors which have contributed to this rapid rise in total educational expenditures during the period 1963 to 1975.

The problem in this study was to analyze the relationship between the rise in total educational expenditures in Kenya between the years 1963 and 1975 and the rise in 27 economic-educational variables. A subproblem of the study was to determine which of these variables were the best predictors of total educational expenditures. The 27 economic-educational variables were grouped into (1) economic variables, (2) education expenditures by levels of education, (3) educational enrollments, (4) the teaching labor force and (5) examinations.

Sources of raw data included the Ministry of Education annual reports, economic reviews, statistical abstracts and the 1974-78 Government Development Plan. These data were analyzed through, first, the growth rates, unit costs and teacher/pupil ratio procedures and secondly, through bivariate correlation analysis, scattergrams and stepwise multiple regression analysis procedures. During the stepwise multiple regression analysis, all the 27 economic-educational variables were analyzed together, then analyzed by variable clusters and finally

these variables were collapsed into four new variables--(1) economic variable, (2) the teaching labor force, (3) educational enrollment, and (4) examinations variable.

The study confirmed that the total educational expenditures had risen faster than all the selected economic-educational variables except the expenditures on administration and higher education. Twenty-four out of the 27 economic-educational variables analyzed showed high positive correlation coefficients of over 0.9000 while the remaining three variables had high positive correlation coefficients of over 0.8000. When the effects of other variables were controlled, secondary school enrollment was shown to be the best predictor of total educational expenditures. Educational enrollments were shown to be the best predictor of the total educational expenditures when new variables were analyzed.

From the study it was concluded that the rise in total educational expenditures has been closely associated with:

(1) high rate of economic growth during the study period

(2) government policies

(3) increased enrollments

(4) improvement in quality of education especially through better qualified teaching force

(5) inflation.

Based on the study, it was recommended that the economic system should be restructured so as to provide more resources for education. The educational system should also be restructured so as to realize greater economies and to fit the needs of the economy.

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CHAPTER I

INTRODUCTION

Popular opinion has it that the finance of education is a true and almost exclusive domain of the economist. The educators, it is argued, first decide what is to be done and the economists determine how much education will cost and how the money is to be raised. Contrary to this view, Professor M. Blaug contends that the particular way in which education is financed in a country can largely determine who it is that will be educated and in what fashion. He concludes that financial questions come not after but before the critical planning.[1]

Planning involves working out how to achieve the maximum outcomes possible with the available resources. Educational planning is specifically concerned with the problem of how to make the best use of the scarce resources devoted to education. Financing of education is therefore not only central but inseparable from educational planning. Discussing the importance of financing in the educational planning process, Professor P.H. Coombs asks:

> Is money--or lack of it--at the root of the educational crisis? How much will be needed, where will it come from, what are the chances of getting enough, and what happens if getting enough proves impossible?[2]

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[1] Mark Blaug, An Introduction to Economics of Education, Allen Lane (ed.), The Penguin Press, 1970, p. 285.

[2] P.H. Coombs, The World Educational Crisis, Oxford University Press, 1968, p. 48.

He goes on to conclude:

> . . . money is an absolutely crucial input of any educational system. It provides the essential power with which education acquires its human and physical inputs. With too little money, education can be helpless. With an ample supply its problems become more manageable even though they do not vanish.[3]

The questions that Professor Coombs asks above are very relevant to the planning of education in Kenya today. His conclusions emphasize the importance of financing aspects of educational planning. In Kenya, the subject of financing of education has been a source of almost continuous controversy. It has been the subject of numerous reports by official commissions, private individuals and groups, of innumerable memorandums within the administration, of debate in legislative bodies and of often bitter public discussion.

Efforts by the colonial government to expand educational opportunity in the years immediately proceeding independence had coincided with an enormous and unparalled public demand of education and in the election campaign, the promise of universal free primary education was one of the basic planks in the Kenya African National Union (KANU) platform. Financial constraints have made the fulfillment of this promise a long-term goal and it has remained a very sensitive issue. Although the establishment of any school without the approval of the Ministry of Education is illegal, politicians have been among the worst offenders in opening self-help schools and government control has proven practically impossible.

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[3]P.H. Coombs, op. cit., p. 48.

The various reasons why government is interested in spending money on education are well known. There is the public demand to be satisfied, there is the need of the economy for skilled and qualified manpower, and there is a built-in momentum of the educational system itself, such that once it is established it has to be maintained. These factors have characterized the education scene in Kenya since the colonial days. Two factors however seem to be predominant: the public demand and the built-in educational momentum. The planning of education in Kenya has therefore been mainly based on "social demand". According to Maureen Woodhall, the social demand approach treats education as a service demanded by the community just like any other goods and services and regards educational planning as the process of forecasting demand and providing sufficient places to satisfy the demand.[4] The third factor, the need of the economy for skilled and qualified manpower, received considerable attention in the 1960's. Throughout this period the proposition that educational expansion promoted, and in some cases even determined, the rate of overall Gross National Product (GNP) remained unquestioned. The logic seemed fairly straight forward. Developing nations like Kenya were very deficient in their supply of semi-skilled and skilled manpower. Without such manpower (which it was assumed could be created only through the formal educational systems) development of leadership in both the public and

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[4]Maureen Woodhall, The Investment Approach to Educational Planning, IIEP Discussion and Lecture Series No. 32, April, 1974, p. 4.

private sectors would be woefully lacking and eocnomic growth would be retarded.

Impressive statistics and numerous quantitative studies of the sources of economic growth in the west were paraded out to demonstrate that it was not the growth of physical capital but that of "human capital" which was the principal source of economic progress in the developed nations. Clearly, in countries such as Kenya, there was an immediate need to build up the "human" as well as physical capital infrastructure in order to provide indigenous leadership for the major tasks of development. Rapid quantitative expansion of enrollment, therefore, appeared justified in light of the substantial manpower scarcities of the 1960's. And, although it is extremely difficult to document statistically, it seems clear that the expansion of educational opportunities at all levels has probably contributed to aggregate economic growth in Kenya by:

1. Creating a more productive labor force and endowing it with increased knowledge and skill.

2. Providing widespread employment and income earning opportunities for local teachers, school and construction workers, textbook and paper printers, school uniform manufacturers, etc.

3. Creating a class of indigenous educated leaders to fill vacancies left by departing expatriates or otherwise vacant positions in governmental services, public corporations, private businesses and the professions.

4. Presumably providing the kind of training and education that would promote literacy, numeracy and basic skills while encouraging "modern" attitudes on the part of diverse segments of the population.

I. THE PROBLEM

In the last two decades, total educational expenditures in most nations rose by five to ten times. This meant that the educational outlays grew two to three times as fast as national incomes and total expenditures. Accordingly, education's percentage share of the Gross National Product (GNP) and of the total budget in many countries doubled or tripled during this period. Messrs. Coombs and Hallak have explained that this sharp rise in educational expenditures was caused by inflation, rising demand owing to rise in youth population, a revolution of rising expectations by parents, widespread adoption of public policies aimed at democratizing educational opportunities and the rapid expansion, upgrading, and diversification of manpower requirements due to technological advances in the economy and the factor costs of education.[5] An examination of pre-war colonial budgets in Africa, for example, reveals that the proportion of expenditures directed to education was about 5 percent before World War II. In the years of independence the proportion of expenditures directed to education in the former British Colonial sector often reached and even exceeded an allotment of 25 percent.

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[5] P.H. Coombs and J. Hallak, Managing Educational Costs, Oxford University Press, 1972, p. 93.

In recent years, government expenditures on education in Kenya have been increasing at 20 percent to 25 percent a year. Meanwhile, government revenue has been increasing at about 17 percent a year. Currently about one-third of the government's recurrent budget is allocated to education. If these trends were allowed to continue, within 15 to 20 years education would consume the entire governmental budget. There would be no government funds for agriculture, health services, roads, law and order or for any other government services. Educational expenditures in Kenya, therefore, cannot continue to grow at this pace indefinitely. The national budget must meet other important needs as well. Education cannot continue to command a rapidly increasing share of available resources without producing serious stresses and distortions in the whole society and economy. There is a stage when the rate of education's budgetary increase must be set more closely in line with the overall rate of growth and the total public revenues. This becomes necessary when the inevitable slackening occurs, and the educational system receives smaller annual budget increments than earlier and more so if the country's economic growth slows down as is being witnessed due to the energy crisis and inflation.

This study focused on the problem of measuring the relationship between growth in total educational expenditure and growth in 27 economic-educational variables during the period 1963 to 1975. These variables were divided into five clusters as follows:

1. Economic Variables

    1. Total Government Expenditure
    2. Gross National Product
    3. Total Government Revenue

2. Educational Expenditure by Levels Variables

    1. Administration Expenditure
    2. Primary Education Expenditure
    3. Secondary Education Expenditure
    4. Teacher Education Expenditure
    5. Technical Education Expenditure
    6. Higher Education Expenditure
    7. Special Education Expenditure

3. Educational Enrollment Variables

    1. Total Educational Enrollment
    2. Standard 1 Enrollment
    3. Primary School Enrollment
    4. Secondary School Enrollment
    5. Teacher Training Colleges Enrollment
    6. Technical Secondary Schools Enrollment
    7. University Enrollment

4. The Teaching Labor Force Variables

    1. Primary Trained Teachers
    2. Primary Untrained Teachers
    3. Secondary School Teachers
    4. Total Primary School Teachers
    5. Teacher Training College Tutors
    6. Technical Secondary Schools Teachers

5. Examinations' Variables

    1. CPE Candidates
    2. CPE Passes
    3. EACE Candidates
    4. EACE Passes

A subproblem of this study was to determine which one or group of variables named above was the best predictor of the Total Educational Expenditures.

Economic Variables

The amount of public expenditures on education is determined by the number of young people of school or college age and the proportion

attending school or college. This population depends on the general standards of living, the geographic distribution of schools and colleges, attitudes toward education, the availability of private resources, manpower needs and the unit costs of education. These in turn are related to standards, productivity, the size of the country and the population groups at each administrative level. As a general rule countries with a high per capita income tend to spend relatively large proportions of their GNP on education.

Expenditures on education are apparently encouraged when real income rises in periods of relative price stability. There is a lag in the response of expenditure to rising prices. It would be a mistake however, to assume that educational expenditures are relatively stagnant in periods of heavy inflation, there has been little evidence to support this assumption. Expenditures are related to the income of the nation and especially their per capita income: the larger the surplus over what is needed to cover the essentials of life, the greater the proportion of income likely to be spent on education.

Price movements alone do not explain the trends in educational expenditures, and such factors as attitudes towards education, manpower needs, the structure of the educational system, the responsibilities for education among different levels of government, per capita income, attitudes toward government, and the contribution of private education, all play a part. In general, when education expenditure is small in relation to GNP, the tendency will be for it to rise. When GNP per capita is high, the tendency is to spend a large proportion on education.

Educational Expenditures

It is useful to distinguish between expenditures on public and on private education. Public educational expenditure means expenditure from public funds for public education; where private educational expenditure means expenditure from private funds for private education. This breakdown of total expenditure by type of education obviously depends primarily on the number enrolled in public and private establishments. For this reason, expenditures should be compared with enrollments. Another explanatory factor generally enters the analysis; it has been found in practice that average unit costs are not identical in public and private education and that the quality of the service rendered must also be taken into consideration. In some countries, for example, private school teachers are on the average less highly qualified than those in the public schools while in others, private education is for the elite, very costly and greatly sought after. In Kenya both situations pertain; private primary schools are for the elite while private secondary education is usually of lower quality and for those who do not gain access to public secondary schools.

The breakdown of educational expenditures by level allows analysis to be carried further in a number of directions. The comparison between recurrent expenditures and enrollments by level of education shows that average recurrent unit costs vary widely between the different levels. Along this line of thought, it is very useful to distinguish between higher education, secondary education, primary and so forth. Unit costs vary widely for each of these categories.

The breakdown of expenditures by level presents no difficulties in principle in so far as the budgets of the financing sources are itemized by level.

Educational Enrollment

School enrollment is expected to grow in any dynamic situation where the population is continually increasing or the school system is progressively expanding. On the contrary, where the population growth or school expansion is arrested, in any temporary or local situation, the number of children attending school may remain unchanged or show signs of decrease. Thus the two factors which basically determine the size of future school-going population are:

1. The expected growth of population, or more precisely, of the school age population.

2. The anticipated expansion of the school system which may result from other developments.

In a country like Kenya where education is not compulsory by law, or where legal provisions for compulsory education are not fully carried out, the number of children attending school will depend, among other things, on the choice and convenience of parents, the availability of school facilities, the possibilities of employment for children and for adults with varying amounts of schooling, and the ability of parents not only to pay fees but to forego the services of their children while they attend school.

In many developing countries, Kenya being no exception, the proportion of girls attending school is consistently lower than the

proportion of boys. More emphasis on the education of girls would naturally increase the total number of children enrolled in school. Similarly, where school enrollment is markedly lower in rural areas than in urban areas, increased efforts directed toward rural schools could result in greatly increasing the total enrollment.

Two sources of wastage in school enrollment may be noted in view of their effects on the size of total enrollment. The first is the tendency, commonly found in almost all countries, for children to drop out of school before the completion of a prescribed course of study, say at the primary or secondary school level. If the drop-out rate could be reduced, that is, if the schools could keep more children in school for a longer time, or still better, if most or all of the children entering school at a given level were to remain until they complete the prescribed course at that level, the immediate effect would be to increase the total school enrollment, even if there were no increases in the school age population or in the number of children entering for the first time.

The second source of wastage is very common in practice, especially in Kenya, of keeping children in the same class or grade because they fail to be promoted at the end of the school year. This requirement for children to repeat their grades, usually justified in terms of maintaining standards, may actually be one of the causes of early school leaving. Hence a reduction in the number and proportion of repeaters could lead to a decrease in the drop out ratio and a corresponding increase in the total enrollment.

The Teaching Labor Force

One of the principle duties of a school administrator is to provide teachers, adequately trained and in sufficient numbers, to carry on the work of teaching a whole generation of boys and girls of school-going age. An expanding school system requires an ever-increasing number of adequately trained teachers. Even if there are no increases in total enrollment, a school system must recruit new teachers every year to replace its losses due to death, retirement, change of profession or other causes. New and better trained teachers must be found to take the place of underqualified members of the existing staff. If the present school system suffers from too many oversized classes due to shortage of teachers, any improvement of the situation would require still more teachers. The need for additional teachers may be urgent if double sessions of children are accommodated in the same school (for example, a morning and afternoon session, often taught by the same body of teachers). Any increase in pupil enrollment would call for more teachers, over and above all existing needs such as those just described.

Teacher costs play an important role in any educational system and are constantly under the influence of dynamic forces operating both inside and outside the educational system.

Virtually any change of educational policy affecting size, program, methods or staffing is likely to have an impact on teacher costs. Similarly, changes in supply-demand conditions for high level manpower, in the general structure of wages and salaries, or in the general movement of prices, are likely to have repercussions on teacher

costs and on the size and quality of supply. These realities warn against making the simplistic assumption that teacher costs per student and the average cost per teacher, will remain constant in coming years.

Examinations

It is worth recalling at the outset that the valuation of the unit costs of the service of education implicitly presupposes that the production of education can be quantified. Simplifying the question of defining the whole aims of the activity of education, we can distinguish two ways of quantifying the production of education: (a) by reference to the number of examination successes or academic performance and (b) by reference to attendance. Under examination successes, or, more generally, the number of pupils reaching a certain standard of education. Under (b) the practice is to consider either production capacity in terms of the number of teachers, classes or places, or attendance itself by reference to the number of pupils or the average daily attendance.

Any attempt to control the quality of education or to think in terms of improvement along a scale assumes the existence of indicators of quality. Applied to internal quality, these may be either direct (e.g., scores in examinations or standardized tests) or indirect (e.g., wastage or drop-out rates). Although the present examinations are inadequate, they could be improved as measures of the intellectual achievement of the more intangible results. Thus the CPE examination which marks the end of primary education, and both the EACE and EAACE,

which mark the end of secondary education could be improved to measure the intellectual achievement of both primary and secondary education.

III. SIGNIFICANCE OF THE STUDY

The purpose of this study was to bring into focus the critical factors that have contributed to the present trend in educational expenditures. Thus, it was proposed that this would help education policy-makers to give more control to these factors in their efforts to reverse the rising educational expenditures. The study went beyond the investigation of the relationship between the educational expenditures and the variables listed above. It also considered the relationship between the variables themselves. This revealed how much the change in one variable influenced the change in the other and how change in each variable and all variables together affected change in educational expenditures. This should enable the education policy-makers to predict the values of one variable from the knowledge of values of another variable or a combination of variables.

One major point of significance of this study was that it scientifically analyzed the degree of association between educational expenditures and the variables mentioned above. As early as 1972 educational observers in Kenya had realized that educational expenditures were rising at a rate that could not be sustained without severely limiting the funds available to other government sectors. It was noticed, for example, that according to the draft educational plan

of the 1974-78 Development Plan, which proposed only a modest expansion of educational programs, the projected government recurrent expenditure on education would have risen at about 16 percent a year for the years 1974-75 to 1978-79. This was compared with the projected government revenue which was to increase at about 7 percent a year during the same period. Thus, if both projections were to be approximately fulfilled, education's share of the recurrent government budget would have increased substantially, from about 30 percent in 1974-75 to over 40 percent in 1978-79 and expenditure by other ministries would have to be curtailed. These calculations were made before the announcement of the abolition of fees in standards I to IV of primary education, which of course further increased educational expenditure.

It was also realized that among the causes of these rising educational expenditures were school enrollments, improved teachers qualifications, teacher's salary revisions and equipment and other costs. The World Bank had already stated that Kenya spent a bigger proportion of its recurrent budget on education than any other country in the world. Calculations done by the Ministry of Education's planning unit were showing that if educational expenditure trends of the first decade of independence were allowed to continue, the share of education in the country's budget would have risen from 31 percent in 1974-75 to 53 percent in 1983-84 to much longer percentage. The share of other ministries would have diminished considerably.

Thus educators in Kenya had been aware of the rising educational expenditures; they had been aware of some of the variables that

influenced the rising expenditures but no attempt had been made to measure the strength of the association or the direction of rate of change. There had been no effort to investigate the relationship between these variables and the effect of these relationships on the rise of educational expenditures. This study was therefore significant in that it did not only analyze the rate of change through the growth rates and units costs, but in a scientific and comprehensive way it delved into the interrelationship's between the selected variables and the association between these variables and educational expenditures. It measured the strength and direction of this association and made it possible for policy-makers to predict the values of one variable from the knowledge of the values of another variable.

Educational Policies and the Total Educational Expenditures

To gain a more balanced view of the relationship between educational expenditures and the selected variables described above it was necessary to look at them in the context of the government policies under which these variables operated. Kenya government's Sessional Paper No. 10 on African socialism published in 1965, which spelled out the country's basic development philosophy stated that education was much more an economic than a social science. This paper added that education was the country's means for relieving the shortage of domestic skilled manpower and equalizing economic opportunities among all

citizens.[6] The Kenya Ministry of Education's annual summary of 1965 explained further that education's new role was to be considered less of a service to the individual and more as a service to the state through the production of engineers and teachers, doctors and agronomists, mechanics and secretaries and all other skilled people, then in short supply.[7] These two government pronouncements indicated that the basic principle that guided educational development in the 1960's was quantitative expansion aimed at satisfying the manpower requirements of the period.

The educational policies that were formulated were therefore geared towards increasing the educational enrollments especially in secondary and tertiary levels of education. This expansion inevitably led to the rise in the educational expenditures.

At primary educational level, quantitative expansion was encouraged by the following policies:

1. In 1961 the Competitive Entrance Examination was abolished and as a result more and more pupils passed through to Standard V. Before then the former African schools had a four year primary course after which pupils had to take a Competitive Entrance Examination to gain admission to the four year course in the intermediate schools.

2. This was followed by the establishment of a seven year primary education cycle in 1966 to replace the former eight-year cycle.

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[6] Kenya Government: Sessional Paper No. 10, African Socialism Government Printer, Nairobi, 1965, p. 40.

[7] Kenya, Ministry of Education. Annual Summary 1965, Nairobi: Government Printer, 1966, pp. 305-11.

3. In 1970 the Central government took over the administration and financing of primary education from the local authorities.

4. In 1971 and 1972 many areas in the North Eastern, Coast, Eastern and Rift Valley provinces were badly affected by drought. As a result of this drought, fees were remitted to pupils whose parents received famine relief.

5. In June 1973 the government abolished school fees in the poorer districts of Isiolo, Mandera, Wajir, Garissa, Tana River, Lamu, Turkana, West Pokot, Samburu and Marsabit. The government also gave remission of fees to 15 percent of primary school children of poorer parents in the other districts.

6. In December of the following year, the government abolished fees for Standards I to IV in the whole country and school fees in Standards V to VII were standardized at K Sh. 60 in the whole country.

The expansion of the primary education sector put pressure on the government to provide more secondary school places to cater for the increased number of primary school leavers. The government therefore embarked on a program of expansion of the secondary school sector. And since the government could not keep up with the demand for secondary school places, it encouraged the local communities to put up secondary schools on self-help basis which came to be called Harambee schools. The government also adopted a policy of taking over the responsibility for some of the Harambee schools throughout the country and thus increasing the number of government maintained schools. The incentive of expecting the government to take over Harambee schools contributed to

the spirit of building more and more Harambee schools by the community. In addition to the above expansion efforts, the government made the following policy decisions all of which had the effect of increasing the secondary school enrollment:

1. Before 1963, the secondary schools were established on a racial basis. There were schools for Europeans, Asians, Arabs, Africans, and Goans. In order to speed up integration in schools the government initiated the award of bursaries to African pupils to enable them to attend the "high cost" schools which had exclusively catered for non-African pupils before the attainment of independence.

2. In a further move to enable more African pupils to enter the more expensive secondary schools the government converted some of the "high cost" schools to maintained status, thereby reducing fees. The schools which were affected by this policy were Mary Hill, State House Road Girls, St. Teresa's Boys, St. Teresa's Girls and Parklands. The fees in Mary Hill, for example were reduced from K Sh. 2,400 to K Sh. 600 per year. Most of the other schools had their fees reduced from K Sh. 890 to K Sh. 414.

3. In 1966 tuition fees for all Form V and VI pupils (Africans) attending "low cost" schools were waived.

In higher education the most important policy decision was taken in 1970 when the former University of East Africa broke up and the University of Nairobi was established as a fully fledged independent degree giving institution. In 1972 Kenyatta University College was established as a constituent college of the University of Nairobi.

The expansion of both primary and secondary education meant that more teachers had to be employed. The following four policy-decisions concerning teachers contributed to the rise in educational expenditures.

1. The decision to promote teachers who passed academic examinations (KJSE, EACE, EAACE) meant that great numbers of teachers studied privately and passed these examinations and were promoted to higher grades with higher salaries.

2. Inservice training of the untrained teachers recruited to cope with the increased enrollments enables these teachers to gain professional qualifications and therefore earn higher salaries.

3. In July 1967, the Teachers Service Commission was established under an Act of Parliament and became the sole employer for all local teachers. Prior to July 1967, teachers in the country were under different employers. There were teachers employed by local authorities, by the central government and by various churches.

4. Since 1963, teachers have won a number of pay raises and together with the salary reviews of 1971 and 1975, teachers' salaries have improved substantially thereby contributing to the rise in educational expenditures.

Current Educational Policies

The current Development Plan 1974-78 spells out the following policies for the development of education during the Plan period:

1. The government reaffirms its commitment to the fundamental right of every child to have access to seven years of basic education. The government would continue to promote the movement towards universal

primary education during the Plan period and towards this end removed fees from Standards I to IV.

2. Whilst the government recognizes the right of every child to a basic education, it would adopt measures to ensure that access to the higher and more specialized levels was directly related to the nations economic needs. Moreover the recipients of the benefits of this education would be required to shoulder a greater part of its cost.

3. The government must carefully control the expansion of educational system at the secondary and tertiary levels.[8]

Thus by 1974 the government had realized that it had to hold back expansion of secondary and higher education, in order to cut down on educational expenditure. During the same year an Inter-Ministerial Working Party was formed between the Ministry of Finance and Planning and the Ministry of Education to study the financing of education in Kenya and recommend measures to be taken in order to control the rising educational expenditures. As a result of this study, the following policy decisions were made by the government for implementation during the current Plan period:

1. Primary Education

    1. The teaching establishment in all primary schools should have one teacher per class including the head of the school.
    2. the pupil/teacher ratio should be 40:1.
    3. primary school fees for Standards V to VII should continue through the Plan period.
    4. an equipment fee of K Sh. 10 per child per year should be collected by the District Education Boards (DEB's) to help the cost of school equipment.

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[8]Kenya Government: Development Plan 1974-1978, Part 1, Nairobi: Government Printer, 1974, p. 407.

2. Primary Teacher Education

1. Entry qualifications for the P 3 course should be KJSE and EACE for P2 and P1 courses.
2. a quota system should be established as follows:

P1:	P2:	P3
1:	2:	3

3. automatic promotion upon passing an examination was abolished with effect from January 1, 1976.
4. promotion of teachers would be on merit and dependent on existence of a vacancy in the next grade.
5. the inservice program should be reduced to 1000 candidates admitted every other year and sychronized with numbers in the training colleges and also be related to the quotas in (2) above.
6. all grades of teachers should be trained in the same college.

3. Secondary Education

1. Secondary education fees would be increased with effect from January 1, 1976 and be paid as follows:

	Day	Boarding
Form I-IV (annually) K Sh.	300	690
Form V and VI (annually K Sh.	400	850

2. a bursary system should be introduced to ensure that some of the qualified and needy students attend school without paying fees.
3. these bursaries should be awarded individually by Boards of Governors.
4. enrollments, admissions and opening of new classes at Forms I and V levels, as well as assistance to Harambee schools should be strictly controlled as indicated in the Development Plan, 1974-78.

4. Secondary Teacher Education

1. The emphasis would be placed on training of graduate teachers for science and mathematics and therefore, B. Ed. (Arts) has been cut back to around 150 students per year to be admitted for courses like English, Music and Kiswahili.
2. the non-graduate training courses at Kenyatta University College and Kenya Science Teachers College would continue throughout the Plan period.
3. the Mature Age courses for practising teachers who may wish to join the University would be restricted to science and mathematics.

4. The present staffing ratios of two graduates to one non-graduate (Arts) and one graduate to one non-graduate (science and mathematics) in Forms I-IV, and one and one-half graduates per class in Forms V and VI would continue throughout the Plan period.
5. It should be noted that the government cannot generally promise employment to every teacher who goes through these training programs and if any surplus teachers are produced for any reason they would be expected to seek employment in private and Harambee schools.

5. Tertiary Education

1. From 1975-76 academic year, the government would give enrollment guidelines to the University of Nairobi and Kenyatta University College, of intakes for different faculties based on high level manpower requirements in the country. This, of necessity, would mean that there would be a large number of qualified Form VI leavers who may not find their way to the University. The only alternative left to them would be to look for employment or other educational opportunities outside the University of Nairobi.
2. Enrollments at the University of Nairobi campus were reduced and would stand at 4,600 by 1978.
3. The Faculty of Education at the University of Nairobi would be phased out into Kenyatta University College beginning in 1976-77 academic year.
4. Capitation Grants to the University of Nairobi and Kenyatta University College would be held constant during the Plan period. The calculation rates used for 1975-76 estimates would continue being used throughout the Plan period.
5. Development funds for Nairobi and Kenyatta University College campuses would be restricted to the minimum requirements in the implementation of the enrollment as indicated in Development Plan 1974-78.
6. Entry requirements for both the University of Nairobi and Kenyatta University College would be reviewed to facilitate the implementation of the above decisions.
7. Tuition fees for the two polytechnics (Nairobi and Mombasa) would be restructured to ensure that industry and other Ministries make a greater contribution to the running of these institutions than they were making thereby inflating the recurrent expenditure of the Ministry of Education.
8. The block grant allocated in the Development Plan to assist Harambee Institutes of Technology would be used sorely to meet part of the recurrent expenditures and not for capital developments.

VI. ASSUMPTIONS

At the beginning of this study the following assumptions were made:

I. There has been a steady rise in educational expenditures during the period between 1963 to 1975.

II. This rise has been influenced by a multitude of economic-educational factors some of which were selected for this study.

III. The rise in educational expenditures has been influenced by the government's policy decisions made during the study period.

Research Questions

From the above assumptions the following research questions were posed:

1. Is there any linear relationship between educational expenditures and the selected variables?

2. If there is any relationship, what is its direction?

3. How strong is the degree of association between the educational expenditures and the selected variables?

4. Which of the selected variables is or are the best predictor(s) of educational expenditures?

V. METHODOLOGY

Professor F. Edding in his study, "Expenditure on Education: Statistics and Comments," observed that many people feel that

uncertainities of estimates of educational expenditure discredit all attempts to reach conclusions on such a basis. On the contrary, Professor Edding argued that even in the present state of statistics it was possible to learn much from expenditure accounts and comparisons of expenditures. He adds:

> . . . But there is no doubt that expenditure is a very good measure perhaps even the most comprehensive and simple measure of educational effort. It would be wrong to neglect it because of present shortcomings.[9]

This study was based on educational expenditure statistics, educational statistics, and economic statistics.

Sources of Data

The sources of raw data were mainly Kenya government official publications:

1. Ministry of Education annual reports 1963-74.
2. The Economic review of 1974-75 and 1974-76.
3. The 1975 Statistical Abstract.
4. The 1974-78 Government Development Plan.[10]

In addition to the above mentioned official publications, data for this study were collected from various sections of the Ministry of Education notably the Management Section, Examination Section, Planning Unit, Statistics Section and the Planning Section of the University of Nairobi.

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[9]F. Edding, "Expenditures on Education: Statistics and Comments," in EAG Robinson and J.E. Vaizey, The Economics of Education, New York: St. Martin's Press, 1966, p. 25.

[10]The President's Office: Kenya Government Printer: Nairobi.

Research Techniques

This study was organized in such a way that although its major thrust was analytical in the way the variables were treated, yet it still preserved a sense of historical sequence.

The first part of the analysis in the study established that the educational expenditures had been rising steadily during the period 1963 when Kenya attained independence to 1975, the terminal date of the data for this study. The study utilized two procedures to achieve this: the growth rates procedure and the unit costs procedure.

The growth rates of educational expenditures were compared with the growth rates of the 27 economic-educational variables to determine how much the educational expenditures growth rates had kept pace with the growth rates of these economic-educational variables. Growth rates were computed by dividing the differences between two consecutive years by the expenditures of the previous year and were expressed in percentages. For example, if educational expenditures in Kenya in 1967 were 673 million and in 1968 were 707 million, the growth over the year was 34 million. This could alternately be presented as growth rate of educational expenditures: $\frac{34 \text{ million}}{673 \text{ million}}$ or 5 percent. This was done for all variables and for the whole period.

An attempt was also made to compare the unit costs for the whole educational system and those of different levels. Unit cost per student is an appropriate measurement for many purposes, such as comparing costs as between different educational levels, institutions, geographic areas, or time periods. Unit cost per student is simply

the total expenditures in a given period either for the whole system, or more likely, for some particular part of it, divided by the number of students in the same educational category. Thus, for example, by properly breaking down overall expenditures, one can compute and compare unit costs (per student) as between primary and secondary schools, secondary general and secondary technical schools, institutions of different sizes, various university programs and so forth. Such differentials provide insights which are concealed by broader averages.

Unit costs are most often expressed in terms of per student enrolled, but for some purpose (when quantifying the production of education) it is useful to calculate the unit cost per student graduated. This procedure indicates one of the problems of quantifying the educational process in that it does not take account of the educational dropouts. Costs can also be related to a variety of other definable units such as teachers, schools and space areas. The important thing is to know at all times precisely what "unit" is being measured, and to remember that it is an average figure for a defined group which may not be precisely accurate for any one member of the group. In this study, apart from comparing the unit costs of the whole system with those of different levels, comparison was also made of unit costs between levels. Growth trends of unit costs between the years 1963 to 1975 were also analyzed.

The second part of the analysis was designed to focus on the strength and direction of association between the educational expenditures, which is the dependent variable, and the 27 economic-educational

variables which are the independent variables. The independent variables were grouped in five clusters: economic, educational expenditures by levels, educational enrollment, teaching labor force and the examinations. This analysis was done by means of bivariate correlation analysis: Pearson correlation, r and scattergrams. According to Norman H. Nie, Hadlai Hull, Jean G. Jenkins, Karin Steinbrenner and Dale H. Bent, the authors of "Statistical Package for Social Sciences (SPSS)," bivariate correlation provides a single number which summarizes the relationship between two variables. These correlation coefficients indicate the degree in which variation (or change) in one variable is related to variation (change) in another. A correlation coefficient not only summarizes the strength of the association between a pair of variables, but also provides an easy means for comparing the strength of relationship between one pair of variables and a different pair.[11]

Establishing a correlation between two variables can be useful in predicting values of one variable from the knowledge of values of another variable. The technique known as regression analysis is employed in making the predictions. This is done by drawing a regression line through a scattergram, and any point which does not fall exactly on the regression line is incompletely accounted for. The amount of "error" then, is the vertical distance from the point to the line. The

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[11]N.C. Nie, C.H. Hull, J.G. Jenkins, K. Steinbrenner, D.H. Bent, Statistical Package for Social Sciences, McGraw-Hill, 1975, p. 277.

distances are squared and added together. This summation of the squared distances is a measure of the total error involved when the regression line is used as the prediction of the location of the data points. A line which minimizes this sum of squared distances will serve as a better predictor than any other.

The Pearson product-moment correlation coefficient, symbolized by r, serves as a means of association indicating the strength of the linear relationship between the two variables. If the value of (r) is close to zero, it can be assumed that there is little or no linear relationship between the two variables. If the value of (r) approaches +1.0 or -1.0, it can be assumed that there is a strong linear relationship.

If the Pearson's (r) is squared, another statistic, denoted (r^2) is the result. It is a more easily interpreted measure of association when the concern is with the strength of relationship rather than the direction of the relationship. (It ranges from a minimum of 0, to a maximum of 1.0). Its usefulness derives from the fact that (r^2) is a measure of the proportion of variance in one variable "explained" by the other.

Stepwise multiple regression statistical technique was also used to analyze the relationship between educational expenditures and the selected variables in the study. Multiple regression as a statistical technique may be viewed either as a descriptive tool by which the linear dependence of one variable on the other is summarized and decomposed or as an inferential tool by which the relationships in

the population are evaluated from the examination of sample data. As a descriptive tool, multiple regression technique is used to (1) find the best linear prediction equation and to evaluate its prediction accuracy; (2) control for other confounding factors in order to evaluate the contribution of a specific variable or set of variables; and (3) to find structural relations and provide explanations for seemingly complex multivariate relationships.[12] Both the bivariate correlation analysis and the stepwise multiple regression analysis was done by means of "SPSS" system of computer programs.

VI. DELIMITATION

This study was limited to the public educational expenditures. Apart from the fact that a study of both the public and private educational expenditures would have been too broad to cover adequately, it was not possible to collect data which was reliable enough from the private sector of the Kenyan educational system. The selection of the other economic-educational variables in the study was done on the basis of the availability of data that lend themselves to the type of analysis that was envisaged. Relationship between total educational expenditures and the individual district or provincial educational expenditures would have been useful, but educational expenditures in Kenya are not

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[12] N.H. Nie, C.H. Hull, J.G. Jenkins, K. Steinbrenner, D.H. Bent, op. cit., p. 321.

broken down according to districts or provinces. Similarly the relationship between the rise in the total educational expenditures and the various educational policies would have been helpful but educational policies are not quantifiable in the same way that educational expenditures are quantified and were therefore difficult to reliably correlate with educational expenditures. The influence of inflation is another factor that has led to increased total educational expenditures but was not included in the 27 selected economic-educational variables owing to the problems of collecting reliable data on inflation. Since the economic data were based on 1964 constant prices, and the aim of the study was not to compare yearly additional resources put into education, it was not necessary to adjust the economic data for inflation. This study was also limited to the educational expenditures incurred through the Ministry of Education. Other Ministries which spend money on some educational activities in their special areas were not included in this study.

VII. LIMITATIONS

One of the limitations of this study was that total population figures which were critical to the rise of enrollments were not obtainable except for the two census years, 1962 and 1969. It was therefore not possible to relate the total popualtion growth to educational expenditures. Closely related to this was the lack of the data related to children of school-going age broken down according to the years covered by the study. This was, however, substituted for by the use of Standard I enrollments. Another limitation in the study was the missing data for technical education enrollments, CPE candidates, CPE passes,

Gross National Product and total government revenues. The SPSS program through which the data was handled, however, has an inbuilt procedure for dealing with missing data. Lastly, like in most data of this type and especially from developing countries, data in this study suffered from minor inaccuracies which in no way limited the methodology of the study.

VIII. DEFINITION OF THE TERMS USED

Productive activities refers to that part of human activity resulting in the creation of goods and services used to satisfy individual and community needs.[13]

Gross Domestic Product (GDP) refers to all the goods and services attributable to economic activities situated in the territory of a particular nation whether carried out by residents or by foreign workers, or whether the capital used is owned by foreigners.[14]

Gross National Product (GNP) refers to all the goods and services attributable to individuals whether nationals or foreigners who habitually reside in the territory of the country concerned and adjusted for incoming and outgoing earnings on capital.[15]

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[13] R. Poignant, "The Relation of Educational Plans to Economic and Social Planning," UNESCO: Paris, IIEP, p. 16.

[14] Ibid.

[15] Ibid.

Investment refers to all increases in the material wealth of a country and may concern both the formation of fixed capital and the formation of stock.[16]

Factor costs refers to a product evaluated at market prices and adjusted for indirect taxation and subsidies.[17]

Unit cost per student is the total expenditures in a given period either for the whole system or for some particular part of it, divided by the number of students in the same category.

Human capital refers to the investment embodied in individuals.[18]

Efficiency in production is defined as the achievement of a given output at minimum cost or as producing maximum output with a given expenditure.[19]

Current prices means prices prevailing during the year.

Constant prices means prices based on selected base year.

Cost of education refers to the real resources that are devoted to education and are therefore not available for allocation to any other economic activity.

National development encompasses economic, cultural, social and political development.[20]

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[16] Ibid.

[17] Ibid.

[18] Daniel C. Rogers and Hirsch S. Ruchlin, Economics and Education, New York: The Free Press, 1971, p. 102.

[19] Ibid., p. 111.

[20] F. Harbison, "Educational Planning and Human Resource Development," paper in Fundamentals of Educational Planning, Paris, UNESCO, 1967, p. 25.

Enrollment ratio is the relationship between the enrollment in Standard I and the estimated population aged six years.

Standards and Forms are used to mean grades. Standards are used in the primary system and Forms in the secondary system.

Pupil is used for all those in the school system, that is in the primary and secondary schools irrespective of age, while the term student is used for those attending universities, teachers colleges, technical colleges and similar institutions.

Government is used to refer to the government of Kenya at the central level.

Province is one of the seven divisions into which Kenya is divided.

District refers to a subdivision of the province.

Primary school includes Standard 1 to 7.

Secondary school encompasses Form 1 to 4 in most schools, while in some two more grade levels, Forms 5 and 6, are added.

East African Certificate of Education (EACE) refers to the examination which all students have to take on completion of secondary schooling. The results of this examination determine those who go on to Form 5 and 6.

East African Advanced Certificate of Education (EAACE) refers to the examination which all students take after the two additional years (Forms 5 and 6) in secondary school, which determines those who continue to the university.

Certificate of Primary Education (CPE) refers to an examination done by all the Standard 7 pupils. It is basically a selection examination for secondary schools.

Kenya Junior Secondary Examination (KJSE) refers to an examination done by Form II pupils in private and Harambee Secondary Schools. This examination serves as a terminal examination as well as a selection examination for Form III classes in aided schools.

Harambee Schools are self-help schools built by local communities since independence.

Aided (or maintained) schools. This refers to schools that are funded by government as opposed to privately owned schools that are mainly found in urban areas and Harambee Schools which are self-help schools mainly in rural areas.

OECD. Organization for Economic Cooperation and Development.

IIEP. International Institute for Educational Planning.

NCEOP. National Committee for Educational Objectives and Policies.

Currency exchange rates:

1 U.S. dollar = 8.42 shillings

2 Sterling Pound = 15.09 shillings

1 Kenya Pound (K£) = 20 shillings

Grading of Teachers:

P_3 = seven or eight years primary school education and two years in a teacher training college.

P_2 = two years in secondary school and two years in a teacher training college.

P_1 = four years in secondary school and two years in a teacher training college.

S_1 = four years in secondary school and three years in a teacher training college.

Graduate = six years in secondary school and three years in the university.

IX. ORGANIZATION OF THE STUDY

This study is divided into five chapters. Chapter I contains the problem and the discussion of the variables, the purpose of the study, assumptions, research questions, methodology, delimitations, limitations, definitions and the organization of the study.

Chapter II contains the review of related literature and the theoretical framework.

Chapter III contains the presentation of data while Chapter IV deals with data analysis and the research findings.

Chapter V contains the summary, conclusion and recommendations resulting from the study.

CHAPTER II

REVIEW OF RELATED LITERATURE

I. INTRODUCTION

In December 1975 the National Committee for Educational Objectives and Policies (NCEOP) started work, and during the year 1976 this committee visited all the provinces and met with individuals and organizations. The Committee which was chaired by the Permanent Secretary in the Ministry of Education was set up to redefine Kenya's educational policies and objectives and to recommend measures which should be taken in order to achieve such objectives. Specifically the terms of reference of the NCEOP required the National Committee to make recommendations which were consistent with the financial constraint that, government recurrent expenditure on education was not to increase faster than government recurrent expenditure as a whole. In other words, education's share of the government's recurrent budget then at about 30 percent was not to increase.

This Committee's Background Paper No. 1 on "Financing of Education" reviewed the findings of the Inter-Ministerial Working Party on Financing of Education, set up in 1974 between the Ministry of Education and the Ministry of Finance and Planning, which identified the following causes of rapidly rising educational expenditures.[1]

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[1]NCEOP, "Background Paper No. 1: Financing of Education, 1976," mimeographed, pp. 2-5.

1. School enrollments
2. Improved teacher's qualifications
3. Incremental creep; teacher's annual salary increments
4. Teacher's salary revisions and
5. Equipment and other costs

In a paper entitled "The Financial Crisis in Kenyan Education: Some Perspectives on Policy," Jeffrey Fine described the financial crisis in the Kenyan education as a situation in which a sizable and growing percentage of government recurrent expenditure was devoted to the educational budget.[2] Specifically this meant that:

1. Between 31 and 35 percent of the annual recurrent budget was allocated to education.

2. The educational budget was growing at the rate of 15 to 20 percent whereas the rate of growth of the total government expenditure was about 10 percent per annum.

Fine warned that if the rate of growth of the education budget continued to rise unchecked, it would have been only a matter of time before it absorbed the government's total expenditure. He observed that as education was organized on a labor intensive basis, teachers' salaries consumed the largest share of the growing budget. Teachers' salaries accounted for 90 percent of the government's expenditure in primary education, 65 to 70 percent in secondary education and 60 percent in university education.

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[2]Jeffrey Fine, "The Financial Crisis in Kenyan Education: Some Perspectives on Policy," University of Nairobi Bureau of Educational Research, Staff Seminar Series 1974-1975, unpublished, pp. 4-5.

Professor F. Edding in his study "Expenditures on Education: Statistics and Comments," points out that in order to gain more insight into the development of educational expenditure, it is useful to quantify the various factors influencing it over a long period. Edding refers to the book by R.A. Freeman on school finance in the United States. Freeman's analysis shows that in the period 1929 to 1955, total current expenditure of public schools in the USA rose from $1.8 billion to $8.2 billion. The increase of $6.3 billion was explained as follows:

	$Million	Percent
Enrollment Increase	393	6.2
Reduction of pupil/teacher ratio	338	5.3
Increase in teachers' real salaries	2298	36.8
Additional instructional services	255	4.0
Additional auxiliary services	644	10.2
Increase in fixed charges (Mainly retirement)	398	6.3
Increase in plant operation and maintenance costs	484	7.6
Increase of administration costs	229	3.6
Price inflation	1309	20.6
Total Increase	6349	100.0 [3]

Looking specifically to higher education, Seymour Harris in his paper "Public Expenditures on Education" argues that the proportion of the real resources of a nation that goes into higher education depends on the following factors:[4]

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[3] Professor F. Edding, "Expenditures on Education: Statistics and Comments," in E.A.C. Robinson and J.E. Vaizey, The Economics of Education, New York: St. Martin's Press, 1966, p. 47.

[4] Seymour Harris, "Public Expenditures on Education," in OECD Financing of Education for Economic Growth, Paris: OECD,1966, p. 108.

1. the income of the nation especially the per capita income.

2. the amount spent on the lower levels of education such as primary and secondary.

3. the proportion of resources spent on other services and goods, and

4. the cost per student, productivity and the quality of the education provided will influence these costs.

In every country which consciously promotes its own development, expenditure for education and training tends to increase. The purpose of this chapter was to review the previous related literature and through this review to identify the trends that had emerged in the area of educational expenditures. This review also helped in limiting and defining the research problems.

II. EDUCATIONAL EXPENDITURES AND THE ECONOMY

As early as the 1950's, it was recognized that education could--and did--contribute directly and indirectly to economic growth. This led to detailed inquiries being conducted into the volume and distribution of expenditure on education. Researchers sought to answer questions such as: how much was spent on education and how was this total distributed between different levels and types of education? What were the main trends in expenditure and how far could increases in expenditure be explained by price changes? What was the average cost per pupil at each stage of education, and how far did costs vary according to size, age of the pupil or subject studied?

The question "How much was spent on education?" formed the basis for Vaizey's study in 1958 which was updated in 1968.[5] The purpose of Vaizey's research was to examine trends in expenditure on education in the United Kingdom (UK) since 1920, and to calculate how much of the increase in expenditure was due to price changes and how much was a real increase in the resources devoted to education. He compared total educational expenditure with national income, in order to see what proportion of the nation's total resources were allocated to education and he examined the distribution of expenditure, to see how these resources were distributed between the main levels of education.

The most striking result of the study was the massive increase in education expenditure, from $65 million in 1920 to $410 million in 1955 and $1115 million in 1965. These figures were expressed in terms of current prices, that is the price-level prevailing in 1920, 1955 or 1965. Obviously, a major part of the increase in expenditure was due to prices. In order to remove the effects of price changes, Vaizey calculated educational expenditures in real terms; that is to say he calculated price indices for each component of expenditure (teachers, buildings, etc.) and used these to deflate the expenditure expressed in current prices, to give expenditure in terms of constant price level. All educational expenditure was expressed in terms of the prices

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[5] J. Vaizey and J. Sheehan, "Resources for Education," London: George Allen and Unwin, 1968. In Maureen Woodhall Economic Aspects of Education: A Review of Research in Britain, NFER Publishing Company LTD, 1972, pp. 19-20.

prevailing in 1948, and in these constant price terms, there was an increase in real expenditure on public education from $100 million in 1920 to $451 million in 1965.

When this increase in expenditure was compared with changes in the school population, Vaizey showed that there had been a rise in real expenditure per child of about one quarter above the level of 1938. This meant that there had been a dramatic increase in the share of national resources devoted to education. Vaizey and Sheehan calculated that as a proportion of Gross National Product (GNP) educational expenditure rose from 1.2 percent in 1920 to over 5 percent in 1965.

Daniel Blot and Michel Debeauvais in their study of educational expenditure in developing areas aimed at analyzing the statistical link between the public expenditures for education and Gross Domestic Product (GDP), both in total and in per capita values, through the use of regression analysis based on data for 104 countries in 1961.[6] The variables used were:

1. Gross Domestic Product in millions of U.S. dollars
2. Public expenditures for education in millions of U.S. dollars
3. Population in millions of inhabitants.

The study was later enlarged to calculate equations not only for the total set of countries but for homogeneous groups of countries--

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[6]Daniel Blot and Michel Debeauvais, "Educational Expenditures in Developing Areas: Some Statistical Aspects," in OECD Financing of Education for Economic Growth, Paris: OECD, 1966, pp. 73-80.

based on predetermined classification criteria. The first grouping was based on the level of GDP per inhabitant, using the classifications established by the United Nation's Organization (UNO) in its report on the social situation in the world, UN 1961 (Class I: $1000 and more; Class II $575 to $999; Class III: $350 to $574; Class IV $200 to $349; Class V $100 to $199; Class VI less than $100).

In each method of grouping and for each of the groups, the correlation coefficients were greater than 0.90. Forecasts based on these results would, of necessity, yield a rate of expansion in the level of educational expenditures, which was approximately equal to that of GDP. This conclusion appears to contradict the world development of educational expenditures over the past few years. Such expenditures have in general increased at a considerably faster rate than has GNP.

Simple regression based on per capita values was applied to the entire set and the correlation obtained for per capita values were somewhat smaller than those based on total values. When multiple regression was applied for the entire set of countries and the analysis was made using the method of least squares the researchers concluded that the correlations based on total values were necessarily higher than those based on per capita values. The results obtained through simple regression based on per capita values were practically identical with those obtained through the multiple regression.

The aim of the essay by Seymour Harris on public expenditures on education cited earlier was to analyze available statistical material

on education.[7] Harris states that a safe generalization is that the higher the per capita income in a country, the larger its expenditure on education in relation to GNP. To provide additional confirmation of this statement Harris quoted the following figures:

Expenditures on Public Schools, USA As a Percentage of GNP

1929-30	2.43
1958-59	3.05
1969-70 (estimate)	3.57

Expenditures on public schools in the United States was more than 70 times higher in 1960 than in 1900, while national income was less than 20 times higher. The educational and general income in institutions of higher learning was 178 times higher in 1960 than in 1870, and GNP was 53 times higher. Harris quoted Professor Edding who found a high correlation between educational expenditure and income:

> In order to verify the close correlation between education expenditures and national income (net national income at factor cost) eighteen countries were selected, in which the definition of school expenditure was not too strongly divergent. Whether their national income or their education expenditure is taken as a measure, these countries range, in almost the same order, from India spending around $0.50 per capita on education to the United States spending much more than a hundred times this amount. The correlation coefficient is .992 in 1954 and .984 in 1950 and .949 for twelve countries in 1938.[8]

Professor F. Edding in his study referred to earlier, states that statistics of educational expenditures could be used to answer questions such as these:

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[7] Seymour Harris, op. cit., pp. 103-111.

[8] Ibid., p. 111.

1. How much expenditure on education, as compared with expenditure on other sectors, is used to achieve certain targets of economic growth?
2. How should a given volume of resources available for education be allocated within education sectors?
3. What resources, drawn from which sectors and regional units of an economy, and collected in what ways, should be used to finance education?
4. What are the secondary, tertiary and so on, effects of educational expenditure?[9]

He contends that it is worthwhile to study in a descriptive way the factors influencing educational expenditure and its relation to national aggregates in a number of countries. He goes on to argue that it is useful to analyze the proportion of expenditure by level of school and of government in different countries and in different phases of economic development.

Since in most countries education is financed mainly from public sources, the question arises whether there is similar growth of the share of education expenditure in relation to total public outlay. Edding explains that in the expansion of public spending in the highly developed countries, public expenditure on education has generally not enjoyed an increasing share. In a number of highly developed countries, the percentage of educational expenditure in the total public outlays was higher before the First World War, than in recent years. Other public responsibilities, in particular armaments and social policy, have secured rapidly rising shares and caused the share of educational expenditure to diminish. In Japan the share has in recent years been

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[9]F. Edding, op. cit., p. 24.

more than double what it was around 1910. Whereas, educational expenditures in the highly developed countries amounts to between 10 and 15 percent of total public expenditure, Japan was spending in the 1950's between 20 and 25 percent of total public outlay on education.

Edding observes that Japan is, in this respect, representative of many of the developing countries. If the public sector is small, then inevitably a high percentage of it has to go to education to reach the ratio of education to national income which these countries have made their objective.

In his paper "Education and National Economic Development in Kenya" Dr. Michael P. Todaro explored the relationship between quantitative and qualitative education expansion and "development" in terms of four basic issues:

1. How does education in Kenya influence the rate, structure and character of its economic growth? Conversely, how does the rate, the structure and character of Kenyan economic growth influence the nature of the educational system?
2. Does education in general and the structure of the Kenyan educational system in particular contribute to or retard the growth of domestic inequity and poverty?
3. What is the relationship between education and unemployment in Kenya? Are rising levels of the "educated unemployed" a temporary or chronic phenomenon?
4. Does the contemporary Kenyan formal educational system tend to promote or retard agricultural and rural development?[10]

Todaro argues that the early claims made on behalf of the unfettered quantitative expansion of educational opportunities--that it would accelerate economic growth; that it would raise level of living--

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[10]Michael P. Todaro, "Education and National Economic Development in Kenya," NCEOP, Task Force No. I, Nairobi, April 1976, mimeographed, pp. 2-22.

especially for the poor, that it would generate widespread and equal employment opportunities for all; that it would acculturate diverse ethnic or tribal groups; and that it would encourage "modern" attitudes have been shown to be greatly exaggerated and in many instances simply false. He explains that education systems in developing countries absorb the greatest share of recurrent government expenditures (in Kenya this figure is the highest in the world). Todaro concludes that where politically feasible, educational budgets in Kenya should grow very much more slowly than in the past to permit more revenue to be used for the creation of rural and urban employment opportunities. He recommends that a larger share of educational budget should be allocated to the primary, as opposed to secondary and higher education, as a basis for self-education and rural work-related learning experiences.

Inflation is another factor that has led to the rise of educational expenditures since 1973. A study by the Planning Unit of the Ministry of Education, "Financing Education: Inflation and the Quality of Education,"[11] states that the rising costs of paper have greatly limited the ability of the Ministry of Education's grant to meet the demands of the schools. This study looked at the cost of paper and textbooks in relation to the Ministry of Education's school equipment grant and concluded that inflation had rendered the grant then calculated

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[11]Planning Unit Ministry of Education,"Financing of Education: Inflation and Quality of Education," Nairobi, February, 1974, mimeographed, pp. 1-6.

at the rate of £ 1 per pupil inadequate and therefore, unable to maintain the then quality of education let alone raising it.

To appreciate fully the impact of inflation to the educational expenditure one needs to look at the memorandum presented to the Ministry of Education by the Kenya Secondary School Heads Association dated June 3, 1974.[12] This memorandum stated:

> That the Ministry of Education accepts the fact that costs of school supplies have gone up to the extent that the grants now given are totally inadequate to keep standards both of learning and living (of pupils) at the levels where they had been, let alone trying to raise them. And then realizing this, the Ministry should:
>
> 1. Either review the entire grants to schools with a view to increasing them to meet adequately the current prices; or
>
> 2. Increase school fees as had been proposed in 1973 but to slightly higher figures.
>
> 3. If neither grants nor fees can be increased then we regrettably suggest that the school year be shortened from the then 39 to 27 weeks, because most schools can manage to keep going for only 27 weeks on current grants and fees.
>
> 4. In the event that none of the above alternatives are adopted and the Ministry of Education cannot do anything else to help the schools, the heads may be allowed to close schools as and when funds completely run out.
>
> 5. We suggest that the Ministry of Education and all those concerned face this problem frankly and squarely rather than letting schools operate on deficits or conniving haphazard ways in which some schools are raising fees and calling them all sorts of names in attempts to solve this country-wide problem.

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[12]Kenya Secondary Heads Association: Memorandum presented to the Ministry of Education, Nairobi, June 3, 1974, mimeographed, p. 1.

III. EDUCATIONAL EXPENDITURES AND LEVELS OF EDUCATION

The cost increasing influence of enrollment expansion is enhanced by the shift of enrollment to higher levels. Teachers, other services, materials and buildings are as a rule, more costly in secondary schools and in higher education than at the primary level. Costs per student in primary schools are often no more than a fraction of what they are at higher levels. Even though total enrollments may not increase, any shift to the higher levels with the same number of students increases total expenditure.

The paper "Entry to Higher Education in Kenya" points out that the yearly recurrent cost of an average higher education student is approximately 100 times that of an average primary school pupil.[13] This single fact ought to ensure the importance of carefully tailoring the provision of higher education to what can be afforded. To put it bluntly, the government can finance 100 primary pupils or a single higher education student.

The share of higher education in the Ministry of Education's recurrent budget for 1974-78 is projected at 25 percent. Thus, on approximately 6000 students is to be devoted a quarter of all recurrent expenditure, whereas on more than 3 million pupils and students in all other sections the nation intends to spend three quarters of the total recurrent budget. The paper argues that there is clearly a need to hold

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[13]Planning Unit, "Entry to Higher Education in Kenya," Nairobi, May 7, 1974, mimeographed, p. 1.

down higher education expenditure and reduce the proportion allocated to higher education. The paper noted two trends which were almost certain to increase the absolute and proportional amount earmarked for higher education beyond the Plan's specifications. First, the University enrollment for 1973-74 exceeded the plan target 1975-76. Secondly, the number of qualified applicants was still increasing.

In another paper, "Control of Education Expenditure," the Planning Unit looked at the expenditures in the three main levels of education: primary, secondary and higher education.[14] The paper noted that the draft Recurrent Budget 1974-75 submitted by the Ministry of Education requested an increase of 13,057,000 or 33.3 percent from the previous year.

Expenditure on primary education accounted for 50 percent of the education budget. The percentages were as follows:

Approved Expenditure 1973-74	Draft Estimates 1974-75	Plan Projections 1974-78
58%	52%	53%

The paper observed that the trend that was evident in primary education-rising of primary teacher's salary bill, was beginning to appear in secondary education. This was due to the increasing demand for secondary teachers caused by the expanded program in the aided schools, assistance to the unaided sector and the demand for teachers by unaided schools.

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[14] Planning Unit, "Control of Education Expenditure," Nairobi, February, 1974, mimeographed, pp. 1-6.

On higher education the paper noted the following two harmful factors in higher education:

1. The University's actual enrollments bear no relationship to the enrollment targets set down by the government. Actual enrollments in 1974 exceeded the Plan's projected targets for 1976. Each student in excess of requirements cost approximately K£ 1000 per annum. The Ministry of Education's draft estimates 1974-75 requested K£ 1 million in excess of the Plan's ceiling. The increase in expenditure was of the following order:

	1973-74 to 1974-75
Kenyatta University College	16.6%
University of Nairobi	18.8%

2. The University's expansion is primarily on the arts side. It is not producing the necessary manpower from the science based faculties because of the shortage of Mathematics/Science graduates at the EAACE level. Continuation of the above trend would lead to a situation in which:

1. University expenditure would increase by 15 to 20 percent per annum.
2. There will be an excess of Arts graduates.
3. Severe manpower shortages will continue to exist in crucial sectors of the economy.

The NCEOP's Task Force No. I, Background Paper on "The Allocation of Scarce Resources Within Education and Training" looked at the recurrent costs per student per annum for the formal education and

produced the following figures:[15]

Per Capita Recurrent Costs of Formal Education K£

	Per Annum	Per Graduation
Primary (rural areas)	16	130
Secondary Aided Form 4	80	450
Secondary Technical Form 4	150	750
Secondary Aided Form 5	120	700
Primary Teacher Education	230	---
University Education (3 years)	1500	5500

This paper then posed three very pertinent questions:

1. Is the allocation of finance between primary education and university education as it should be? Are staffing and other standards at university level too generous at a time when rural primary schools lack pencils?

2. Do costs involved in secondary technical education reinforce one's reservations about the advisability of expanding this sector?

3. How do costs per student relate to (1) benefits to the individual and (2) benefits to the nation accruing from education?

John Chesswass and Jacques Hallak made a study of the "Behavior of Non-Teacher Recurring Expenditures" in secondary schools in Uganda during the period 1965 to 1967. The purposes of the study were:

1. to investigate the behavior of itemized expenditure controlled by the authorities of individual schools;
2. to compare and contrast such behavior between schools of different structures;
3. to attempt to relate unit expenditures on various items to explanatory variables; and
4. to assess the value of such analysis to educational planning purposes.[16]

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[15]NCEOP, Task Force I: Background Paper "Allocation of Scarce Resources Within Education and Training," mimeographed, 1976, pp. 8-9.

[16]John Chesswass and Jacques Hallak, "Uganda: Behavior of Non-Teacher Recurring Expenditures," Educational Cost Analysis in Action 1 IIEP, Paris, 1972, pp. 69-89.

The choice of the schools to be covered in the sample was dictated by practical consideration. The only schools which could be considered were those for which a set of accounts were available for the whole of the three years 1965-67 in a form lending itself to the type of analysis that was desired. A representative sample of 11 schools was chosen. For the purpose of the study the schools in the sample were given a simple code which helped the reader to identify the major factors that might influence non-teacher recurrent costs.

This study revealed that the expenditure on non-teaching staff and tuition was the largest items in day schools, whereas in boarding schools the boarding element was by far the most important. In both categories, expenditure on transport and traveling constituted a negligible proportion of total recurrent expenditure. A detailed study of the figures from the sample schools showed that unit expenditures were influenced by two main factors:

1. The influence of income on expenditure: from the analysis of the sample schools it was possible to show that the higher the income per student the higher the expenditure.

2. The effect of personalities on expenditure patterns: heads of schools at different schools had different priorities, and that within any particular income bracket different heads of schools spent their income in different ways.

Secondary school expenditures were also investigated by J. Proust in his study of "Costs of Public Secondary Education: Analysis

of a Governmental Survey" in Morocco.[17] The purpose of this study was to produce accurate information on the total cost per pupil according to the size of the school and the utilization of the science teaching equipment in the schools.

Twenty-three schools were selected for the study with an enrollment of 29,835 pupils out of the total of 228,837 secondary school pupils in Morocco. The school construction bureau listed the different stages of construction with the cost commitments and the number of the contracts awarded. On the basis of this information, the accounting service looked up the vouchers, thus determining the expenditures actually effected. After determining these components of total cost, it was necessary to classify each item of school expenditure in terms of three cost components; building costs and operating costs. The results of this study were as follows:

1. The pupil/teacher ratio was on average equivalent to 20.5 and there was little dispersion around this average except for a few cases.

2. The average salary per teacher varied considerably from school to school; the ratio between the lower and the higher figure was 1:2.

3. The average salary was generally higher in the complete-cycle schools than in the first-cycle schools and also higher in urban schools than rural schools.

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[17] J. Proust, "Costs of Public Secondary Education: Analysis of a Governmental Survey," Educational Cost Analysis in Action, IIEP, Paris, 1972, pp. 256-259.

The per-pupil salary cost varied from one school to another, the ratio between per pupil cost and a number of explanatory variables was analyzed by calculating a regression equation and correlation coefficients. The variables considered were per pupil cost, teacher/pupil ratio, average salary per teacher and proportion of expatriates. The total coefficient was about 0.96.

IV. EDUCATIONAL EXPENDITURES AND THE TEACHING LABOR FORCE

In a paper prepared for the Working Party on Financing Education entitled "Primary School Teachers' Salaries" the Planning Unit of the Ministry of Education observed that more than half of the recurrent education budget in Kenya was spent on primary education.[18] Ninety percent of this primary education expenditure was for teachers' salaries and related payments. In other words, the paper added, primary school teachers' salaries consume half of all expenditures on education. The paper identified four main reasons for this fast rate of increase in teachers' salaries.

1. Primary school enrollments have increased rapidly and so more teachers have been trained and employed.

2. The qualifications of primary school teachers have been improving rapidly. Hence they command a higher salary than formally.

3. There have been periodic salary and "fringe benefits" increases for teachers.

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[18] Planning Unit, "Primary School Teachers' Salaries," Nairobi, August 20, 1974, mimeographed, p. 1.

4. Qualified teachers receive a salary increase after each year of service.

The paper also made three observations regarding the teachers' qualifications and salaries.

1. Ten years before 1974 the primary teaching force consisted almost entirely of P3 teachers.

2. In 1974 almost all entrants to primary teachers colleges had passed EACE and were, therefore, to become P1 teachers. Large numbers of serving teachers were promoted from P3 to P2 and from P2 to P1 as a result of passing KJSE and EACE.

3. Teachers' salaries are determined by educational qualifications. A P1 teacher typically earned about K£ 300 more than a P3 teacher, and at the top of the scale the difference was about K£ 400.

Looking at the problem of teacher's salaries, Coombs and Hallak had this to say:

> A decision made to upgrade large numbers of poorly qualified teachers to higher-paying categories through in-service training without prior study of the cost consequences can put an educational system on the road to bankruptcy.[19]

The Planning Unit paper also warned that the consequence of the situation outlined above was a rate of increase of the salary bill for primary education, which would not possibly be maintained. Given the numbers of P1 teachers that were "in the pipeline" and in view of the agreed new salaries, it was to be several years before the alarming

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[19] P.H. Coombs and J. Hallak, op. cit., p. x.

trend could be reversed. Shortly afterwards the Unit produced another paper "Primary School Teachers: Prospects and Alternatives" which made the following observations:

1. Given (a) present primary school enrollments,
   (b) the likely growth of enrollments,
   (c) numbers of places at teachers colleges, and plans for expansion,
   (d) the continuation of the present two year training course,
   then until 1980, 40 to 50 percent of primary school teachers were to be unqualified.

2. Even though so many teachers were to be unqualified, primary education costs were to rise considerably faster than government revenue if the 1974 salary structures were to be maintained.

3. If nothing was done to check that, then either the government programs (health service, development of agriculture, roads, police, etc.) would have to be cut to make more money available for education or the government would have to create more money to pay its bills.

4. If the government creates more money to pay its bills, this would cause rapid inflation which would reduce the real value of teachers' salaries.[20]

In another study John Chesswass analyzed the factors influencing change in basic teachers' salaries.[21] The main objective of the study was to provide a reliable methodology for projecting teachers' salaries,

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[20]Planning Unit, "Primary School Teachers: Prospects and Alternatives," Nairobi, August 20, 1974, mimeographed, p. 1.

[21]John Chesswass, "Factors Influencing Change in Teachers' Basic Salaries," In Educational Cost Analysis in Action I, IIEP, Paris, 1972, p. 39.

the largest element of educational expenditure. In the main, Chesswass explained, the evolution of teachers' salaries was influenced by economic factors such as changes in the general level of wages and prices, as well as by endogenous educational variables which include planned changes in the overall methods of supplying teachers. While both factors were fundamental to the computation of teachers' salaries, the study confined itself to the operative factors within the educational system in order to isolate their influence on teachers' salaries and also to emphasize to planners how such factors could be handled in projecting the total teacher's bill.

The purpose of the study was to show how the total of the basic salaries of teachers was influenced by the compounding of two factors:

1. Changes over the years in the numbers and proportions of teachers belonging to each category of teachers.

2. The changing proportions within each category at each point of the scale particularly as influenced by the age structure of the teaching force.

It was further demonstrated how these two factors are themselves influenced by a combination of three others:

1. The development of the numbers of classes at each grade in the educational sector concerned allied with;

2. The method of staffing classes at various grades with teachers of different categories; and

3. The methods and rate of supply of trained teachers in particular preservice training versus upgrading of serving teachers as a

means of supplying teachers of higher qualifications.

John Chesswass used Tanzania for his case study and the calculations made for neighboring Uganda in 1964 were used for the basis of assumed tables of survival indices.

The principle underlying the survival index is that in each year, the graduation of a group of teachers of the same sex, a certain percentage of them are still in service. The numbers of each annual graduation group who were still in service in 1964 were counted and related to the total number who originally graduated adjusted to take into account the particular circumstances of Uganda's upgrading system.

The steps of the methodology were as follows:

1. Calculation of the structure of stock of each category of teachers by point of salary scale in 1967.

2. Calculation of the total bill for basic salaries of teachers in public primary schools.

3. Projection of the stocks of teachers in 1969.

4. Calculation of the total bill for basic salaries of teachers of public primary schools 1969.

5. Projection of stocks of teachers 1979.

6. Calculation of the total bill 1979.

Chesswass concluded that in costing the bill for projections of teachers consideration should be given to:

1. the intake of pupils into the initial grade of a cycle.

2. the size of classes or other kinds of groups of pupils.

3. the division of teachers into categories and the differentials between the salary scales of each category.

4. the role of the teacher and staffing policies especially the identification of particular categories of teachers with specific grades of the educational system.

5. the policies on the methods of financing and supply of teachers, especially pre-service training versus inservice training and regrading.

6. the salary scale of teachers, numbers of incremental steps and the percentage increase in salary which each step represents, and policies of entry to and movement up the scales.

The university education structure was studied and reported by the Task Force 3 of NCEOP in their background paper "University Education in Kenya: Statistics and Analysis."[22] This paper observed that the University Grants Committee (UGC) Report for the East African Universities (Nairobi, Makerere and Dar-es-salam) 1967, recommended approximately nine hours a week of teaching for academic staff in the common faculties. The UGC recommended the following student/staff ratios for faculties of about 100 or more students:

1. Arts, Social Sciences, Mathematics: 11.4 to 15.0
2. Botany and Zoology: 13.3 to 16.6
3. Chemistry and Physics: 10.0 to 13.3

The overall ratio recommended for Nairobi in 1969-70 was 10.4.

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[22]NCEOP, Task Force No. 3: Background Paper, "University Education in Kenya: Statistics and Analysis," Nairobi, mimeographed, 1976, pp. 2-8.

The Report of the University Grants Committee for 1972 to 1975 (University of Nairobi only) appears to have been much more generous than the earlier UGC Report. It recommended that post-graduate students should be included in the calculations of student/staff ratios and should be given double-weighting. On the other hand, the report recommended that the part-time students should be omitted from the calculations. Its recommended ratios for 1974-75 were as follows:

1.	Arts, Commerce, Education, Law and Science	10.0
2.	Architecture and Engineering	11.7
3.	Agriculture and Veterinary Medicine	5.1
4.	Medicine	3.6
5.	All Faculties	7.6

In comparison with the recommendations of the 1967 UGC Report, the University of Nairobi was seriously overstaffed in 1975-76. Using the ratio of 10.4 recommended for Nairobi for 1969-70, the University was overstaffed by 225 staff members, or 31 percent. Since students enrollments were expected to fall in 1976-77 (by about 150) and established posts were to increase (by 17) the degree of overestablishment (by the standards of the 1967 UGC Report) was to increase. However, the paper added that considerable numbers of established posts were not filled in 1975-76.

By the standards of the later (1971-74) University Grants Committee Report, the University was overestablished by about 20 academic posts (though since considerable numbers of established posts were not filled, there was no overall over-staffing in practice).

The paper noted that the average salary levels were as follows:

	1975-76	1976-77
1. Academic staff	Kčs 2450	3000
2. Senior staff	975	1180
3. Auxilliary staff	330	410

The estimates indicated a 20 percent increase in recurrent expenditure between 1975-76 and 1976-77. Numbers of students remained roughly the same and the increase could only be attributed mainly to inflation.

V. EDUCATIONAL EXPENDITURES AND EDUCATIONAL ENROLLMENTS

Seymour Harris pointed out that in general, the increases in expenditure on education are greater as the pouplation increases and as the student population or enrollment ratio increases.[23] After an examination of the relationship in 1958 between the expenditure and enrollment, by age groups, he noted that the ratio of expenditure to enrollment tends to rise for higher age groups.

The relationship between expenditures and enrollment was also supported by the study by Blot and Debeauvais in which they stated that the larger the rise in students in relation to population and in teachers in relation to students, the greater will be the increase in educational expenditure.[24] Interest in raising the numbers of teachers

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[23] Seymour Harris, op. cit., p. 104.

[24] Daniel Blot and Mchel Debeauvais, op. cit., p. 130.

centered in the 5 to 14 age group where the increase in the number of teachers was estimated to be two-thirds higher than that in the number of students as compared to 5 percent for the 15 to 19 years age group and 3 percent for the 20 to 24 years age group. Approximately one-third of the rise in expenditures corresponded to the increase in the number of students, the increase which exceeded that of population by 55 percent.

The Planning Unit's paper "Educational Enrollments in Kenya" argued that the growth of primary school enrollment was largely demand-determined and dependent from year to year on the ability of local communities to provide physical facilities and parents to pay fees.[25] Enrollments in Standard I (the first year of primary school) have increased at the following rates in recent years:

1968 over 1967	9.6 percent
1969 over 1968	1.0 percent
1970 over 1969	17.0 percent
1971 over 1970	6.8 percent
1972 over 1971	10.0 percent

Thus, the growth rate has been erratic. It also varies greatly from district to district with an average of about 10 percent and an apparent enrollment ratio of 0.7 in 1972.

After the abolition of fees the Planning Unit did another paper "Primary School Enrollments 1974" which updated the previous one.[26]

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[25]Planning Unit, "Educational Enrollments in Kenya," Nairobi, September 14, 1973, mimeographed, pp. 1-3.

[26]Planning Unit, "Primary School Enrollments 1974," Nairobi, June 19, 1974, mimeographed, pp. 2-5.

This paper noted that at first sight it appeared that the abolition of fees in Standards I to IV had ensured that virtually all children of primary school age were at school. Projections from the 1969 Population Census of the pouplation aged 6 to 12 years indicated that in 1974 there should have been about 2,400,000 children of primary school age in Kenya. Yet, the primary school enrollment showed that there were 2,734,000 children attending primary school in 1974. In other words, the number of children attending primary school apparently exceeded the number of children of primary school age. It then appeared that Kenya had achieved universal primary education.

However, when the statistics of individual districts were examined, it was discovered that in some parts of the country the number of children attending primary school exceeded the population of primary school age by as much as 40 percent. In other districts, there were clearly many children who were not yet attending school.

Thus, although the overall apparent primary school enrollment ratio of 1.07 implied that Kenya had achieved universal primary education, many districts had a long way to go before all their children of primary school age were at school. One of the surprising results of the abolition of fees in Standards I to IV was the massive increase in enrollments in districts which one would have thought, on the basis of 1973 enrollments, had virtually achieved universal primary education.

The primary school enrollment ratio for Muranga district in 1973 for example was 1.17 (there were 17 percent more children at primary school than there were children of primary school age); yet

according to the returns from the District Education Officer (DEO), Standard I enrollment increased from 23,900 in 1973 to 40,200 in 1974, an increase of 70 percent. The primary school enrollment ratio for 1974 in Muranga was recorded as 1.41 (there were 41 percent more children in primary school than there were children of primary school age). This paper drew the following conclusions from the study.

1. The 1969 Population Census underestimated the population and since estimates of the number of children of primary school age in 1974 were derived from 1969 census, these estimates were likely to be too low.

2. The apparent primary school enrollment ratio, the statistic that was used to measure the progress towards universal primary education, assumed that the primary school population was the age group 6-12 years inclusive which is a seven year age span. But many pupils spent more than seven years at school by repeating especially in upper classes. Detailed examination of statistics on repeaters and dropouts indicated that the average time spent at primary school was about eight years and not seven years. Therefore, the enrollment ratio could be adjusted by changing the base of the fraction of the age group to 6 to 13 years. This gives an enrollment ratio of .091 for all districts instead of 1.07.

3. Many children at primary school are older than 13 years of age, because they joined Standard I late. Thus, there was an "age backlog" problem which was likely to persist for several years. The Standard I intake in 1974 clearly included many children aged seven

years and over who did not enter primary school at official entry age. It, therefore, seems likely that the increase in enrollments resulting from the abolition of fees in Standards I to IV was to continue for some years as there were some districts where further big increases were expected.

The paper "Educational Enrollments in Kenya" stated that enrollments in secondary schools are dependent on the number of secondary classes the government intended to finance. In recent years expansion of secondary aided schools had taken two forms:

1. The takeover of unaided schools (Form 1 in Year 1, Form 2 in Year 2, etc.). In the 1970 to 1974 the government proposed to take over 30 new Form 1 classes each year (and 30 Forms 2, 3 and 4 in subsequent years.) In practice the numbers taken over were somewhat in excess of 30 a year in the early years of the Plan. This policy was changed in 1974 and henceforth 20 new Form 3 classes are opened per annum from 1975. Entry to these Form 3 classes is on a competitive examination open only to students in registered and unaided and assisted schools.

2. The opening up, at existing aided schools of 14 new Form 5 classes each year (and Form 6 in subsequent years) in the ratio of two science/mathematics classes to one arts class. This policy was also changed in the 1974-78 Development Plan and no new Form 5 and Form 6 classes were to be established in the plan period.[27]

In the paper "Entry to Higher Education in Kenya" the Planning Unit noted that the University of Nairobi altered its minimum requirements for entry from one to two principal passes at East African

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[27]Planning Unit, "Educational Enrollments in Kenya," op. cit., pp. 4-5.

Advanced Certificate Examination (EAACE).[28] In the years immediately following independence there were hardly sufficient qualified applicants even at the level of one principal pass. In 1974, in contrast, some 1900 students were eligible for consideration for entry to the University having attained the minimum requirements in the 1973 EAACE examination. The number was expected to rise further owing to the openings of new Form 5 streams in 1973 and 1974. As there are no new streams that are to be started during the Plan period, the number of qualified applicants is to level at 2300 to 2500 until academic year 1980-81 when the effect of Form 5 classes opening in 1973 will be felt.

The paper concluded by posing the question as to whether the government should go on expanding higher education opportunities or accept the principle that only a certain proportion of those with minimum entry will be admitted to higher education courses. In effect, this is what is happening now.

VII. CONCLUSIONS

The study of related literature in this chapter showed that total educational expenditures had been rising in many countries of the world during the last two decades. In Kenya the rise in total educational expenditures has been faster than the rate of growth of the economy. The percentage of the total educational expenditures in

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[28] Planning Unit, "Entry to Higher Education," op. cit., p. 5.

the Gross National Product also increased in most countries of the world.

Influence of economic factors such as the GNP, population, inflation and total government revenue in the rise of total educational expenditures were also identified. Educational factors such as enrollments, teachers salaries, and equipment costs were also shown as major influences on the rise in total educational expenditures. The correlation between these factors and total educational expenditures were shown to be above 0.9000.

CHAPTER III

THE PRESENTATION AND DESCRIPTION OF DATA

I. INTRODUCTION

The purpose of this study was to investigate how certain selected economic-educational factors have influenced the rise of educational expenditures in Kenya during the period of 1963 to 1975. This chapter serves to present and to describe the data that was used in this study. In this chapter the behavior of the data over the 13 year period was investigated and various interrelationships were brought into focus.

The main sources of this data were the Kenya government official publications, which are compiled by the Central Bureau of Statistics in the Ministry of Finance and Planning and by the Statistics, Examination and the Planning Unit of the Ministry of Education. Educational statistics such as the student enrollments, numbers of teachers, examination candidates and examination results are obtained through questionnaires that are sent to all schools, teacher training colleges, the University of Nairobi and Kenyatta University College. These questionnaires are completed by the institutions named above and returned to the respective sections of the Ministry of Education. These data are then coded and processed through the computer in the Central Bureau of Statistics.

Statistics on the economy of the country are collected by the Central Bureau of Statistics through the regular national accounting

system. Both the educational statistics and the economy statistics are then published through the Educational Annual Reports produced by the Ministry of Education or the Economic Reviews and Statistical Abstracts produced by the Ministry of Finance and Planning through the Central Bureau of Statistics.

For this study the data were divided into 27 educational-economic variables and analyzed in relation to total educational expenditures. To facilitate further analysis data were grouped into five clusters as follows:

1. Economic Variables

    a. Total Government Expenditure
    b. Gross National Product
    c. Total Government Revenue

2. Educational Expenditure Variables

    a. Administration Expenditure
    b. Primary Education Expenditure
    c. Secondary Education Expenditure
    d. Teacher Education Expenditure
    e. Technical Education Expenditure
    f. Higher Education Expenditure
    g. Special Education Expenditure

3. Educational Enrollment Variables

    a. Total Educational Enrollment
    b. Standard I Enrollment
    c. Primary School Enrollment
    d. Secondary School Enrollment
    e. Teacher Training Colleges Enrollment
    f. Technical Secondary Schools Enrollment
    g. University Enrollment

4. The Teaching Labor Force Variables

    a. Primary Trained Teachers
    b. Primary Untrained Teachers
    c. Total Primary School Teachers
    d. Secondary School Teachers
    e. Teacher Training Tutors
    f. Technical Secondary School Teachers

5. Examination Variables

   a. CPE Candidates
   b. CPE Passes
   c. EACE Candidates
   d. EACE Passes

II. GROWTH RATES

Economic Factors

The above variables were analyzed according to how fast they had grown during the study period and in relationship to the rise of educational expenditures. Table I shows that the growth rate for the total government expenditure has increased more than five times from 5 percent between 1963 and 1964 to 28 percent between 1973 and 1974 with an average growth rate of 15 percent. The growth rate of the Gross National Product (GNP) also doubled from 9 percent between 1963 and 1968 to 19 percent between 1973 and 1974 with an average growth rate of 12 percent. The growth of the government revenue has been more erratic and has moved from 9 percent from 1967 to 1968 to 37 percent between the year 1972 and 1973 with an average growth rate of 18 percent. Thus of the economic variables, the government revenues showed the highest growth rate of 18 percent followed by the total government expenditure which recorded an average growth rate of 15 percent.

Educational Expenditures by Levels

Compared to the economic variables, educational expenditures have risen very sharply during the study period. The total educational expenditures particularly rose sharply after the central government took

TABLE I

GROWTH RATES OF THE SELECTED ECONOMIC FACTORS IN K£

Year	Total Govt. Expenditure	Growth Rates Percentage	Gross National Product	Growth Rates Percentage	Total Govt. Revenue	Growth Rates Percentage
1963	42,607,096					
		5				
1964	44,818,322		346,080,000			
		11				
1965	49,670,012					
		10				
1966	54,635,988				53,415,000	
		8				12
1967	58,792,064				59,847,000	
		4		9		9
1968	61,321,800		460,660,000		65,201,000	
		21		10		17
1969	73,905,647		502,430,000		76,179,000	
		25		10		22
1970	92,542,135		551,670,000		92,988,000	
		18		12		16
1971	109,484,099		616,050,000		107,806,000	
		19		12		9
1972	121,829,702		690,140,000		117,136,000	
		13		12		37
1973	146,091,009		770,890,000		160,524,000	
		28		19		21
1974	186,482,790		914,780,000		193,707,000	
		23				19
1975	228,578,462				231,071,000	
Mean	97,750,692	15	606,587,500	12	115,787,400	18

over the financing of primary education from the local authorities. Table II shows that the growth rate between 1968 and 1969 was 84 percent while that of the period of 1969 to 1970 was 61 percent. The average growth rate for the 13 years was 22 percent. This average was greatly lowered by the figures for the six years 1964 to 1969 when primary education was financed by the local authorities. The growth rate for the last seven years 1969 to 1975 was 35 percent which is more than double that of the total government expenditure. The growth rates for the primary education expenditures were negative during the six years when primary education was financed by local authorities and rose sharply in 1970 when the central government took over. The growth rate for the years 1968 and 1969 was considered extraordinary and was, therefore, excluded from the calculation of the average. A more realistic picture is derived from the average growth rate of the last six years 1970 to 1975, which is 29 percent instead of the 10 percent average growth rate for the whole period under study. Expenditures on administration rose sharply during the period at an average growth rate of 51 percent. It is also important to note the high growth rates of the higher education expenditures with the highest rise of 84 percent between 1969 and 1970 and an average growth rate of 26 percent.

Educational Enrollments

One of the major causes for the increase in educational expenditures is the quantitative expansion of education at all levels. Table III shows that except for the Teacher Training Colleges whose enrollments' average growth rate was 6 percent for the 13 year period,

TABLE II

GROWTH RATES OF EDUCATIONAL EXPENDITURES K£

Year	Total Educational Expenditure	Growth Rates Percentage	Administration Expenditure	Growth Rates Percentage	Primary Education Expenditure	Growth Rates Percentage	Secondary Education Expenditure	Growth Rates Percentage	Teacher Education Expenditure	Growth Rates Percentage	Technical Education Expenditure	Growth Rates Percentage	Higher Education Expenditure	Growth Rates Percentage	Special Education Expenditure	Growth Rates Percentage
1963	8,253,474		227,381		1,697,857		1,371,618		606,799		35,2608		621,682			
		-37		-16		-83		26		29		25		10		
1964	5,235,150		192,012		282,225		1,733,732		783,859		441,734		686,699			
		29		65		-72		55		23		38		8		
1965	6,772,707		316,441		78,002		2,683,161		967,660		609,051		743,796			
		-3		-9		-25		6		14		2		42		
1966	6,539,300		287,279		58,644		2,850,646		1,102,821		621,930		1,057,625			
		16		22		-20		31		2		-6		21		
1967	7,596,071		349,234		47,189		3,729,759		1,125,402		586,098		1,280,885		73,514	
		13		14		-87		19		5		-7		13		33
1968	8,572,310		399,318		5,361		4,454,327		1,185,899		543,069		1,444,616		97,420	
		84		128		73,195*		6		6		28		28		6
1969	15,739,858		909,236		3,929,347		4,708,312		1,257,485		695,000		1,847,319		102,823	
		61		18		162		17		1		14		84		40
1970	25,401,302		1,077,231		10,309,799		5,489,785		1,275,499		790,987		3,395,383		144,000	
		23		144		23		35		18		26		14		14
1971	31,301,936		2,627,199		12,654,900		6,328,155		1,506,966		997,823		3,880,628		164,800	
		18		-30		28		14		4		4		34		6
1972	37,089,108		1,843,835		16,039,663		7,232,792		1,570,279		1,042,340		5,149,770		174,983	
		20		166		55		16		4		26		-1		9
1973	44,639,900		4,905,082		24,816,446		8,346,412		1,632,940		1,312,065		5,156,402		191,088	
		21		-21		34		-2		10		38		42		8
1974	54,215,475		3,885,600		33,354,406		8,169,230		1,803,408		1,807,622		7,323,600		205,450	
		19		98		6		9		20		2		-3		3
1975	64,591,461		7,675,400		35,513,758		8,926,600		2,160,998		1,835,328		7,092,100		212,560	
Mean	24,303,692	22	1,899,461	51	10,810,000	10	5,080,230	17	1,306,077	10	895,076	18	3,056,308	26	151,848	15

*Not included in computation of the mean.

TABLE III

GROWTH RATES OF ENROLLMENT FACTORS

Year	Total Enrollment	Growth Rates Percentage	STD 1 Enrollment	Growth Rates Percentage	Primary Enrollment	Growth Rates Percentage	Secondary Enrollment	Growth Rates Percentage	TTC Enrollment	Growth Rates Percentage	Technical Enrollment	Growth Rates Percentage	University Enrollment	Growth Rates Percentage
1963	920,180		137,000		892,000		23,200		4,610				370	
		14		31		14		19		5				32
1964	1,047,810		180,000		1,015,000		27,500		4,820				490	
		3		6		3		22		6				39
1965	1,081,400		196,000		1,042,000		33,600		5,120				680	
		1		-1		0		23		7				28
1966	1,093,440		194,000		1,043,000		41,200		5,470		2,900		870	
		9		18		9		17		8		44		30
1967	1,192,590		229,000		1,133,000		48,400		5,890		4,170		1,130	
		7		10		7		17		13		18		3
1968	1,279,310		251,000		1,210,000		56,600		6,630		4,920		1,160	
		6		1		6		16		8		10		49
1969	1,361,940		253,000		1,282,000		65,600		7,190		5,420		1,730	
		12		17		11		14		12		21		33
1970	1,519,470		296,000		1,428,000		74,600		8,020		6,550		2,300	
		7		4		7		8		7		1		23
1971	1,623,770		307,000		1,525,000		80,500		8,620		6,810		2,840	
		10		16		10		14		1		0		25
1972	1,786,540		357,000		1,676,000		91,500		8,680		6,820		3,540	
		8		6		8		9		4		6		26
1973	1,936,150		379,000		1,816,000		99,400		9,050		7,250		4,450	
		48		153		51		3		4		12		19
1974	2,859,050		959,000		2,734,000		102,200		9,450		8,120		5,280	
		5		-30		5		4		1				-3
1975	3,010,070		668,000		2,881,000		106,300		9,510				5,140	
Mean	1,593,216	12	339,000	18	1,514,000	12	65,400	11	7,160	6	5,880	18	2,306	24

all the other levels had average growth rates of more than 10 percent. The university enrollments have grown faster than all the other levels at an average growth rate of 24 percent. The negative growth rate of -3 percent between 1974 and 1975 reflects the government's policy of controlling the expansion of higher education. This can also be noticed from the growth rates of secondary education between 1973 and 1975. The shift of the government's policy from emphasis in higher education and secondary education to primary education can be seen in the high average growth rate of 18 percent in Standard 1 enrollment. The impact of the removal of school fees in the first four grades of primary school Standard 1 to 4 at the end of 1973 is shown by a rise of 153 percent in Standard 1 enrollment, 51 percent in primary school enrollment and 48 percent in the total educational enrollment. The high increase of Standard 1 enrollment in 1974 absorbed most of the children of school going age and this meant that fewer children were available to start school in 1975. This is reflected by a negative growth rate of -30 percent between 1974 and 1975.

The Teaching Labor Force

The growth of educational enrollments at all levels has necessitated training and employment of more teachers. Thus, teachers at all levels have grown at an average rate of 10 percent with an average growth rate of 11 percent in primary and secondary levels, 8 percent in Teacher Training Colleges and 9 percent in technical secondary education. A growth rate of 108 percent in primary untrained teachers recorded for the period between 1973 and 1974 reflect the

impact of the removal of fees in the first four grades of primary education. The increase in enrollment demanded that more teachers be hired to cope with the increased enrollment. As there were no trained teachers outside the educational system, large numbers of untrained teachers were recruited. The impact of this recruitment is also shown by the growth rate of 31 percent in the total primary school teachers during the same period. (See Table IV.)

Examinations

The increase in secondary school enrollments that followed independence in 1963 was clearly noticeable in the increase of East African Certificate of Education (EACE) four years later. Thus, the growth rate of the number of candidates between 1966 and 1967 was 46 percent and the number of passes grew by 38 percent during the same period. During the 13 years 1963 to 1975 the average growth rate for candidates was 21 percent while the average growth rate for EACE passes was 17 percent. The growth of CPE candidates was steady at an average growth rate of 9 percent. The impact of the removal of fees in Standard I to IV will be felt in 1980 when the pupils enrolled in Standard I in 1974 will reach Standard VII the last grade of primary school and thereby sitting CPE examination. (See Table V.)

Educational Expenditures and the Economic Factors

Table VI illustrates the relationship between the educational expenditures and the economic factors namely the total government expenditures, total government revenue and the Gross National Product. From

TABLE IV

GROWTH RATES OF THE TEACHING LABOR FORCE FACTORS

Year	Primary Trained Teachers	Growth Rates Percentage	Primary Untrained Teachers	Growth Rates Percentage	Total Primary Teachers	Growth Rates Percentage	Secondary School Teachers	Growth Rates Percentage	TTC Teachers	Growth Rates Percentage	Technical School Teachers	Growth Rates Percentage
1963	17,200		5,600		22,800		1,380					
		12		54		22		14				
1964	19,200		8,600		27,800		1,570					
		6		24		12		14				
1965	20,300		10,700		31,000		1,790		366		133	
		15		-5		8		14		9		-6
1966	23,300		10,200		33,500		2,040		400		125	
		8		4		7		14		31		-19
1967	25,100		10,600		35,700		2,320		524		101	
		10		-2		6		17		-11		29
1968	27,500		10,400		37,900		2,720		463		130	
		9		-20		1		13		12		12
1969	30,000		8,300		38,300		3,060		522		145	
		10		4		8		15		10		-1
1970	32,900		8,600		41,500		3,530		575		143	
		14		37		19		5		5		27
1971	37,600		11,800		49,400		3,700		605		182	
		11		1		8		11		4		14
1972	41,600		11,900		53,500		4,120		627		208	
		6		6		6		4		-8		14
1973	43,900		12,600		56,500		4,270		578		237	
		9		108		31		5		16		
1974	48,000		26,200		74,200		4,500		671			
		14		19		16		-0		-0		
1975	54,800		31,300		86,100		4,480					
Mean	32,415	10	12,830	17	45,246	11	3,331	11	534	8	156	9

TABLE V

GROWTH RATES OF EXAMINATION FACTORS

Year	CPE Candidates	Growth Rates Percentage	CPE Passes	Growth Rates Percentage	EACE Candidates	Growth Rates Percentage	EACE Passes	Growth Rates Percentage
1963					4,882		2,986	
						10		18
1964	103,400		11,500		5,382		3,531	
		44		11		20		27
1965	148,900		12,800		6,462		4,499	
		-1		13		12		11
1966	146,900		14,500		7,212		5,015	
		2		8		46		38
1967	149,700		15,700		10,548		6,929	
		7		20		34		21
1968	159,700		18,900		14,114		8,369	
		0		12		29		21
1969	159,900		21,200		18,166		10,089	
		4		6		15		15
1970	166,900		22,500		20,878		11,631	
		6		8		20		2
1971	176,100		24,300		24,965		11,835	
		7		10		16		18
1972	187,600		26,700		28,990		13,972	
		7		2		10		16
1973	200,300		27,300		31,807		16,163	
		8		1		13		11
1974	216,200		27,600		36,029		17,977	
		5		1		17		19
1975	226,700		27,800		42,017		21,405	
Mean	170,200	9	20,900	9	19,342	21	10,338	17

TABLE VI

EDUCATIONAL EXPENDITURES AS A PERCENTAGE OF TOTAL GOVERNMENT EXPENDITURE, GROSS NATIONAL PRODUCT AND TOTAL GOVERNMENT REVENUE

	1	2	3	4			
Year	Educational Expenditures	Total Govt. Expenditures	Gross National Product	Total Govt. Revenue	1/2 Percent	1/3 Percent	1/4 Percent
1963	8,253,474	42,607,096			19.4	1.5	
1964	5,235,150	44,818,322	346,080,000		11.7		
1965	6,772,207	49,670,012			13.6		
1966	6,539,300	54,635,988		53,415,000	12.0		12.2
1967	7,596,071	58,792,064		59,847,000	12.9		12.7
1968	8,572,310	61,321,800	460,660,000	65,201,000	14.0	1.9	13.1
1969	15,739,858	73,905,647	502,430,000	76,179,000	21.3	3.1	20.7
1970	25,401,302	92,542,135	551,670,000	92,988,000	27.4	4.6	27.0
1971	31,301,936	109,484,099	616,050,000	107,806,000	28.6	5.1	29.0
1972	37,089,108	121,829,702	690,140,000	117,136,000	30.4	5.4	31.7
1973	44,639,900	146,091,009	770,890,000	160,524,000	30.6	5.8	27.8
1974	54,215,475	186,482,790	914,780,000	193,707,000	29.1	5.9	28.0
1975	64,591,461	228,578,462		231,071,000	28.3		28.0
Mean	24,303,692	97,750,692	606,587,500	115,787,400	24.9	4.0	21.0

a relatively high percentage of 19.4 percent in 1963, the share of total government expenditures taken by education fell to 11.7 percent during the following year. Since then the share of the total government expenditure that goes to education has risen very sharply to a record high of 30.6 percent in 1973 with an average growth rate of 24.9 percent over the 13 year period. This average has been realized in spite of very low expenditures of the first six years after independence 1964 to 1969 when education was financed by the local authorities. The average growth rate for the last seven years of the study; 1969 to 1975, is 28.0 percent.

An examination of educational expenditures in relation to the Gross National Product reveals the same trend. The share of GNP that is devoted to education has trebled from 1.9 to 5.9 percent in the seven years 1969 to 1974. This has meant an average rise of 4.0 percent. The share of the total government revenue that goes to education has also increased from 12.2 percent in 1966 to 31.7 percent in 1972 and dropped to 28.0 percent in 1975 with an average rise of 21.0 percent. The average for the last seven years of the study; 1969 to 1975 was 27.5 percent, 6.5 percent higher than the average for the whole period. From these figures it appears that the share of the national budget devoted to education is very similar to the share of the national revenue that goes to education.

III. EDUCATIONAL EXPENDITURES BY LEVELS AND TOTAL EDUCATIONAL EXPENDITURES

The previous table illustrated the important share that educational expenditures take from the total government expenditures, Gross National Product and the total government revenues. Table VII on the other hand, illustrates the emphasis between different levels of education as judged from the proportion of each level to the total education expenditure. The percentages of educational expenditures by levels for example reflect the decline in priority of secondary and higher education and the increasing emphasis on primary education since 1970. The percentage of primary education expenditure over the total government expenditure has risen from 20.6 percent in 1963 to 61.5 percent in 1974 with an average of 44.5 percent over the whole period. The low percentages between 1964 and 1969 reflects that period when primary school was financed by the local authorities. The share of the secondary education expenditure in the total educational expenditure has declined from 52.0 percent in 1968 to 13.8 percent in 1975 with an average of 20.9 percent for the whole study period. The emphasis on primary education and its predominant share in the educational budget has caused a decline in the emphasis of all other levels of education. Teacher education has gone down from 16.9 percent in 1966 to 3.3 percent in 1975, technical secondary education from 9.5 percent in 1966 to 2.8 percent in 1975, higher education from 16.9 percent in 1967 to 11 percent in 1975 and special education from 1.0 percent in 1967 to 0.3 percent in 1975.

TABLE VII

EDUCATIONAL EXPENDITURES BY LEVELS OF EDUCATION SHOWN AS PERCENTAGES OF TOTAL EDUCATIONAL EXPENDITURES**

Year	Administration	Primary Education	Secondary Education	Teacher Education	Technical Education	Higher Education	Special Education
1963	2.8	20.6	16.6	7.4	4.3	7.5	
1964	3.7	5.4*	33.1	15.0	8.4	13.1	
1965	4.7	1.2*	39.6	14.2	9.0	11.0	
1966	4.4	0.9*	43.6	16.9	9.5	16.2	
1967	4.6	0.6*	49.1	14.8	7.7	16.9	1.0
1968	4.7	0.1*	52.0	7.5	6.3	16.9	1.1
1969	5.8	25.0*	29.9	8.0	4.4	11.7	0.7
1970	4.2	40.6	21.6	5.0	3.1	13.4	0.6
1971	8.4	40.4	20.2	4.8	3.2	12.4	0.5
1972	5.0	43.2	19.5	4.2	2.8	14.0	0.5
1973	11.0	55.6	18.7	3.7	2.9	11.6	0.4
1974	7.2	61.5	15.1	3.3	3.3	13.5	0.4
1975	11.9	55.0	13.8	3.3	2.8	11.0	0.3
Mean	7.8	44.5	20.9	5.4	3.7	12.6	0.6

*Primary Education was financed by local authorities.

**The percentages do not add to 100 because of expenditures incurred on other educational aspects not included in the tables.

IV. UNIT COSTS BY LEVELS OF EDUCATION

The most noticeable fact about the unit costs is the large difference between different levels of education. As Table VIII clearly indicates the average unit cost for university education is 101 times that of primary education, 18 times that of secondary education, 8 times that of technical education and 7 times that of teacher education. Whereas, it is generally accepted that it costs more to educate students at the university level than at primary school level yet the question is still valid as to whether such a big difference can be justified. It is, however, comforting to note that the university unit costs are showing a decreasing trend from K£ 1680 in 1963 to K£ 1380 in 1975 with an average unit cost of K£ 1313. This should be compared with the rise in primary education unit costs from K£ 9 in 1963 to K£ 21 in 1975, or an overall growth of 133 percent. Secondary education and teacher education showed an overall growth of 42 percent and 72 percent respectively. From Table VIII one also notices that the unit cost for technical secondary education is twice that of the regular academic secondary education which explains the high cost associated with the practical subjects taught in these schools.

V. TEACHER/PUPIL RATIOS BY LEVELS OF EDUCATION

Unlike the unit costs which have been rising during the period under study, the teacher/pupil ratio remained fairly stable. This is an encouraging aspect in the sense that the teacher/pupil ratios which are at times used as a measure of educational productivity and quality have

TABLE VIII

UNIT COSTS BY LEVELS OF EDUCATION IN K£

Year	Primary Education	Secondary Education	Technical Education	Teacher Education	Higher Education
1963	9	59		132	1,680
1964	5	63		163	1,401
1965	6	80		189	1,094
1966	6	69	214	202	1,216
1967	6	77	141	191	1,134
1968	7	79	110	179	1,245
1969	12	77	128	175	1,069
1970	17	74	121	159	1,476
1971	19	79	147	175	1,366
1972	21	79	153	181	1,469
1973	23	84	181	180	1,159
1974	19	80	223	191	1,387
1975	21	84		227	1,380
Mean	13	75	157	180	1,313
Growth	133	42	4	72	-18

remained stable in spite of rising enrollments. The primary schools teacher/pupil ratio of 34 is caused by the employment of unqualified teachers as can be seen in Table IX when the teacher/pupil ratios are computed for the primary school trained teachers. However, even with primary school trained teachers, the average teacher/pupil ratio of 48 can be justified by the fact that the Ministry of Education's guideline gives 50 children as the maximum number that can be taught in one class, though the recommended teacher/pupil ratio is 40:1. Except for the technical secondary schools with a teacher/pupil ratio of 36, secondary schools and teacher training colleges' teacher/pupil ratios appear too low.

VI. OVERALL GROWTH 1963 TO 1975

Table X concludes this chapter by presenting the overall growth of all the variables. From this table it is clear that there has been remarkable growth in all the variables that were investigated. There was also a wide range between the lowest overall growth of 78 percent in technical secondary school teachers to an overall growth of 3281 percent in educational administration expenditure. It is worth noting that of the 28 variables studied, 8 of them showed an overall growth of over 500 percent. Among the eight variables which showed highest growth was the total education expenditure. How the growth of educational expenditure is associated with the other variables is the subject of the next chapter.

TABLE IX

TEACHER/PUPIL RATIO BY LEVELS OF EDUCATION

Year	Primary	Primary T. Teachers*	Secondary	Technical	T.T.C.'s**
1963	39	52	17		
1964	37	53	18		
1965	34	51	19		14
1966	31	45	20	23	14
1967	32	45	21	41	11
1968	32	44	21	38	14
1969	33	43	21	37	14
1970	34	43	21	46	14
1971	31	41	22	37	14
1972	31	40	22	33	14
1973	32	41	23	31	16
1974	37	57	23		14
1975	33	53	24		
Mean	34	48	21	36	14

*Primary T. Teachers - Primary Trained Teachers

**T.T.C. - Teacher Training Colleges

TABLE X

OVERALL GROWTH 1963 TO 1975

Category	Percentage
Total Government Expenditures	436
Gross National Product	164 (calculated from 1964)
Total Government Revenue	333 (calculated from 1966)
Total Educational Expenditures	683
Administration Expenditure	3,281
Primary Education Expenditure	1,992
Secondary Education Expenditure	551
Teacher Education Expenditure	256
Technical Education Expenditure	421
Higher Education Expenditure	1,040
Special Education Expenditure	188
Total Educational Enrollment	227
STD 1 Enrollment	388
Primary School Enrollment	223
Secondary School Enrollment	358
Teacher Training Colleges Enrollment	106
Technical Secondary School Enrollment	180 (calculated from 1966)
University Enrollment	1,289
Primary Trained Teachers	219
Primary Untrained Teachers	459
Total Primary Teachers	278
Secondary School Teachers	225
Teacher Training Colleges Teachers	83 (calculated from 1965)
Technical Schools Teachers	78 (calculated from 1965)
CPE Candidates	119 (calculated from 1964)
CPE Passes	142 (calculated from 1964)
EACE Candidates	791
EACE Passes	617

CHAPTER IV

DATA ANALYSIS AND RESEARCH FINDINGS

I. INTRODUCTION

In the first chapter the following four research questions were posed:

1. Is there any linear relationship between expenditures and the selected economic-educational variables?

2. If there is any relationship, what is its direction?

3. How strong is the degree of association between the educational expenditures and the selected economic-educational variables?

4. Which of the selected economic-educational variables is or are the best predictor(s) of educational expenditures?

It was also stated that in order to test the existence of a linear relationship between educational expenditures and the other selected economic-educational variables, and to determine the direction and strength of this association, the data presented in the previous chapter were analyzed through Pearson Product Moment Correlation, r, and scattergrams. To be able to use Pearson, r, for the analysis, the following assumptions had to be met:

1. That the data were at least of the interval level of measurement.

2. That the association between two variables was linear. Linearity exists when the intersectional points lie roughly in a straight line.

The stepwise multiple regression statistical technique was also going to be used to:

1. Find the best linear prediction equations and to evaluate their accuracy.

2. Control for other confounding factors in order to evaluate the contribution of a specific variable or set of variables.

3. Find structural relations and provide explanations for seemingly complex multivariate relationships.

Stepwise multiple regression enables the researcher to select a subset consisting of a reasonable number of the available predictor variables to fit the regression equation. In addition to entering one variable on the basis of its having the highest partial correlation with the criterion variable (with the effects of already existing predictors removed), the stepwise procedure examines each of the pre-existing predictors for possible elimination. If the elimination of any one of the pre-existing predictors does not lead to a significant drop in Multiple R, it is eliminated.

Correlation, therefore, measures a co-relation, a joint property of two variables. Regression on the other hand deals primarily with the means of one variable and how their location is influenced by another variable. Correlation is associated with descriptive technique, regression comes close to implying cause and effect relations. Thus, whereas a correlation coefficient indicates a joint relationship between variables, a regression coefficient means that if the value of the independent variable is altered then the dependent variable can be expected

to change by a certain amount on the average, sampling variation making it unlikely that precisely the stated amount of change will be observed.

II. BIVARIATE CORRELATION BETWEEN TOTAL EDUCATIONAL EXPENDITURES AND TWENTY-SEVEN ECONOMIC-EDUCATIONAL VARIABLES

From Table XI it is clear that there is a very strong positive bivariate correlation between total education expenditure and the economic-educational variables. Except for Standard 1 enrollment with a Pearson correlation coefficient r of 0.8527, primary schools untrained teachers with a correlation coefficient of 0.8371 and the teacher training college tutors with a correlation coefficient of 0.8654, all the other variables have correlation coefficients of over 0.9000. The highest correlation coefficients were between the total educational expenditures and primary education expenditure with a correlation coefficient of 0.9908 and the total government expenditure with a correlation coefficient of 0.9903. This high correlation is to be expected because of autocorrelation. "Auto" or "serial" correlation occurs when a variable is correlated with part of itself. In this study while primary education expenditure is a component of the total educational expenditures, total educational expenditures is on the other hand, a component of the total government expenditures. In Table XI, variables 9 through 27 show more valuable correlations because they are not expenditures and, therefore, not autocorrelated with total educational expenditures.

TABLE XI

THE RELATIONSHIP BETWEEN TOTAL EDUCATIONAL EXPENDITURES AND TWENTY-SEVEN ECONOMIC-EDUCATIONAL VARIABLES

	Total Educational Expenditures	r	r^2
1.	Total Government Expenditures	0.9903	0.9807
2.	Administration Expenditure	0.9388	0.8813
3.	Primary Education Expenditure	0.9908	0.9817
4.	Secondary Education Expenditure	0.9390	0.8817
5.	Teacher Education Expenditure	0.9313	0.8677
6.	Technical Education Expenditure	0.9710	0.9428
7.	Higher Education Expenditure	0.9853	0.9708
8.	Special Education Expenditure	0.9683	0.9376
9.	Gross National Product	0.9847	0.9696
10.	Total Government Revenue	0.9829	0.9661
11.	Total Educational Enrollment	0.9625	0.9264
12.	Standard 1 Enrollemnt	0.8257	0.7271
13.	Primary School Enrollment	0.9577	0.9172
14.	Secondary School Enrollment	0.9317	0.8681
15.	Teacher Training Colleges' Enrollment	0.9194	0.8453
16.	Technical Secondary Schools' Enrollment	0.9294	0.8638
17.	University Enrollment	0.9835	0.9673
18.	Primary Schools' Trained Teachers	0.9755	0.9516
19.	Primary Schools' Untrained Teachers	0.8371	0.7007
20.	Total Primary Schools' Teachers	0.9662	0.9335
21.	Secondary School Teachers	0.9191	0.8447
22.	Teacher Training Colleges Tutors	0.8654	0.7489
23.	Technical Secondary Schools' Teachers	0.9446	0.8923
24.	CPE Candidates	0.9301	0.8651
25.	CPE Passes	0.9090	0.8263
26.	EACE Candidates	0.9779	0.9562
27.	EACE Passes	0.9688	0.9386

The coefficient of determination, the r^2 column in Table XI, p. 92, indicates that 14 out of 27 economic-educational variables have coefficients of determination of over 0.9000 which means that over 90 percent of the variation in total education expenditures is accounted for by using any one of these 14 variables. Ten out of the 27 economic-educational variables have coefficients of determination of over 0.8000 and only three variables have coefficients of determination of less than 0.8000.

Table XI (p. 92) can also be divided into two categories. The first eight variables comprising of expenditure variables and variables 9 through 27 comprising of the other economic-educational variables. As explained earlier, the correlation coefficients of the first eight variables are very high due to autocorrelation. The coefficients of determination are also high for these eight variables. Five out of them have coefficients of determination of over 0.9000 and the remaining three have coefficients of determination of over 0.8500. Nine out of the nineteen variables (variables 9 to 27) have coefficients of determination of over 0.9000, seven have coefficients of determination of over 0.8000 while the remaining three have coefficients of determination of over 0.7000.

III. INTERCORRELATIONS BETWEEN TWENTY-SEVEN ECONOMIC-EDUCATIONAL VARIABLES

From Table XI (p. 92) it was learned that there exists a very strong positive correlation between total educational expenditure and

the 27 economic-educational variables. It was shown that all the correlation coefficients were above 0.8000. Table XII, on the other hand, shows that there is a very strong positive correlation between the economic-educational variables themselves. Eighteen correlation coefficients drawn out of the correlation matrix were above 0.9900 and the correlation coefficients between total government expenditure and gross national product, total education enrollment and the primary school enrollment, primary schools' trained teachers and EACE candidates, and teachers' colleges enrollment and secondary school teachers were almost perfect.

Further examination of the coefficient matrix shows that all correlation coefficients between the economic-educational variables were above 0.5000 and only the following three correlation coefficients were below 0.6000.

1. CPE passes with primary untrained teachers (0.5862).

2. Technical schools enrollment with primary untrained teachers (0.5715).

3. Teacher training colleges tutors and primary untrained teachers (0.5367).

Table XII also shows that out of the 18 selected high correlations, 8 of them (1 to 8) are between expenditures variables and other economic-educational variables. The coefficients of determination r^2 between these variables range from 0.9809 to 0.9920. The coefficient of determination between the 10 remaining variables range from 0.9802 to 0.9992.

TABLE XII

INTERCORRELATIONS BETWEEN THE TWENTY-SEVEN ECONOMIC-EDUCATIONAL VARIABLES

	Variables	r	r^2
1.	Total government expenditure with Gross National Product	0.9960	0.9920
2.	Total government expenditure with total government revenue	0.9938	0.9876
3.	Total government expenditure with secondary school enrollment	0.9904	0.9809
4.	Total government expenditure with total primary school teachers	0.9904	0.9809
5.	Secondary education expenditure with secondary school enrollment	0.9955	0.9910
6.	Special education expenditure with teachers colleges' enrollment	0.9910	0.9821
7.	Special education expenditure with secondary school teachers	0.9905	0.9810
8.	Higher education expenditure with university enrollment	0.9905	0.9810
9.	Gross National Product with total government revenue	0.9911	0.9323
10.	Total government revenue with CPE Candidates	0.9901	0.9802
11.	Gross National Product with university enrollment	0.9948	0.9896
12.	Total educational enrollment with primary school enrollment	0.9996	0.9992
13.	Secondary school enrollment with teachers colleges' enrollment	0.9933	0.9866
14.	Secondary school enrollment with secondary school teachers	0.9979	0.9958
15.	Secondary school enrollment with CPE Passes	0.9928	0.9857
16.	Teachers colleges' enrollment with secondary school enrollment	0.9968	0.9936
17.	Primary school trained teachers with EACE Candidates	0.9963	0.9926
18.	Primary school trained teachers with EACE Passes	0.9939	0.9878

Scattergrams

To gain a better picture of the relationship between total educational expenditure and the economic-educational variables, scattergrams were drawn showing the relationship between total educational expenditures and the 12 selected economic-educational variables. Ten variables were selected on the basis of their high correlations, two from each of the five variable clusters: economic, expenditures by levels, educational enrollments, teacher's labor force and the examinations. For comparison two other variables with the lowest correlation coefficients were also included. The list of the 12 variables was, therefore, as follows:

		r	r^2
1.	Gross National Product	0.9847	0.9696
2.	Total Government Revenue	0.9829	0.9661
3.	Primary Educational Expenditure	0.9908	0.9817
4.	Higher Education Expenditure	0.9853	0.9708
5.	Primary Schools' Trained Teachers	0.9755	0.9516
6.	Secondary Technical Schools' Teachers	0.9446	0.8923
7.	Primary Schools' Enrollment	0.9577	0.9172
8.	University Enrollment	0.9835	0.9673
9.	EACE Candidates	0.9779	0.9562
10.	CPE Candidates	0.9301	0.8651
11.	Standard 1 Enrollment	0.8527	0.7271
12.	Primary Schools' Untrained Teachers	0.8371	0.7001

To be able to draw the scattergrams, data for these variables were reduced into thousands.

A scattergram is a graph of data points based on two variables, where one variable defines the horizontal axis and the other defines the vertical axis. The values of the variables of any given case serve as the coordinates of the point representing that case. A regression line is drawn through the scatter of data points approximating the pattern of these points. If, for example, variable Y is plotted along the vertical axis and variable X along the horizontal axis, the resulting line is called the regression of Y on X. The most common type of regression is linear regression in which the objective is to locate the best fitting line. Linear regression is most commonly used because it gives a simple summary of the relationship. The general formula for the straight line is:

$$Y' = a + bx \pm SE\ (1.96)$$

Where a is the intercept, and b is the slope of the line which denotes how much Y changes for one unit change in X. SE stands for the Standard Error of estimate.

Figures 1 through 12 show the scattergrams drawn to explain further the high correlations between total educational expenditures and the variables mentioned above. Using the statistics provided by the computer print out with the scattergrams, the relationship between total educational expenditure and the 12 variables can be shown by means of simple regression equations.

Figure 1: Total educational expenditures and Gross National Product: $r = 0.9847$ $r^2 = 0.9696$ $a = -29177.96$ $b = 0.09$

Regression Equation $Y' = -29177.96 + 0.09X_1 \pm 3271.09\ (1.96)$

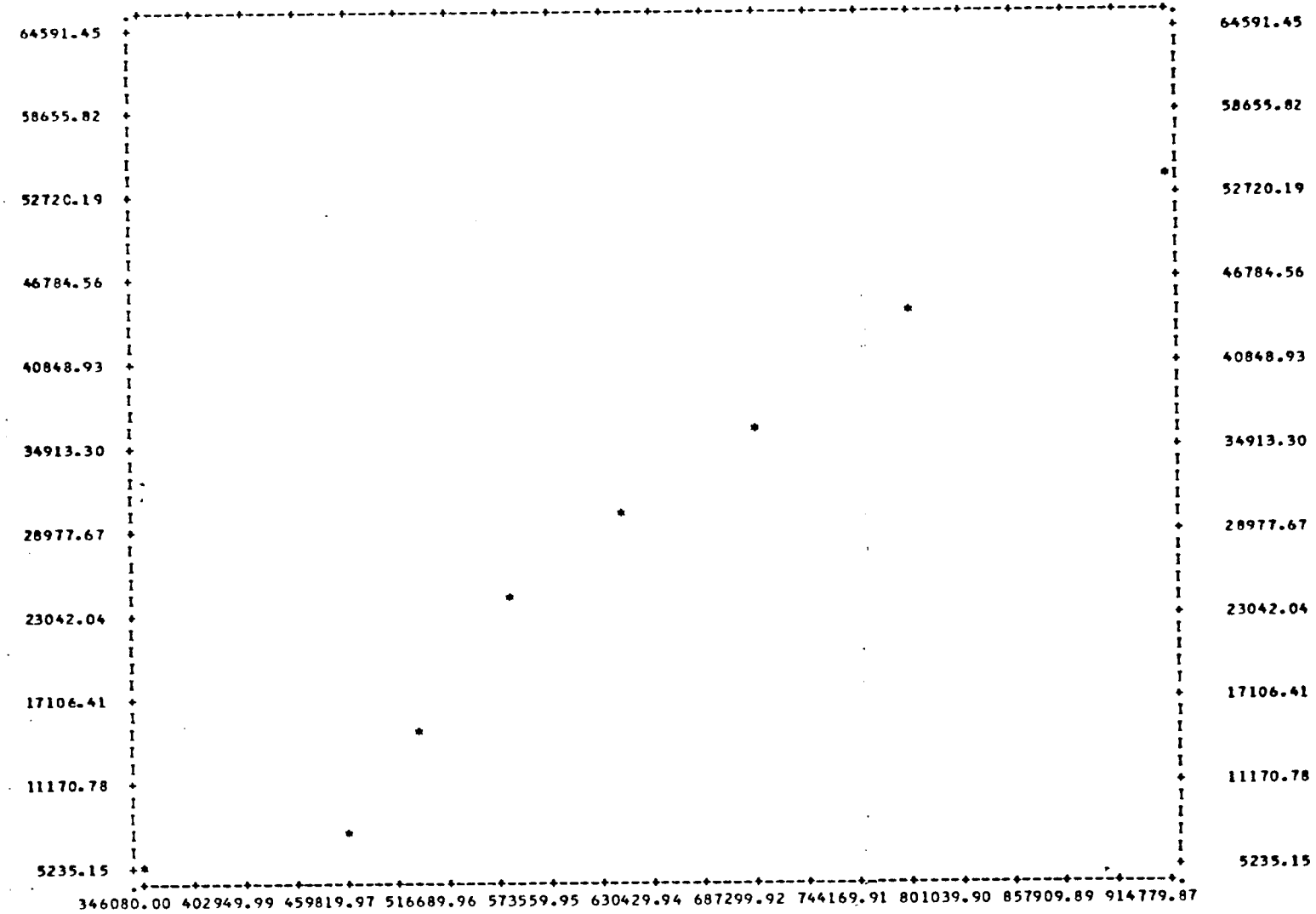

Figure 1. Total Educational Expenditures (ordinate) and the Gross National Product (abscissa).

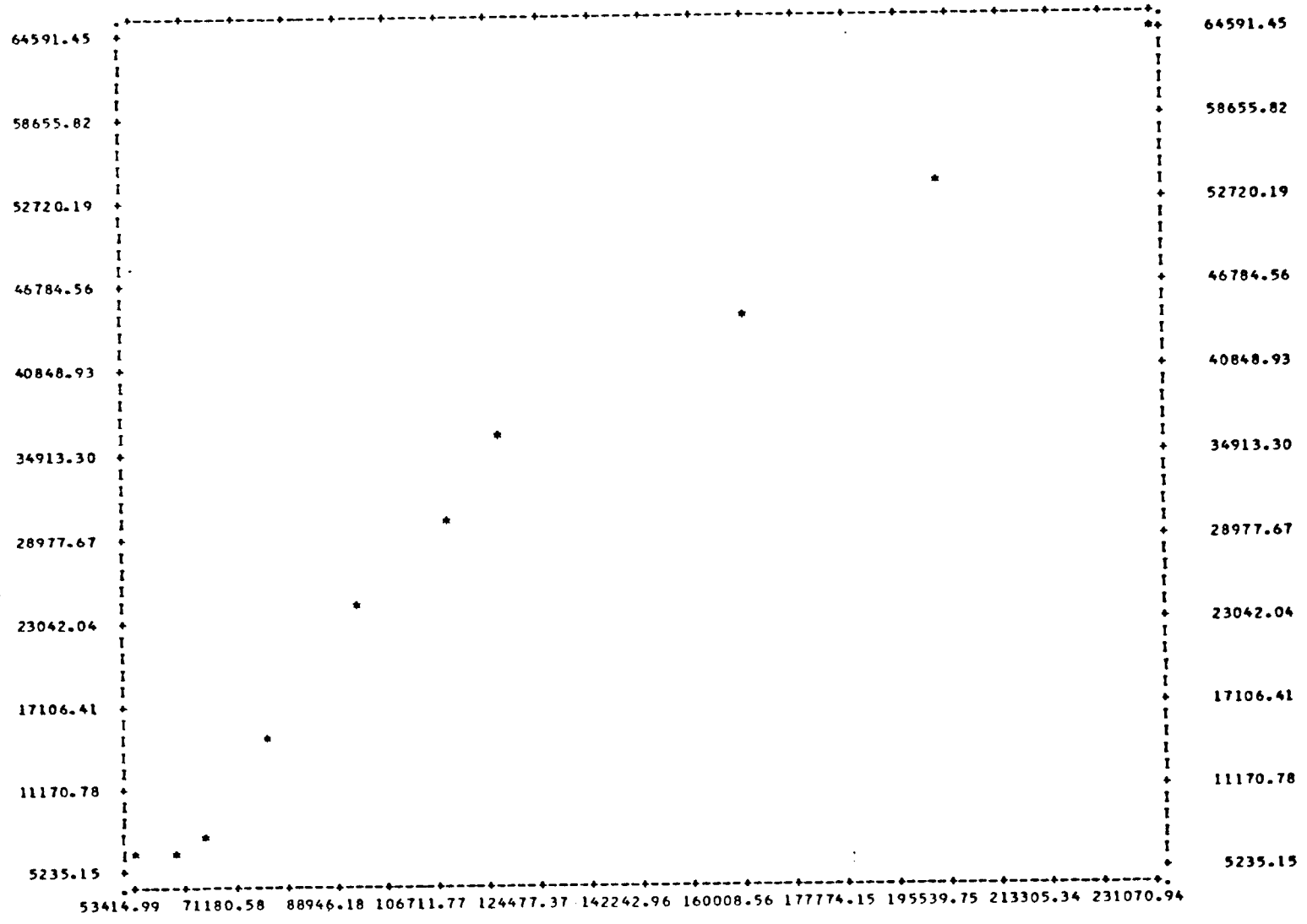

Figure 2. Total Educational Expenditures (ordinate) and Total Government Revenue (abscissa).

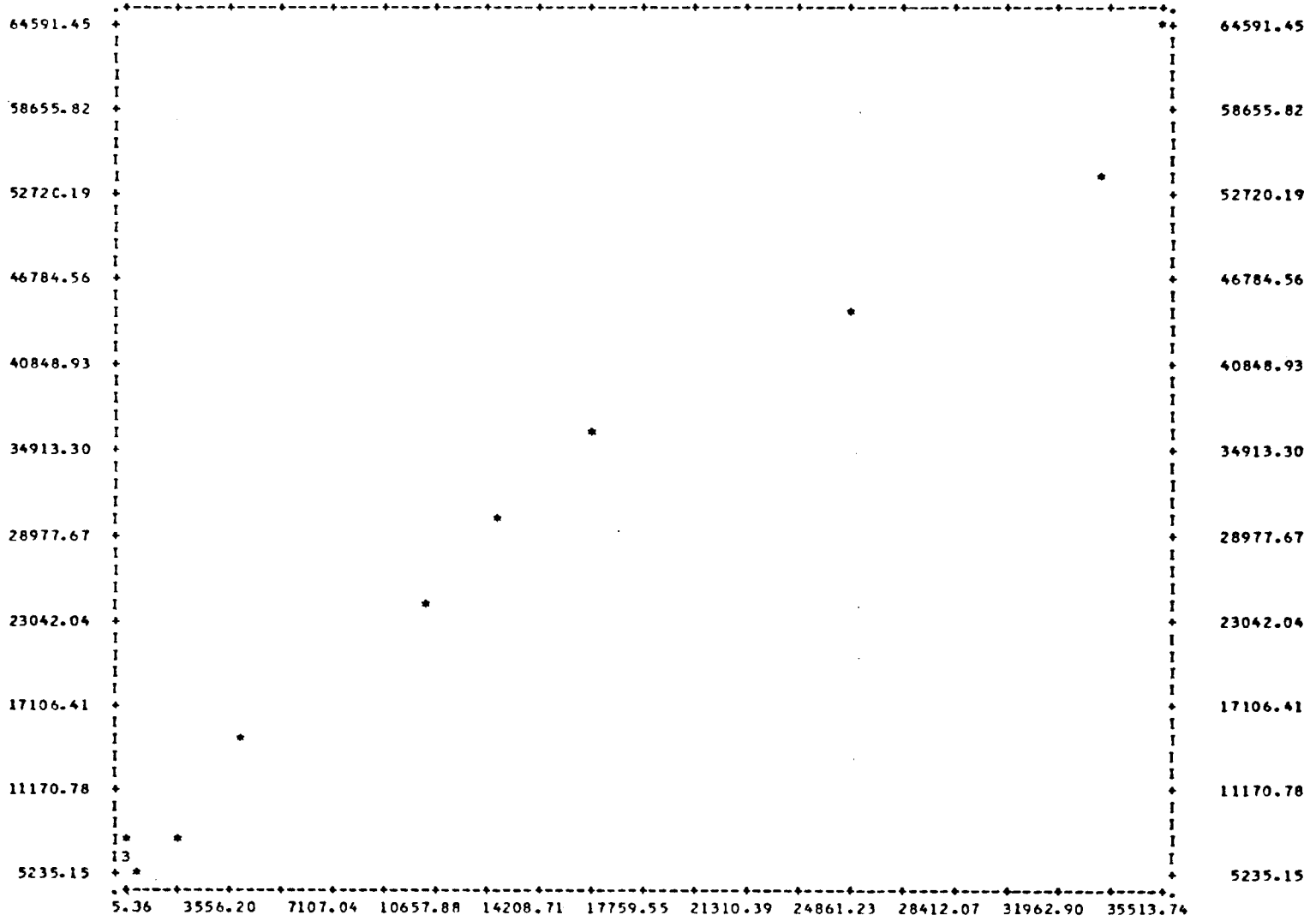

Figure 3. Total Educational Expenditures (ordinate) and the Primary Education Expenditure (abscissa).

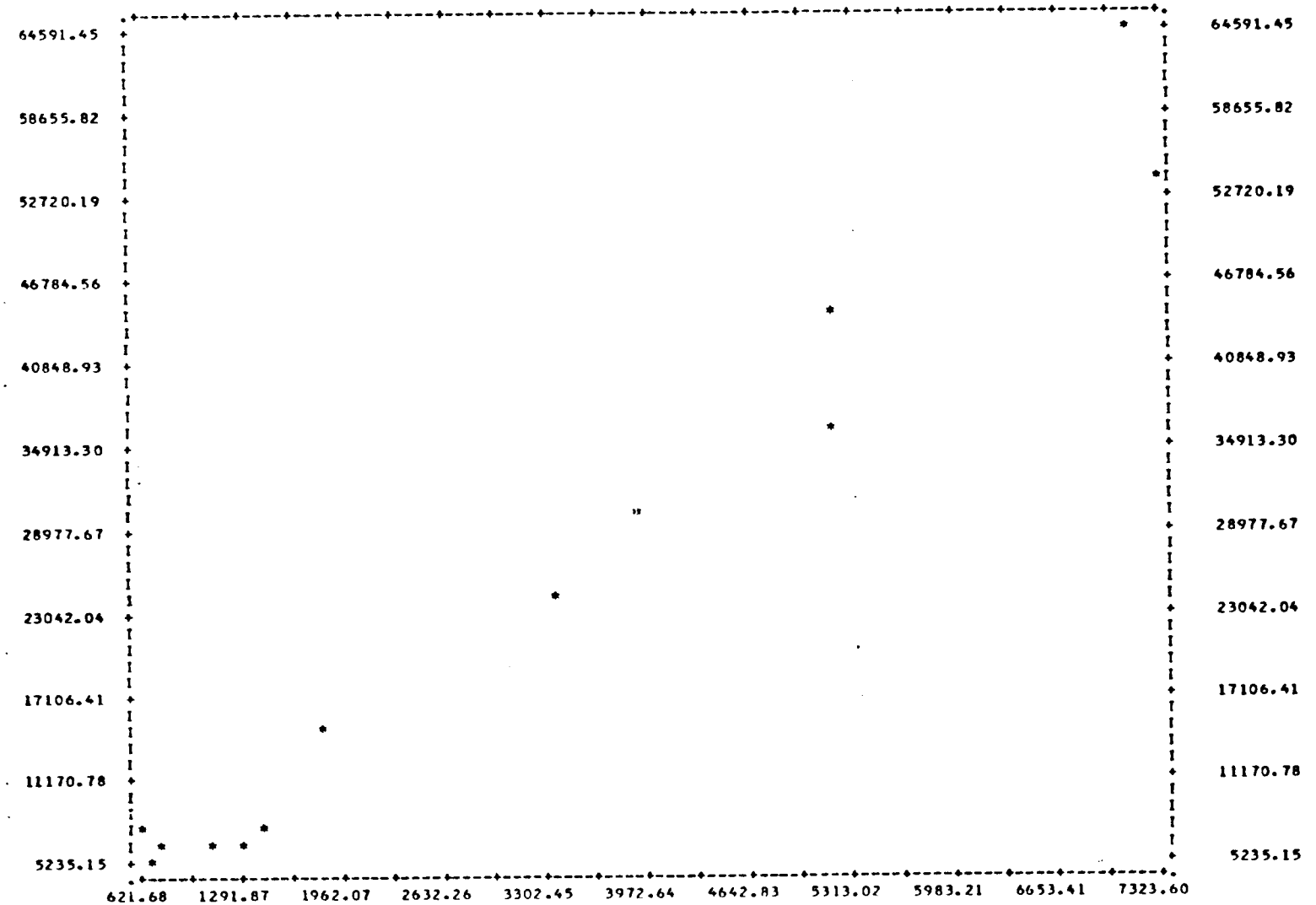

Figure 4. Total Educational Expenditures (ordinate) and the Higher Education Expenditures (abscissa).

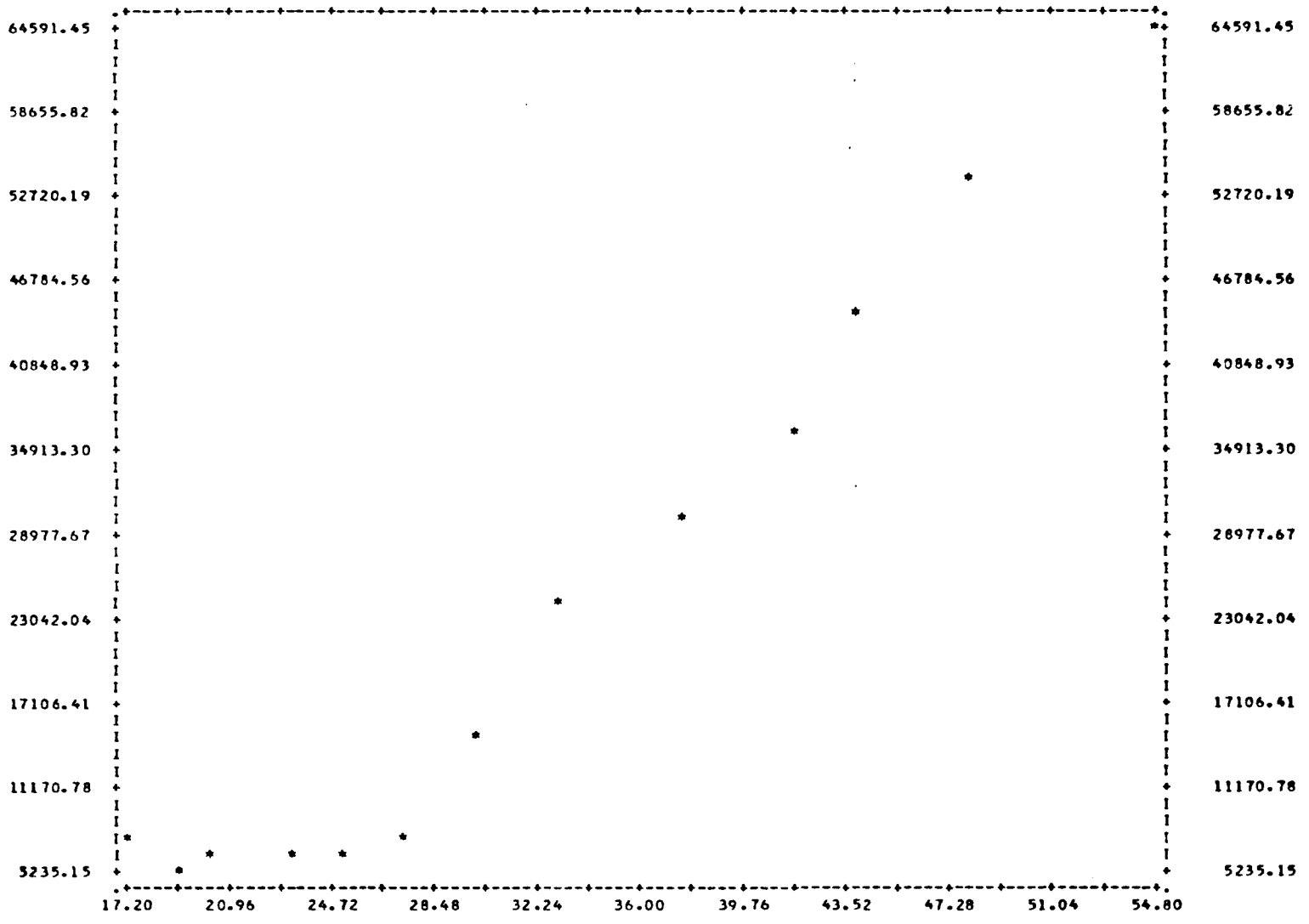

Figure 5. Total Educational Expenditures (ordinate) and the Primary Schools' Trained Teachers (abscissa).

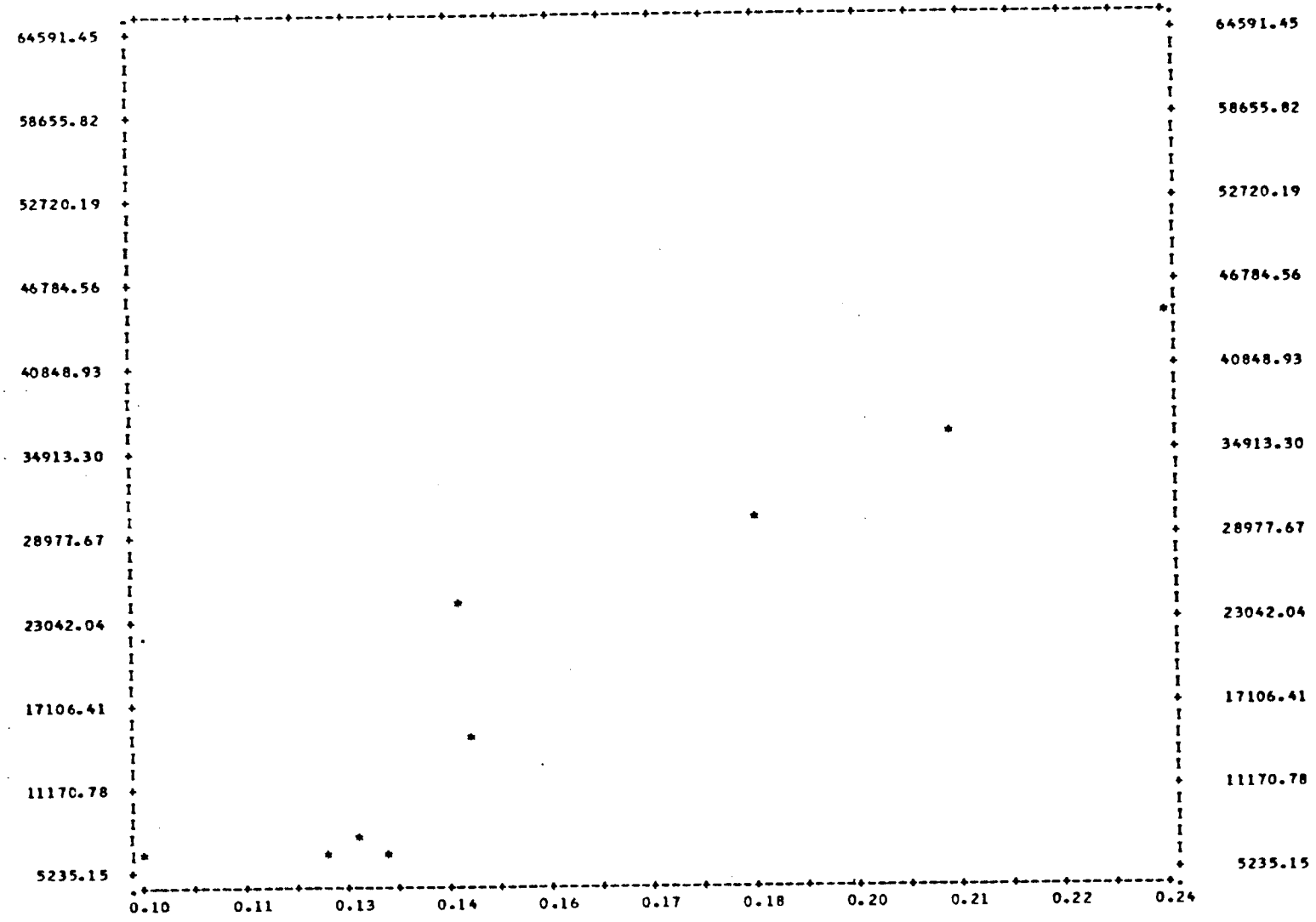

Figure 6. Total Educational Expenditures (ordinate) and the Secondary Technical Schools' Teachers (abscissa).

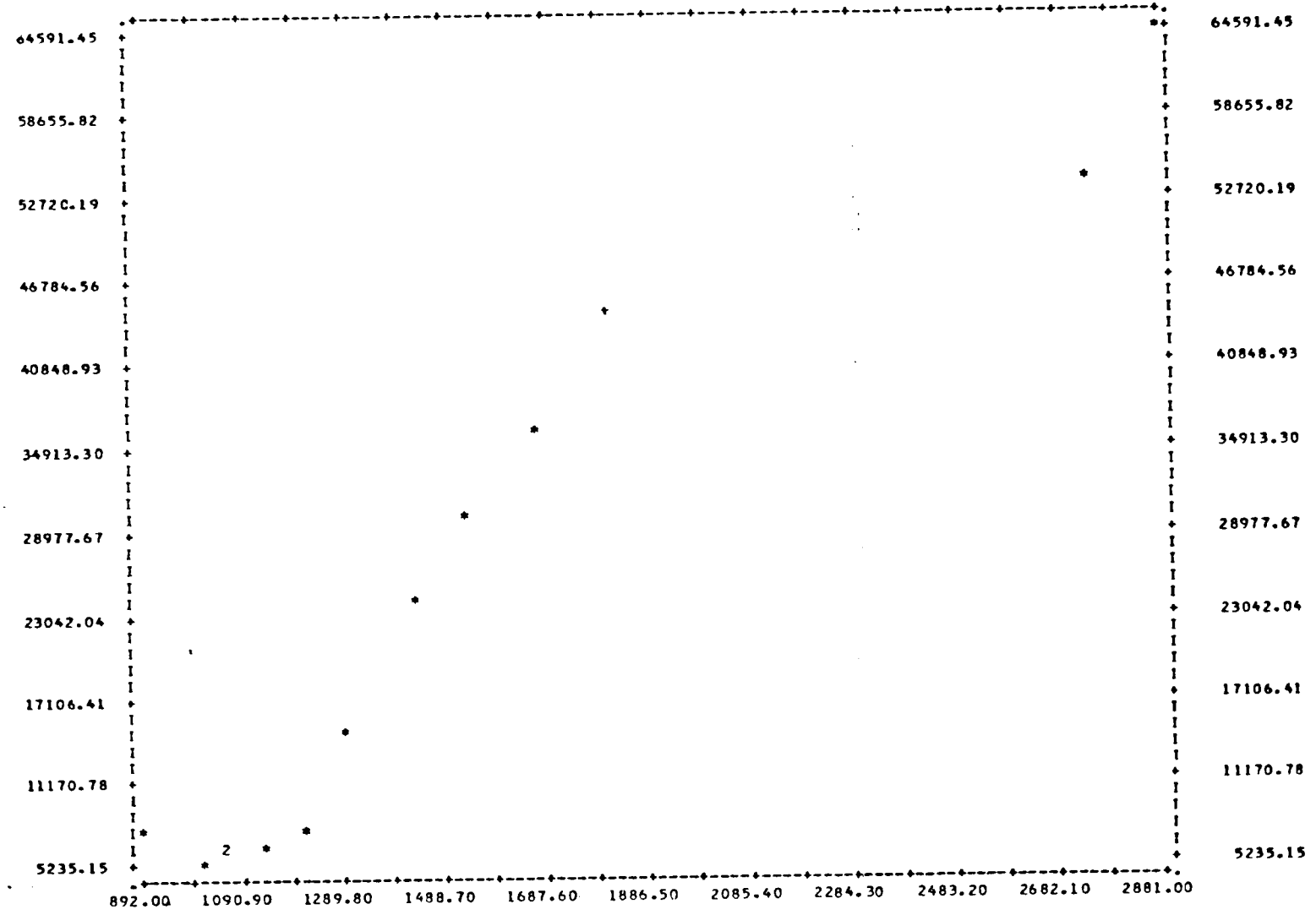

Figure 7. Total Educational Expenditures (ordinate) and Primary Schools' Enrollment (abscissa).

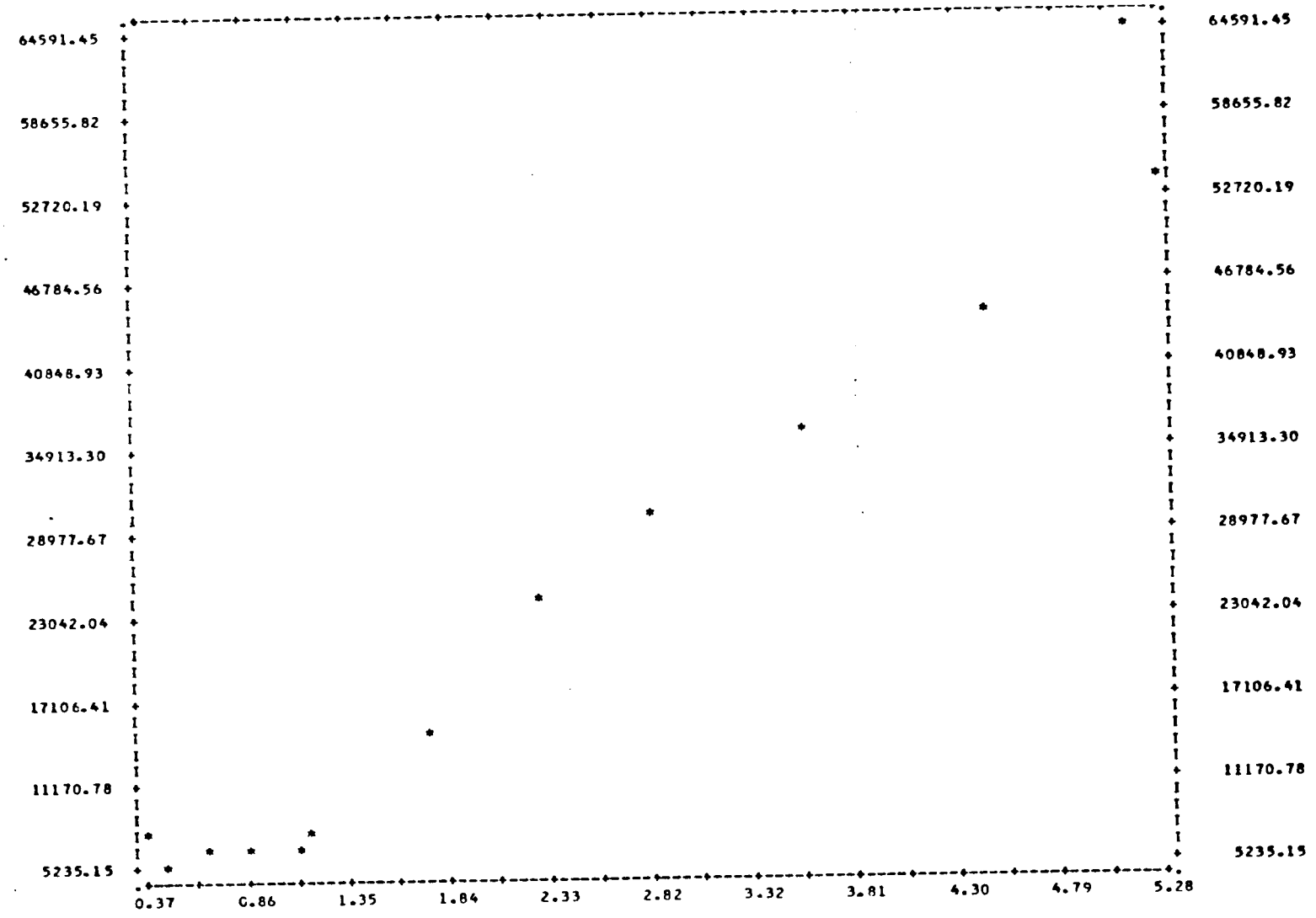

Figure 8. Total Educational Expenditures (ordinate) and University Enrollment (abscissa).

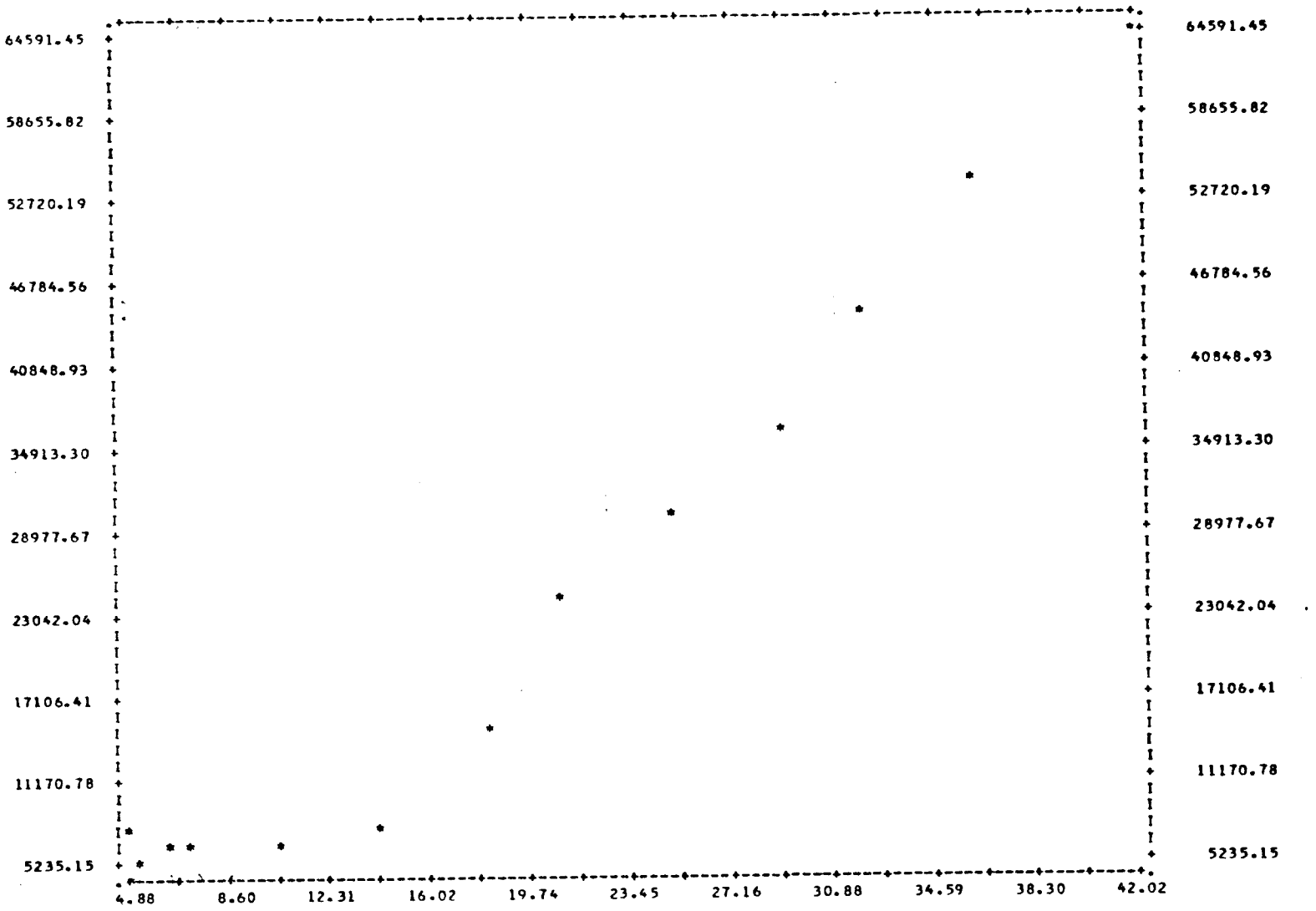

Figure 9. Total Educational Expenditures (ordinate) and the EACE Candidates (abscissa).

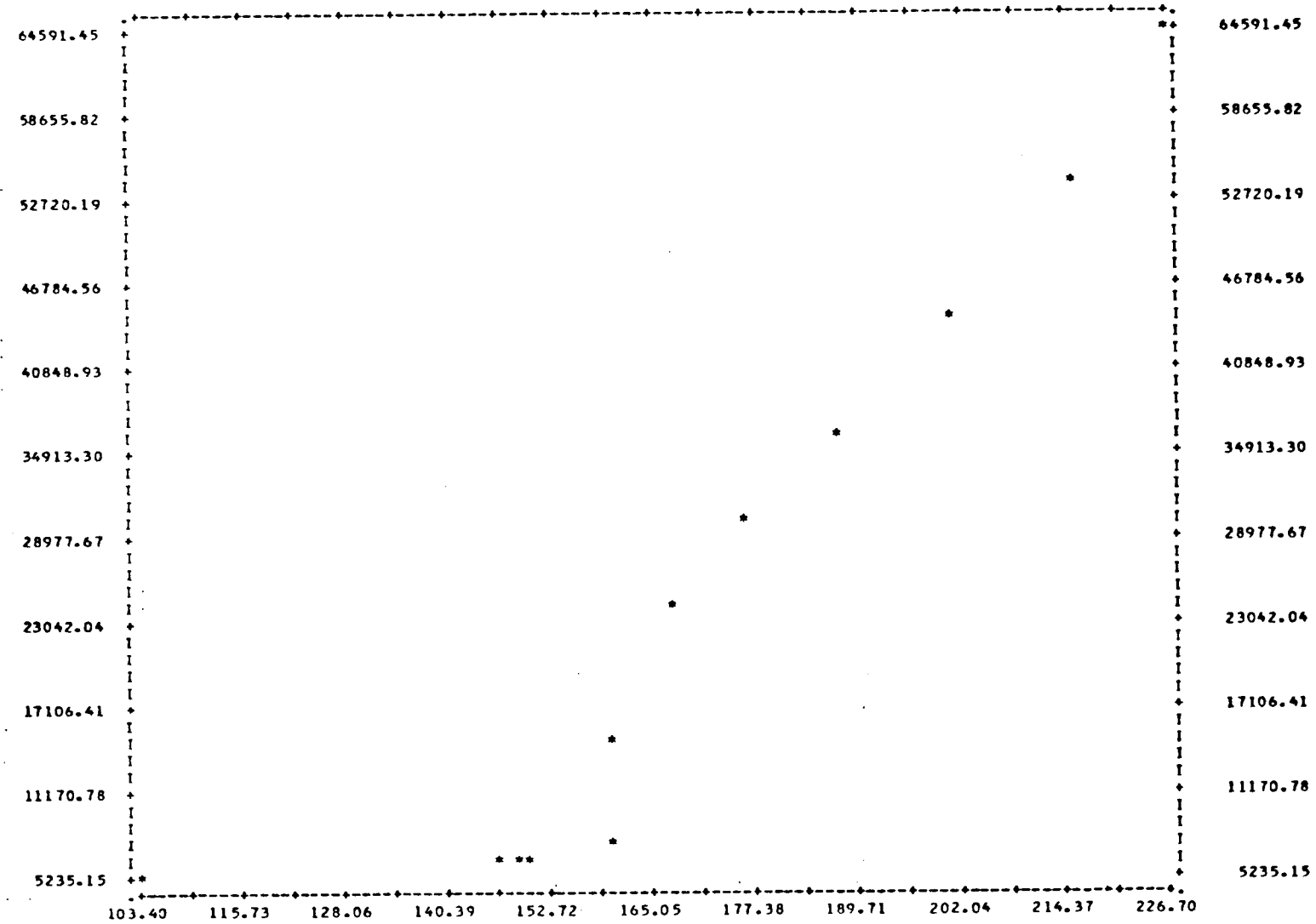

Figure 10. Total Educational Expenditures (ordinate) and the CPE Candidates (abscissa).

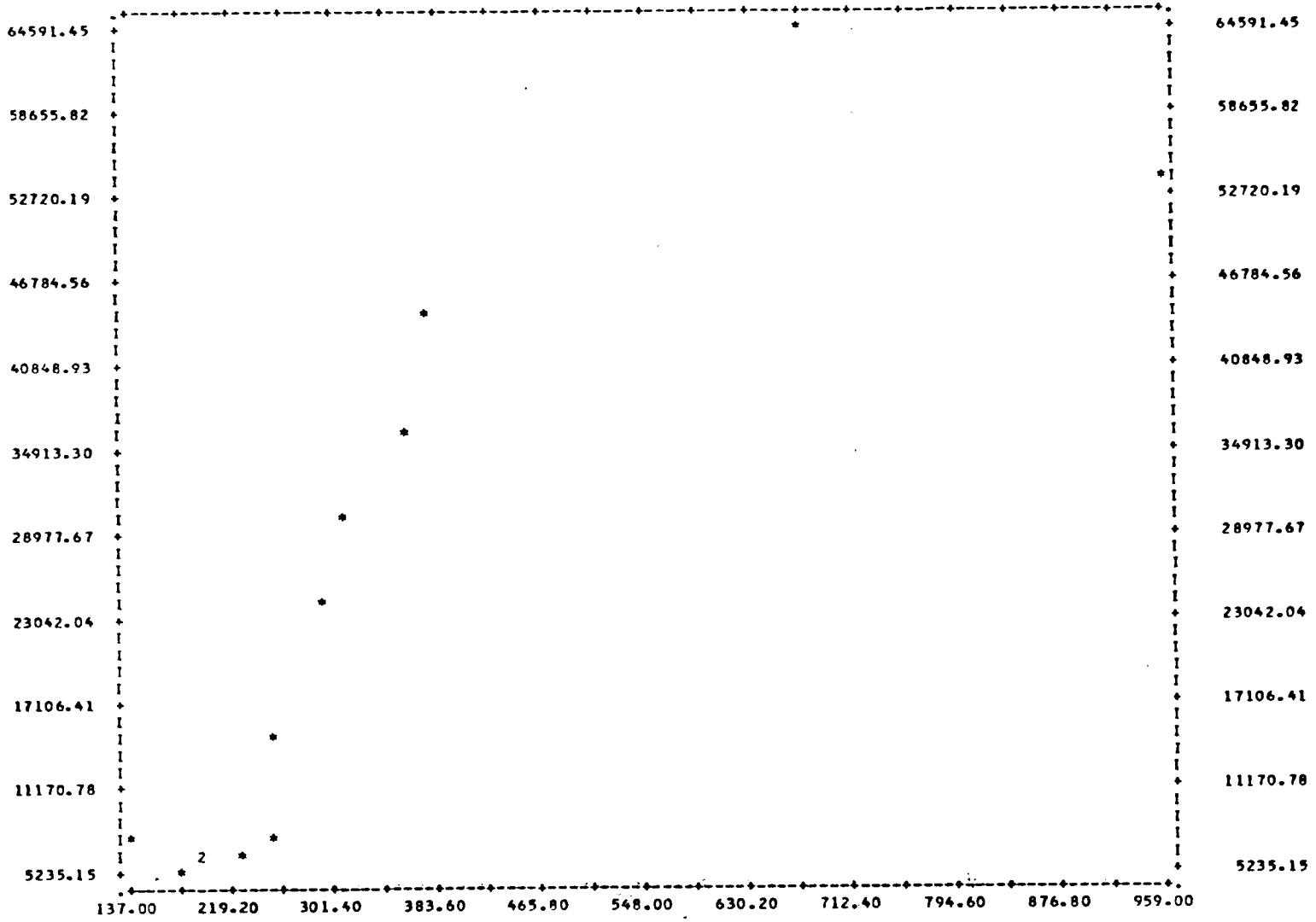

Figure 11. Total Educational Expenditures (ordinate) and the Standard I Enrollment (abscissa).

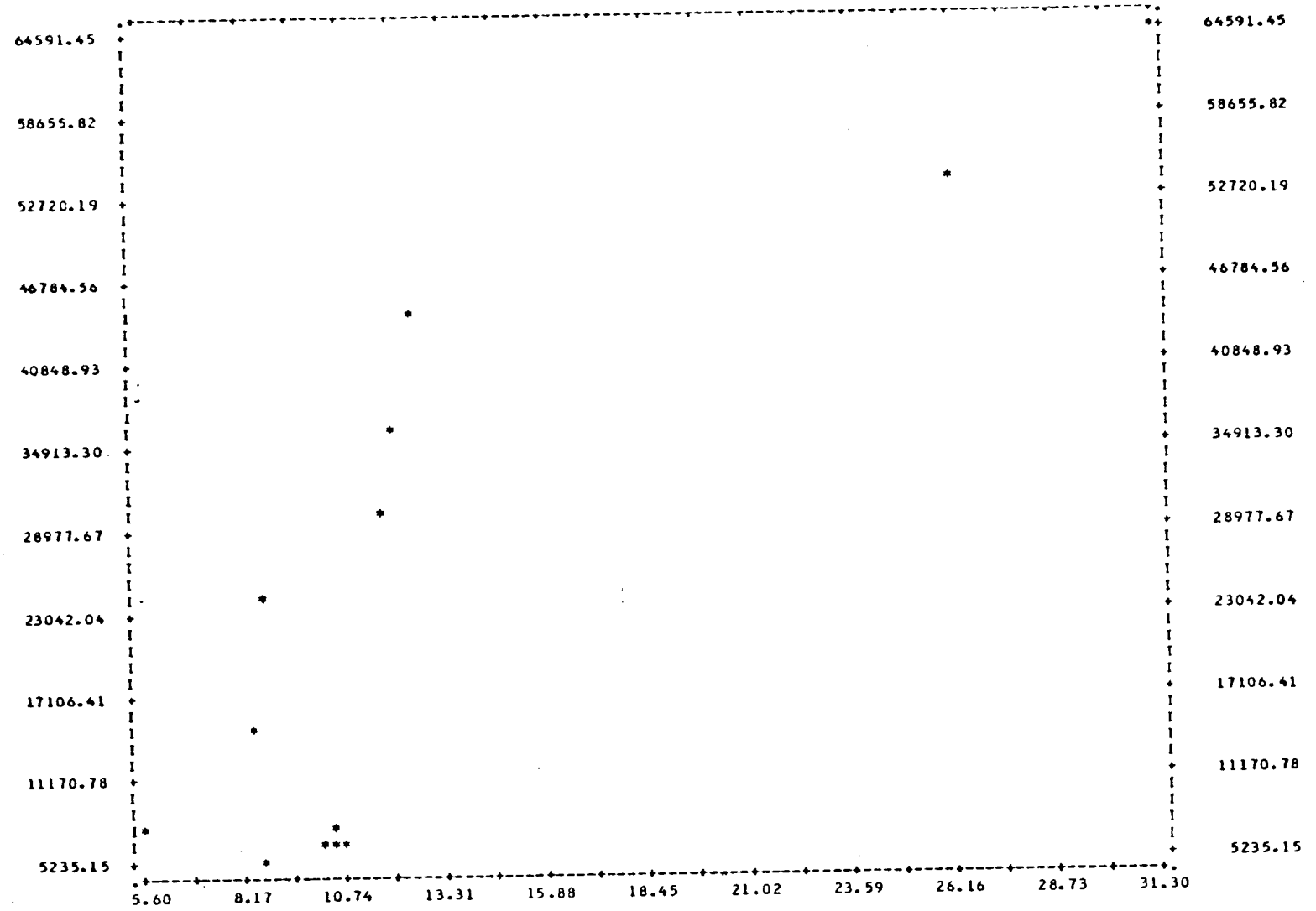

Figure 12. Total Educational Expenditures (ordinate) and the Primary Schools' Untrained Teachers (abscissa).

Figure 2: Total educational expenditures and total government revenue: $r = 0.9829$ $r^2 = 0.9661$ $a = -8911.77$ $b = 0.33$

Regression Equation: $Y' = -8911.77 + 0.33\ X_2 \pm 3999.78\ (1.96)$

Figure 3: Total educational expenditures and primary education expenditure: $r = 0.9908$ $r^2 = 0.9817$ $a = 7803.91$ $b = 1.55$

Regression Equation: $Y' = 7803.91 + 1.55\ X_3 \pm 2889.84\ (1.96)$

Figure 4: Total educational expenditures and higher education expenditure: $r = 0.9853$ $r^2 = 0.9708$ $a = -695.79$ $b = 8.18$

Regression Equation: $Y' = -695.79 + 8.18\ X_4 \pm 3633.69\ (1.96)$

Figure 5: Total educational expenditures and primary schools trained teachers: $r = 0.9755$ $r^2 = 0.9516$ $a = -29756.11$ $b = 1667.72$

Regression Equation: $Y' = -29756.11 + 1667.72\ X_5 \pm 4689.15\ (1.96)$

Figure 6: Total educational expenditures and secondary technical schools teachers: $r = 0.9446$ $r^2 = 0.8923$ $a = -28712.83$ $b = 314862.91$

Regression Equation: $Y' = -28712.83 + 314862.91\ X_6 \pm 5133.09\ (1.96)$

Figure 7: Total educational expenditures and primary schools enrollment: $r = 0.9577$ $r^2 = 0.9172$ $a = -22170.43$ $b = 30.70$

Regression Equation: $Y' = -22170.43 + 30.70\ X_7 \pm 6128.34\ (1.96)$

Figure 8: Total educational expenditures and university enrollment: $r = 0.9835$ $r^2 = 0.9673$ $a = -1663.79$ $b = 11260.07$

Regression Equation: $Y' = -1663.79 + 11260.07\ X_8 \pm 3854.46\ (1.96)$

Figure 9: Total educational expenditures and EACE Candidates: $r = 0.9779$ $r^2 = 0.9562$ $a = -6362.94$ $b = 1585.46$

Regression Equation: $Y' = -6362.94 + 1585.46\ X_9 \pm 4451.08\ (1.96)$

Figure 10: Total educational expenditures and CPE Candidates: $r = 0.9301$ $r^2 = 0.8651$ $a = -70917.08$ $b = 567.35$

Regression Equation: $Y' = -70919.08 + 567.35\ X_{10} \pm 7972.33\ (1.96)$

Figure 11: Total educational expenditures and Standard 1 enrollment: $r = 0.8527$ $r^2 = 0.7271$ $a = -1367.65$ $b = 75.74$

Regression Equation: $Y' = -1367.65 + 75.74\ X_{11} \pm 11127.02\ (1.96)$

Figure 12: Total educational expenditures and primary schools' untrained teachers: $r = 0.8371$ $r^2 = 0.7001$ $a = -5388.93$ $b = 2314.17$

Regression Equation: $Y' = -5388.93 + 2314.17\ X_{12} \pm 11651.00\ (1.96)$

In the regression equations above, Y stands for the total educational expenditure and X stands for each respective independent variable. The probability level is .05.

IV. PREDICTION OF TOTAL EDUCATIONAL EXPENDITURES THROUGH STEPWISE MULTIPLE REGRESSION

In order to be able to predict the total educational expenditures on the basis of the 27 economic-educational variables, three types of information were required--the multiple regression equation, the coefficient of multiple correlation and the beta weights.

A multiple regression prediction equation has the same basic form as the simple regression equation of one predictor variable, but several predictor variables are involved each represented by a different X symbol. This equation is expressed as: $Y' = B_1X_1 + B_2X_2 + B_3X_3 \ldots B_kX_k$.

The coefficient of multiple correlation R provides an index of the accuracy of the prediction equation. The coefficient of multiple correlation R can be thought of as a simple Pearson correlation between the actual value of a simple Pearson correlation between the actual value of Y variable. Thus, if R is equal to +1.00, it would indicate that the predicted value correlates perfectly with the actual value of criterion variable.

Regression coefficients and beta weights: in a multiple regression prediction equation, the numbers that precede each of the predictor variables are called regression coefficients. These regression coefficients cannot be compared against one another in an attempt to determine which of the various predictor variables is the best predictor, because the predictor variables in the actual prediction equation are not on the same scale of measurement.

It is, however, possible to convert the regression coefficients into comparable units called beta weights. There will be one beta weight for each predictor variable and the beta weights can be thought of as the regression coefficients that would have been obtained if the various predictor variables were equal to one another in terms of means and standard deviations. The predictor variable that has the largest beta weight, disregarding whether the beta weight is positive or negative, is the best predictor. Conversely, a small beta weight indicates that the corresponding predictor variable is not contributing to successful prediction as much as the other predictor variables. Working with beta weights enables one to simplify the regression equation since

the constant a (the Y intercept) is always equal to zero and therefore can be omitted.

To determine the best predictors of total educational expenditure from the 27 economic-educational variables, seven stepwise multiple regressions were carried out and the results are shown in Tables XIII through XIX.

Stepwise 1

In this analysis the 27 independent variables were included. Secondary school enrollment was shown to be the best predictor of total educational expenditure with the highest beta weight of 0.46982. Other variables included in the multiple regression equation were: teacher's training college enrollments, primary education expenditure and special schools enrollment. The multiple regression prediction equation was:

$$Y' = 0.46982\ X_1 + 0.29626\ X_2 + 0.19429\ X_3 + 0.05047\ X_4$$

Stepwise 2

The four variables included in the equation above were omitted from the second run. A stepwise multiple regression equation was therefore repeated with the 23 independent variables. Secondary school teachers were shown to be the best predictor of the total educational expenditure with the highest beta weight of 1.06943. Other variables included in the equation were administration expenditure, university enrollment, and secondary education expenditure. This multiple

TABLE XIII

STEPWISE 1

Variable	Multiple R	R Square	Beta
Secondary School Enrollment	0.99501	0.99005	0.46982
Teachers College Enrollment	0.99937	0.99874	0.29626
Primary Education Expenditure	0.99997	0.99995	0.19429
Special Schools Expenditure	1.00000	1.00000	0.05047

TABLE XIV

STEPWISE 2

Variable	Multiple R	R Square	Beta
Secondary School Teachers	0.99366	0.98737	1.06943
Administration Expenditure	0.99958	0.99916	0.28583
University Enrollment	0.99999	0.99998	-0.36010
Secondary Education Expenditure	1.00000	1.00000	-0.04620

TABLE XV

STEPWISE 3

Variable	Multiple R	R Square	Beta
Total Government Expenditure	0.99344	0.98693	0.73760
Technical Education Enrollment	0.99928	0.99857	0.27706
EACE Passes	0.99968	0.99936	-0.16884
Standard 1 Enrollment	1.00000	1.00000	-0.17020

TABLE XVI

STEPWISE 4

Variable	Multiple R	R Square	Beta
EACE Candidates	0.99250	0.98506	2.65797
Technical Secondary School Teachers	0.99537	0.99077	-0.69356
CPE Passes	0.99967	0.99935	-1.16831
CPE Candidates	1.00000	1.00000	0.17731

TABLE XVII

STEPWISE 5

Variable	Multiple R	R Square	Beta
Total Education Enrollment	0.99164	0.98336	0.28834
Teacher Training College Tutors	0.99671	0.99343	0.31217
Total Government Revenue	0.99988	0.99976	0.52690
Teacher Education Expenditure	1.00000	1.00000	-0.05749

TABLE XVIII

STEPWISE 6

Variable	Multiple R	R Square	Beta
Primary School Enrollment	0.99081	0.98171	0.88666
Gross National Product	0.99310	0.98625	-0.97145
Technical Education Expenditure	0.99793	0.99587	0.73324
Higher Education Expenditure	0.99920	0.99841	0.36275

TABLE XIX

STEPWISE 7

Variable	Multiple R	R Square	Beta
Primary Trained Teachers	0.98862	0.97342	1.12962
Primary Untrained Teachers	0.99291	0.98587	-0.18137

regression prediction equation was:

$$Y' = 1.06943\ X_5 + 0.28583\ X_6 - 0.36010\ X_7 + 0.04602\ X_8$$

Stepwise 3

In the third run, the eight variables discussed above were left out and a stepwise multiple regression was carried out with the remaining variables. During this run total government expenditure came out as best predictor of total educational expenditure with the highest beta weight of 0.73760. Included in this equation were technical education enrollment, EACE passes and Standard 1 enrollment. The multiple regression equation was:

$$Y' - 0.73760\ X_9 + 0.27706\ X_{10} + 0.16884\ X_{11} - 0.17020\ X_{12}$$

Stepwise 4

Twelve variables dealt with in the last three equations were now excluded from the fourth run and of the remaining fourteen variables EACE candidates was the best predictor of total educational expenditure with a beta weight of 2.65797. In the equation were also included technical secondary schools teachers, CPE passes and CPE candidates. The multiple regression prediction equation was:

$$Y' = 2.65797\ X_{13} - 0.69356\ X_{14} - 1.16831\ X_{15} + 0.17731\ X_{16}$$

Stepwise 5

The remaining variables were then subjected to a similar analysis and total government revenue was shown as the best predictor for the total educational expenditure with the highest beta weight of 0.52690. Included together with total government revenue were total educational

enrollment, teacher's training colleges tutors and the teacher education expenditure. The multiple regression prediction equation was:

$$Y' = 0.28834\ X_{17} + 0.31217\ X_{18} + 0.52690\ X_{19} - 0.05740\ X_{20}$$

Stepwise 6

When the sixth run was done only seven variables were included and Gross National Product given as the best predictor of total educational expenditure with the highest beta weight of -0.97145. Other variables included in the equation were primary school enrollment, technical educational expenditure and higher educational expenditure. The multiple regression equation was:

$$Y' = 0.88666\ X_{21} - 0.97145\ X_{22} + 0.73324\ X_{23} + 0.36275\ X_{24}$$

Stepwise 7

The three remaining variables were then analyzed through the same procedure and primary trained teachers were the best predictors of the three variables. When primary untrained teachers was added, they accounted for the total variation and, therefore, the third variable, the total primary teachers, was not included in the equation. Total primary teachers is also a linear function of the two variables included in the equation as follows:

$$Y' = 1.12962\ X_{25} - 0.18137\ X_{26}$$

In the above equations Y stands for the total educational expenditures as the dependent variable and X stands for the independent variables.

Best Predictors of Total Educational Expenditures According to Variable Clusters

In the analysis of these data it was considered useful to find out the best predictors from different variable clusters. This would enable policy-makers to compare different educational expenditure predictions or feel confident to use the available variable clusters where a whole set of 27 variables is not readily available.

Stepwise multiple regression procedures were applied to the economic variables, expenditure by level variables, enrollment variables, teaching labor force variables and the examination variables. Tables XX to XXIV give the results of these regressions.

From these tables it is observed that all the three economic variables were included in the multiple regression prediction equation in which the total government expenditure, with the highest beta weight, of 2.23908 was the best predictor of the total educational expenditure. Regression analysis of education expenditures by levels showed technical education expenditure as the best predictor with a beta weight of 0.54828. Primary education expenditure, higher education expenditure and secondary education expenditure were also included in the equation. Analysis of the enrollments showed the university enrollment to be the best predictor with the highest beta weight of 0.33696. Other variables included in the equation were secondary school enrollment, teacher training colleges enrollment and the technical schools enrollment. The teaching labor force was the fourth variable cluster to be analyzed. In this cluster secondary schools

TABLE XX

ECONOMIC VARIABLES AND TOTAL EDUCATIONAL EXPENDITURES

Variable	Multiple R	R Square	Beta
Total Government Expenditure	0.99344	0.98693	2.23908
Gross National Product	0.99566	0.99133	-1.73174
Total Government Revenue	0.99918	0.99836	0.49522

TABLE XXI

EDUCATION EXPENDITURES BY LEVELS AND TOTAL EDUCATIONAL EXPENDITURES

Variable	Multiple R	R Square	Beta
Primary Education Expenditure	0.98707	0.97432	0.33190
Higher Education Expenditure	0.99689	0.99379	0.51542
Technical Education Expenditure	0.99843	0.99686	0.54828
Secondary Education Expenditure	0.99997	0.99994	-0.37854

TABLE XXII

EDUCATIONAL ENROLLMENTS AND TOTAL EDUCATIONAL EXPENDITURES

Variable	Multiple R	R Square	Beta
Secondary School Enrollment	0.99501	0.99005	0.31748
Teachers Training Colleges Enrollment	0.99937	0.99874	0.19501
University Enrollment	0.99975	0.99949	0.33696
Technical Schools Enrollment	0.99999	0.99999	0.16517

TABLE XXIII

THE TEACHING LABOR FORCE AND TOTAL EDUCATIONAL EXPENDITURES

Variable	Multiple R	R Square	Beta
Secondary Schools Teachers	0.99366	0.98737	0.86265
Technical Schools Teachers	0.99552	0.99106	-0.02263
Teacher Training Colleges Tutors	0.99574	0.99150	-0.08946
Primary Trained Teachers	0.99580	0.99162	0.23418

TABLE XXIV

EXAMINATIONS AND TOTAL EDUCATIONAL EXPENDITURES

Variable	Multiple R	R Square	Beta
EACE Candidates	0.99250	0.98506	1.97927
EACE Passes	0.99344	0.98693	0.24906
CPE Candidates	0.99409	0.98822	-0.34612
CPE Passes	0.99549	0.99101	-0.89918

teachers was the best predictor of total educational expenditures with the highest beta weight of 0.86265. The regression prediction equation also included technical schools teachers, teacher training colleges tutors and primary trained teachers. Examinations was the last variable cluster to be analyzed and EACE candidates came out as the best predictor with the highest beta weight of 1.97927. All the variables were included in this multiple regression prediction.

Multicollinearity

High intercorrelation between independent variables is one of the most vexing and perplexing problems in the multiple regression analysis especially of time series data. The problem of high intercorrelation between independent variables is frequently referred to as the problem of multicollinearity. In the extreme case, two or more of the independent variables may be so highly correlated that their separate effects upon the dependent variables cannot be distinguished.

According to Norman H. Nie, C. Hadlai Hull, Jean A. Jenkins, Karin Steinbrenner and Dale H. Bent, if at least one of the independent variables is a perfect linear function of one or more other independent variables in the equation, the coefficients may not be uniquely determined. One of the uses of multiple regression as an interpretive tool is to evaluate the relative importance of the independent variables. The more strongly correlated the independent variables are the greater the need for controlling the confounding effects. The authors added that the greater the intercorrelation of the independent variables, the

less the reliability of the partial regression coefficients. They suggested two solutions to the problem of multicollinearity:

> 1. Create a new variable which is a composite scale of the set of highly intercorrelated variables and was the new scale variables in the regression equation in place of its components, or;
>
> 2. Use only one of the variables in the highly correlated set to represent the common underlying dimension.[1]

Table XII (p. 95) referred to earlier, showed very high intercorrelations between independent variables. It was shown that 18 correlations coefficients between various independent variables were above 0.9900 and all the correlation coefficients were above 0.50000. Thus, although none of the independent variables showed a perfect linear function of one or more other independent variables in the equation, yet the researcher considered it necessary to apply one of the suggestions offered by the authors above and compare the results from the component variables.

Creation of New Variables

Four new independent variables were created from the components of the four variable clusters by adding together the components of each variable cluster and averaging them into a single variable. The following variables were then created:

1. Economic variable
2. Enrollment variable

---

[1]Norman H. Nie, C. Hadlai Hull, Jean A. Jenkins, Karin Steinbrenner, Dale H. Bent. op. cit., pp. 340-341.

3. Teaching labor force variable

4. Examination variable

The variable cluster entitled "Educational Expenditures by Levels" was eliminated altogether as it was considered spurious to run a regression analysis of the sum of educational expenditures by levels or even its average with the total educational expenditure as the dependent variable.

Table XXV shows that the correlation coefficients between total education expenditure and the new variables were just as high as they were in the component variables. All the correlation coefficients were above 0.9000. The intercorrelations between the independent variables were relatively lower in Table XXV than they were in Table XII (p. 95). Whereas, 18 coefficients in Table XII (p. 95) were above 0.9000, in Table XXVI the highest correlation coefficient was 0.9861.

The similarity between the correlations of the created variables and the correlations of component variables was also demonstrated when scattergrams were drawn between total educational expenditures and the new variables. It was shown, for example, that Figure 13 was similar to Figures 8 and 9 (pp. 105, 106), Figure 14 was very similar to Figures 1 and 11 (pp. 98, 108), Figure 15 was similar to Figures 3 and 12 (pp. 100, 109) and Figure 16 was also similar to Figures 7 and 8 (pp. 104, 105).

Stepwise multiple regression analysis was carried out between total educational expenditures and the four created independent variables. Enrollment variable was shown to be the best predictor with the highest

3. Teaching labor force variable

4. Examination variable

The variable cluster entitled "Educational Expenditures by Levels" was eliminated altogether as it was considered spurious to run a regression analysis of the sum of educational expenditures by levels or even its average with the total educational expenditure as the dependent variable.

Table XXV shows that the correlation coefficients between total education expenditure and the new variables were just as high as they were in the component variables. All the correlation coefficients were above 0.9000. The intercorrelations between the independent variables were relatively lower in Table XXV than they were in Table XII (p. 95). Whereas, 18 coefficients in Table XII (p. 95) were above 0.9000, in Table XXVI the highest correlation coefficient was 0.9861.

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Stepwise multiple regression analysis was carried out between total educational expenditures and the four created independent variables. Enrollment variable was shown to be the best predictor with the highest

TABLE XXV

CORRELATION BETWEEN EDUCATIONAL EXPENDITURES AND THE CREATED VARIABLES

	Educational Expenditures	Economic Variable	Enrollment Variables	Teachers Variable	Examination Variable
Educational Expenditures	1.0000	0.9822	0.9285	0.9753	0.9537
Economic Variable	0.9822	1.0000	0.9571	0.9796	0.9679
Enrollment Variable	0.9285	0.9571	1.0000	0.9861	0.8681
Teachers Variable	0.9753	0.9796	0.9861	1.0000	0.9642
Examination Variable	0.9537	0.9679	0.8681	0.9642	1.0000

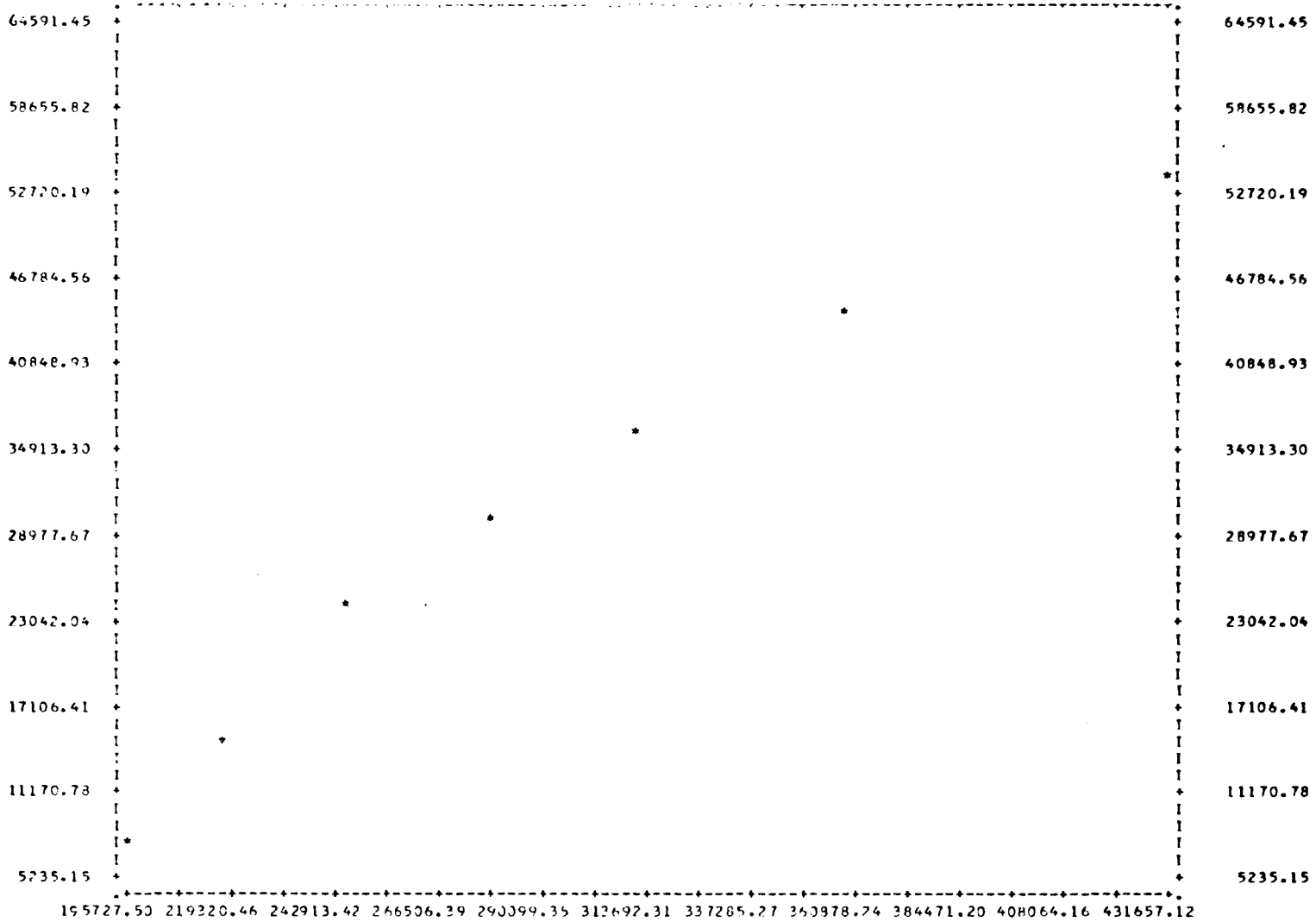

Figure 13. Total Educational Expenditures (ordinate) and the Economic Variables (abscissa).

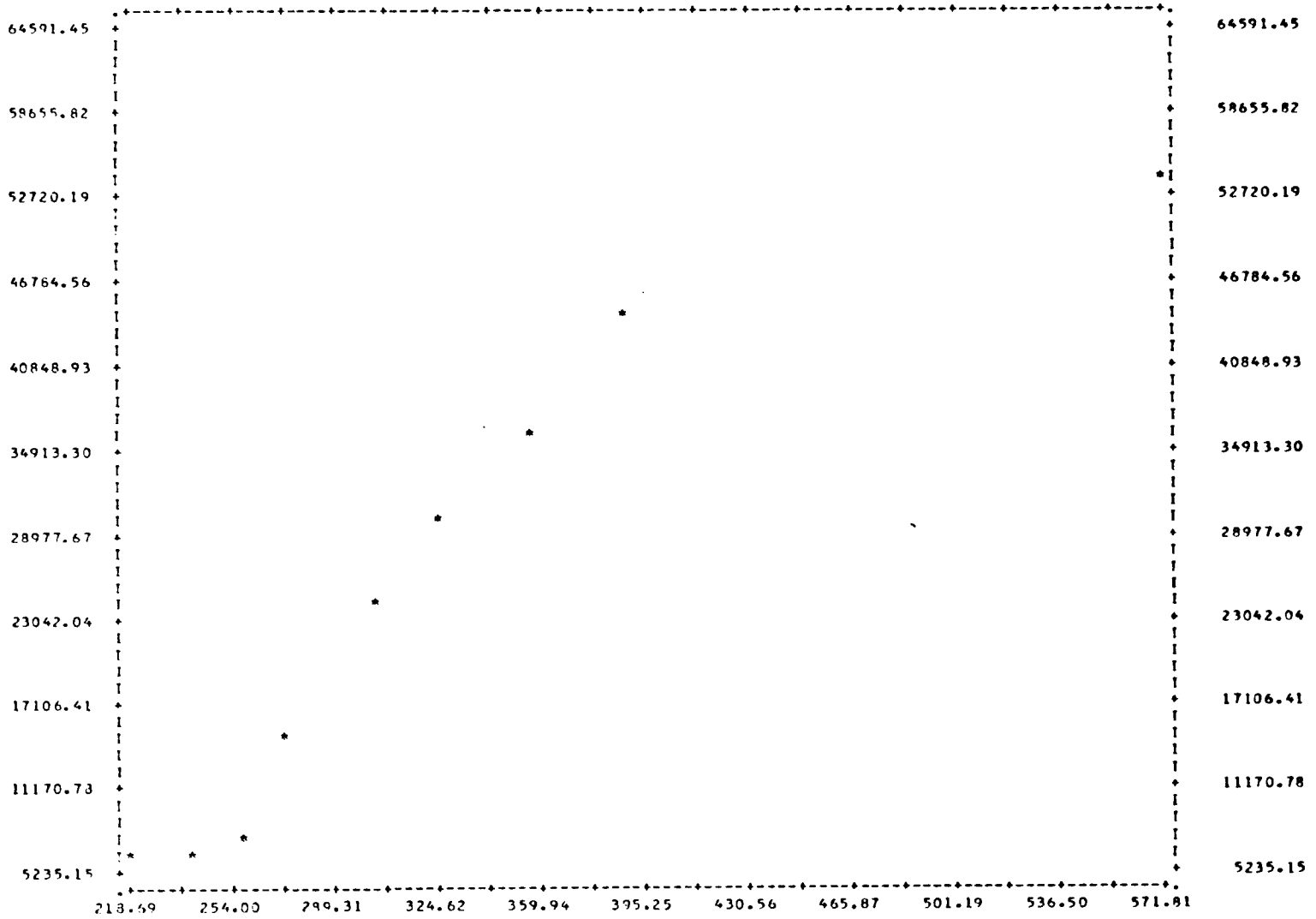

Figure 14. Total Educational Expenditures (ordinate) and the Enrollment Variables (abscissa).

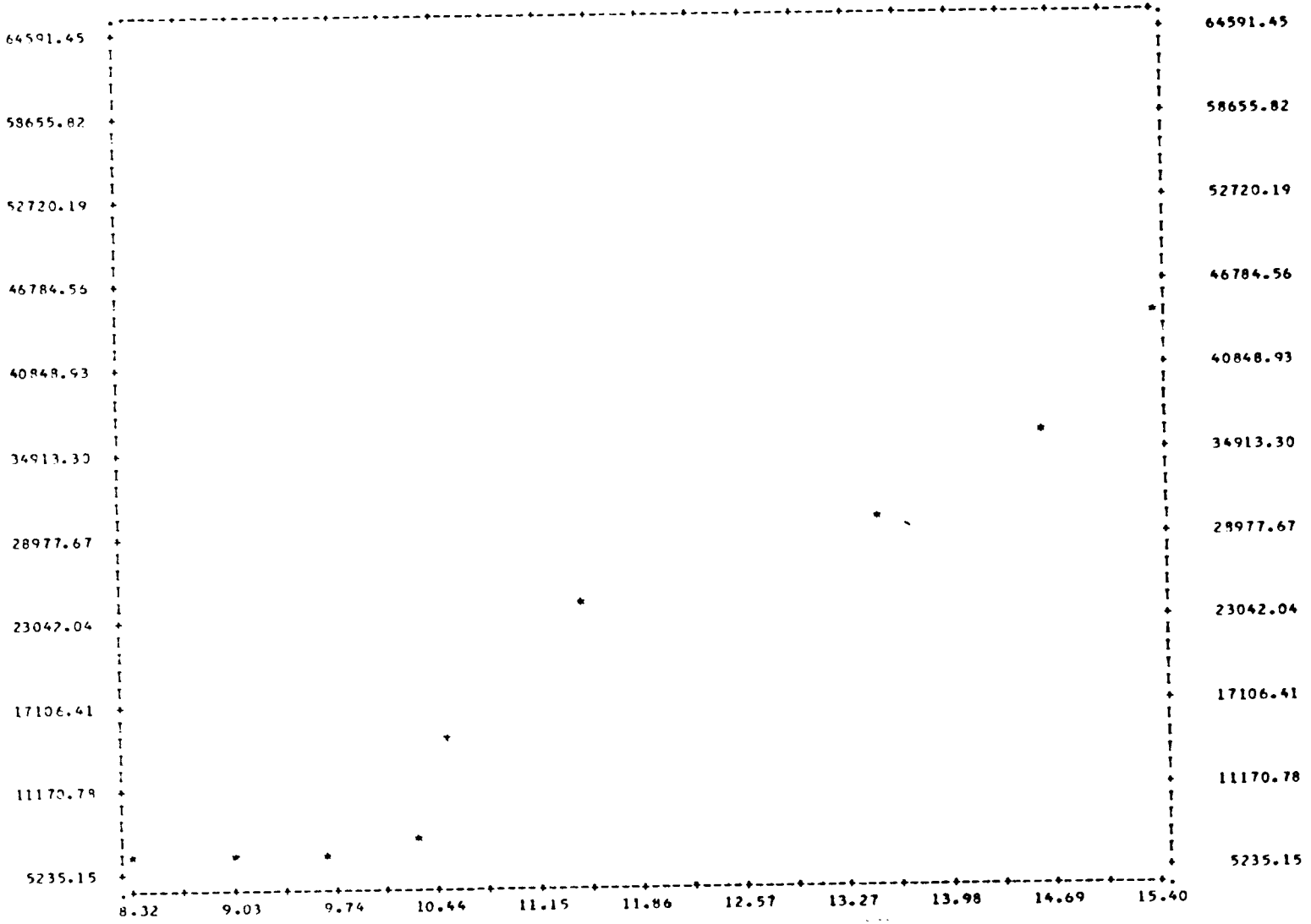

Figure 15. Total Educational Expenditures (ordinate) and the Teaching Labor Force Variable (abscissa).

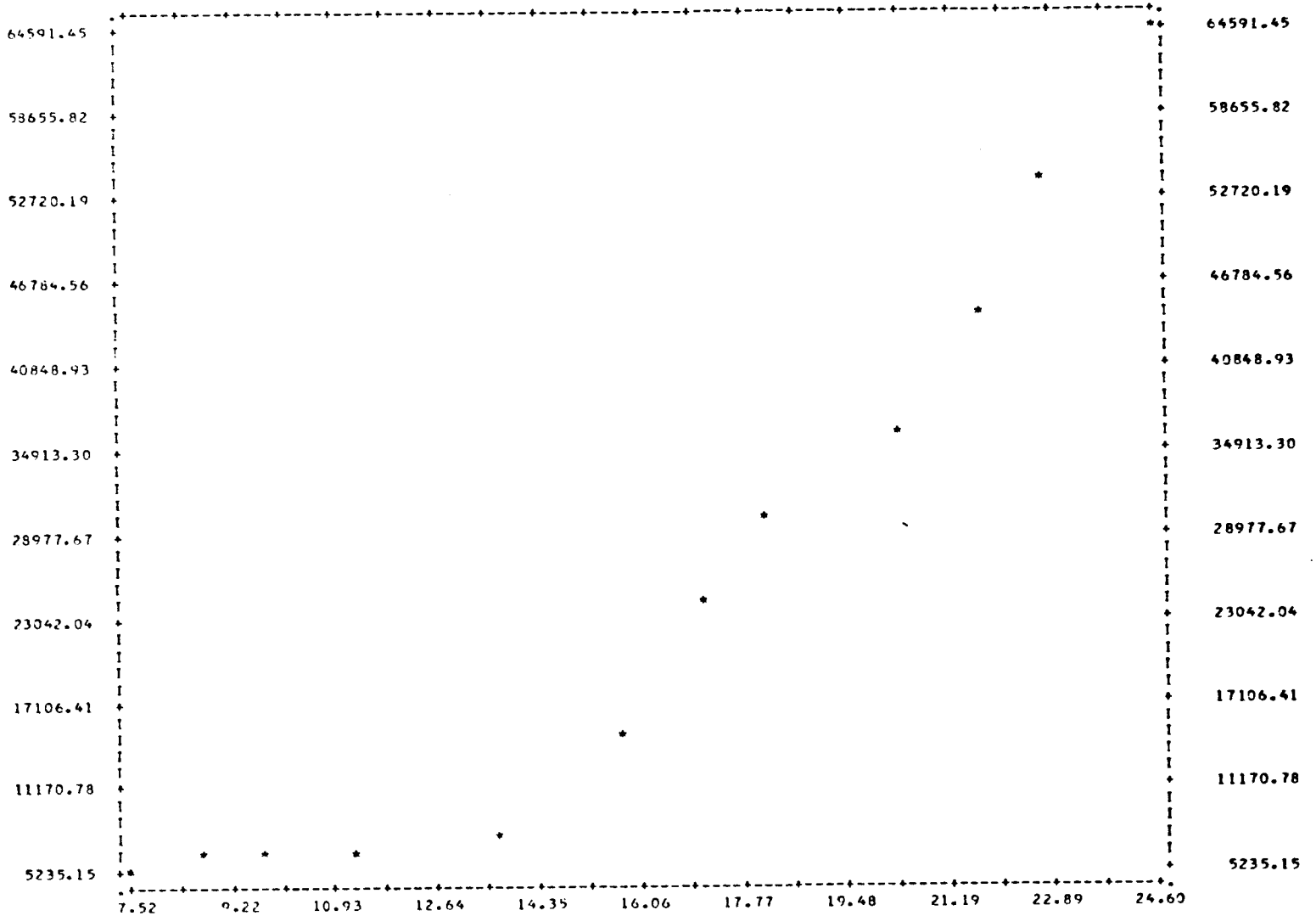

Figure 16. Total Educational Expenditures (ordinate) and the Examination's Variable (abscissa).

beta of 1.15363. Other variables included in the equation were examinations and the economy variables. The multiple regression prediction equation drawn from Table XXVI (p. 127) was:

$$Y' = 1.15363\ X_1 + 0.39237\ X_2 - 0.55324\ X_3$$

Research Findings

1. There is a very strong positive correlation between total educational expenditure and all the selected variables.

2. Change in any of the independent variables accounts for a high percentage of change in total educational expenditure.

3. There is a strong intercorrelation between the independent variables.

4. Any one of the selected variables can predict with a relatively high degree of accuracy the rise in educational expenditures. The error of prediction ranges from 2 percent for the highly correlated variables (total government expenditure and primary education expenditure) to 30 percent for primary untrained teachers, the lowest correlated variable.

5. When the effects of other variables were controlled, secondary school enrollment was shown to be the best predictor.

6. A combination of any four of the independent variables easily accounted for the total variation in total education expenditures.

7. Variables from the secondary school level of education (enrollment, teachers, expenditures and examinations) provided the best predictors when the effects of other variables were controlled.

8. The best predictors from respective clusters of variables were:

   a. Total government expenditure for the economy variables
   b. Primary school expenditure for the expenditure by levels variables
   c. Secondary school enrollment for the enrollment variables
   d. Secondary school teachers for the teaching labor force variable, and
   e. EACE candidates for the examination variables.

9. Enrollment was the best predictor among the new variables.
10. Multicollinearity did not impair the methodology of the study.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

I. SUMMARY

This study started on the premise that financing of education is an essential aspect of educational planning in Kenya. In the recent years the government's awareness of the importance of financial considerations in planning educational development in Kenya has been increased by the rising trend of government's expenditures on education. Total educational expenditures have been rising faster than the total government expenditure, the government recurrent revenue and the Gross National Product. The government's concern is, therefore, that if this rate of growth in educational expenditures continues, less resources will be available for other government services.

As stated in the first chapter, the problem of this study was, therefore, to analyze the relationship between the rise in total educational expenditures in Kenya between the years 1963 and 1975 and the rise in the some 27 economic-educational variables grouped into (1) economic variables, (2) educational expenditures by levels variables, (3) educational enrollment variables, (4) the teaching labor force variables, and (5) examination variables. A subproblem of the study was to find out which of the 27 economic-educational variables was the best predictor of the total educational expenditures and what combinations of variables were the best predictors. The purpose of the study was stated as to bring into focus the critical factors that have

contributed to the rising trend of total educational expenditures. This, it was suggested, would enable policy-makers to give more priority to these factors in their efforts to reverse the present trend.

The study was designed to investigate the presence of linear relationship between total educational expenditures and the 27 economic-educational variables, the direction and the strength of the relationship, if it exists, and which of the 27 economic-educational variables are the best predictors of total educational expenditures.

Data collected from the Ministry of Education's Annual Reports 1963-1974, the Economic Reviews 1974 to 1976, the Statistical Abstracts 1974 and 1975, the Government Development Plan 1974-1978 and from various sections of the Ministry of Education were analyzed in two chapters--Chapters III and IV. The third chapter utilized the procedures of unit costs, growth rates and teacher/pupil ratios to establish the case for the rising trend in total educational expenditures. The fourth chapter on the other hand utilized bivariate correlation analysis and stepwise multiple regression procedures to measure the relationship between total educational expenditures and the 27 economic-educational variables and to determine which of these variables were the best predictors of the total educational expenditures.

The analysis of growth rates for both the total educational expenditures and the economic variables showed that while the total government recurrent revenue was rising at an average growth rate of 12 percent, and the total government expenditure at an average growth rate of 15 percent, total educational expenditures were rising at an

average growth rate of 22 percent. It was also shown that while the unit costs for primary, secondary, technical and teacher education were rising during the study period, unit costs for higher education showed a declining trend. The bivariate correlation analysis showed a strong positive correlation between total educational expenditure and the 27 economic-educational variables. Stepwise multiple regression analysis showed that the secondary school enrollment was the best predictor of the total educational expenditures and that any 4 of the 27 economic-educational variables could account for the total variation in total educational expenditures.

II. CONCLUSIONS

From the study, it is concluded that since;

1. a. There is a very strong correlation between total educational expenditures and all the selected variables,

b. Change in any of the independent variables accounts for a high percentage of change in total educational expenditure, and

c. There is a strong intercorrelation between the independent variables:

efforts to control the rise in total educational expenditures should take into account all the educational-economic variables analyzed in the study. More attention should however be given to the variables that showed the highest correlations such as the primary education expenditure and the total government expenditures.

2. Since any one of the selected variables can predict with a relatively high degree of accuracy the rise in educational expenditures,

policy-makers can use any of the selected educational-economic variables to predict the rise in educational expenditures. Accuracy will however be improved if variables such as total government expenditures and primary education expenditure which were shown to have the highest coefficients of determination are used.

3. As secondary school enrollments in particular and all the variables from secondary school level of education were generally shown to provide best predictors when the effects of other variables were controlled it is concluded that change in variables from secondary school level of education reflect best change in total educational expenditures. When data in these variables are available they should be used to predict the rise in educational expentitures.

4. Since a combination of any four of the independent variables easily accounted for variation in total education expenditures, policy-makers can use a combination of any four variables to predict the rise in total educational expenditures.

5. Where policy-makers have access to only one of the five variable clusters studied accurate prediction of the rise in total educational expenditures can be made using total government expenditures for the economy variables, secondary school enrollment for the enrollment variables, secondary school teachers for the teaching labor force variables and EACE candidates for the examination variables.

6. Policy-makers can also collapse the 27 educational-economic variables into four variables: economy, enrollment, teaching labor force and the examination variable. If this is done enrollment

variable can be used to predict the rise in total educational expenditures.

II. RECOMMENDATIONS

1. As it was confirmed that total educational expenditures have been rising faster than economic variables, the teaching labor force, enrollment variables and the examination variables, it is recommended that efforts be made to reverse this trend. Growth in total educational expenditures should particularly be brought in line with the growth in total government revenues.

2. The government should take a comprehensive approach in its effort to control the rise in educational expenditures. Such an approach should include all the variables which were shown to be highly correlated with total educational expenditures.

3. Regression analysis and multiple regression analysis technique in particular should be used to predict the rise in educational expenditures. It is recommended that comparison should be made between educational expenditures forecasts based on unit costs and growth rates and educational expenditures based on regression analysis.

4. In either predicting or forecasting educational expenditures, the decision to use a single variable such as the secondary school enrollment, a combination of variables into a multiple regression equation or collapsing various clusters into single variables should depend on the availability of data and the professional judgement of the planner.

5. Further study. It is recommended that studies be carried out to find out the possiblility of designing new sources of educational finance.

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APPENDICES

APPENDIX A

AN SPSS PROGRAM USED TO COMPUTE THE GROWTH RATES

```
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X02   092542135 109484099 129829702 146091009 186484790 228578462             2
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X03   551670000 616050000 690140000 770890000 914780000                       2
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X28                       000000133 000000125 000000101 000000130 000000145   1
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RUN NAME        GROWTH RATES
```

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INPUT MEDIUM    DISK
N OF CASES      UNKNOWN
INPUT FORMAT    FIXED(6X,7(F9.0,1X)/6X,6(F9.0,1X))
MISSING VALUES  ALL(0)
COMPUTE         GR01=(Y964-Y963)/Y963*100
COMPUTE         GR02=(Y965-Y964)/Y964*100
COMPUTE         GR03=(Y966-Y965)/Y965*100
COMPUTE         GR04=(Y967-Y966)/Y966*100
COMPUTE         GR05=(Y968-Y967)/Y967*100
COMPUTE         GR06=(Y969-Y968)/Y968*100
COMPUTE         GR07=(Y970-Y969)/Y969*100
COMPUTE         GR08=(Y971-Y970)/Y970*100
COMPUTE         GR09=(Y972-Y971)/Y971*100
COMPUTE         GR10=(Y973-Y972)/Y972*100
COMPUTE         GR11=(Y974-Y973)/Y973*100
COMPUTE         GR12=(Y975-Y974)/Y974*100
ASSIGN MISSING  GR01 TO GR12(0)
LIST CASES      CASES=28/VARIABLES=GR01 TO GR12/
CONDESCRIPTIVE  GR01 TO GR12
STATISTICS      1,5
READ INPUT DATA
FINISH
```

APPENDIX B

AN SPSS PROGRAM USED FOR ANALYSIS OF UNIT COSTS, TEACHER PUPIL RATIOS, PEARSON, r AND STEPWISE MULTIPLE REGRESSION

```
//STEP1 EXEC SPSS6
//FT08F001 DD *
1963  008253474 042607096                    001697857 0920180 0137000        1
1963  0892000 0023200 0227381 1371618 0352608 0606799          0621682        2
1963          17200 05600 22800       04882 02986 4610      0370 1380        3
1963                                                                           4
1964  005235150 044818322 346080000          000282225 1047810 0180000        1
1964  1015000 0027500 0192012 1733732 0441734 0783859          0686699        2
1964  0103400 19200 08600 27800 11500 05362 03531 4820      0490 1570        3
1964                                                                           4
1965  006772207 049670012                    000378002 1081400 0196000        1
1965  1042000 0033600 0316441 2683161 0609051 0967660          0743796        2
1965  0148900 20300 10700 31000 12800 06462 04499 5120      0680 1790        3
1965  366 133                                                                  4
1966  006539300 054635988           053415000 000058644 1093440 0194000        1
1966  1043000 0041200 0287279 2850646 0621930 1102821          1057625        2
1966  0146900 23300 10200 33500 14500 07212 05015 5470 2900 0870 2040        3
1966  400 125                                                                  4
1967  007596071 058792064           059647000 000042189 1192590 0229000        1
1967  1133000 0048400 0349234 3729759 0586098 1125402 0073514 1280865        2
1967  0149700 25100 10600 35700 15700 10546 06929 5890 4170 1130 2320        3
1967  524 101                                                                  4
1968  008572310 061321800 460660000 065201000 000005361 1279310 0251000        1
1968  1210000 0056600 0399318 4454327 0548069 1185899 0097420 1444086        2
1968  0159700 27500 10400 37900 18900 14114 08369 6630 4920 1160 2720        3
1968  468 130                                                                  4
1969  015739858 073905647 502430000 076179000 003929347 1361940 0253000        1
1969  1282000 0065600 0509236 4708312 0695000 1257485 0102823 1847319        2
1969  0159900 30000 08300 38300 21200 18166 10089 7190 5420 1730 3060        3
1969  522 145                                                                  4
1970  025401302 092542135 551670000 092988000 010309799 1519470 0296000        1
1970  1428000 0074600 1077231 5489785 0793987 1275499 0144000 3395383        2
1970  0166900 32900 08600 41500 22500 20678 11631 8020 6550 2300 3530        3
1970  575 143                                                                  4
1971  031301936 109484099 616050000 107806000 012654900 1623770 0307000        1
1971  1525000 0080500 2627199 6328155 0997823 1506966 0164800 3830628        2
1971  0176100 37600 11600 49400 24300 24965 11835 8620 6810 2840 3700        3
1971  605 182                                                                  4
1972  037089108 129829702 690140000 117136000 016039663 1786540 0357000        1
1972  1676000 0091500 1843636 7232792 1042540 1570279 0174983 5199770        2
1972  0187600 41600 11900 53500 26700 25490 13972 8680 6820 3540 4120        3
1972  627 208                                                                  4
1973  044639900 146091009 770890000 160524000 024816446 1936150 0379000        1
1973  1816000 0099400 4905082 8364412 1312065 1632940 0191088 5156402        2
1973  0200300 43900 12600 56500 27300 31807 16163 9050 7250 4450 4270        3
1973  578 237                                                                  4
1974  054215475 186484790 914780000 193707000 033354406 2859050 0559000        1
1974  2734000 0102200 3885600 8169250 1607622 1803408 0205450 7328600        2
1974  0216200 48000 26200 74200 27600 36029 17977 9450 8120 5280 4500        3
1974  671                                                                      4
1975  064591461 228578462           231071000 035513758 3010070 0668000        1
1975  2881000 0106300 7675400 8926600 1835328 2160998 0212560 7092100        2
1975  0226700 54800 31300 86100 27800 42017 21405 9510      5140 4480        3
1975                                                                           4
//SYSIN DD *
RUN NAME        KENYA EDUC EXPEND
VARIABLE LIST   X01 TO X28
INPUT MEDIUM    DISK
N OF CASES      UNKNOWN
INPUT FORMAT    FIXED(6X,5(F9.0,1X),2(F7.0,1X)/6X,8(F7.0,1X)/
```

```
                6X,F7.0,1X,6(F5.0,1X),4(F4.0,1X)/6X,2(F3.0,1X))
VAR LABELS      X01,EDUCATIONAL EXPENDITURE/X02,TOTAL GOVT EXPENDITURE/X03,GROSS
                NATIONAL PRODUCT/X04,TOTAL GOVT REVENUE/X05,PRIMARY EDUCATION
                EXPENDITURE/X06,TOTAL EDUCATION ENROLMENT/X07,STD1 ENROLMENT/X08,
                PRIMARY SCHOOL ENROLMENT/X09,SECONDARY SCHOOL ENROLMENT/X10,
                ADMINISTRATION EXPENDITURE/X11,SECONDARY EDUCATION EXPENDITURE/
                X12,TECHNICAL EDUCATION EXPENDITURE/X13,TEACHER EDUCATION
                EXPENDITURE/X14,SPECIAL SCHOOLS EXPENDITURE/X15,HIGHER EDUCATION
                EXPENDITURE/X16,CPE CANDIDATES/X17,PRIMARY TRAINED TEACHERS/X18,
                PRIMARY UNTRAINED TEACHERS/X19,TOTAL PRIMARY TEACHERS/X20,CPE
                PASSES/X21,EACE CANDIDATES/X22,EACE PASSES/X23,TEACHERS COLLEGES
                ENROLMENT/X24,TECHNICAL EDUCATION ENROLMENT/X25,UNIVERSITY
                ENROLMENT/X26,SECONDARY TEACHERS/X27,TTC TEACHERS/X28,TECHNICAL
                SCHOOL TEACHERS/
MISSING VALUES  ALL(0)
COMPUTE         CU1=X01/X06
COMPUTE         CU2=X05/X08
COMPUTE         CU3=X11/X09
COMPUTE         CU4=X12/X24
COMPUTE         CU5=X13/X23
COMPUTE         CU6=X15/X25
COMPUTE         TP1=X08/X19
COMPUTE         TP2=X08/X17
COMPUTE         TP3=X09/X26
COMPUTE         TP4=X24/X28
COMPUTE         TP5=X23/X27
COMPUTE         VAR01=X01/1000
COMPUTE         VAR02=X03/1000
COMPUTE         VAR03=X04/1000
COMPUTE         VAR04=X05/1000
COMPUTE         VAR05=X15/1000
COMPUTE         VAR06=X17/1000
COMPUTE         VAR07=X28/1000
COMPUTE         VAR08=X08/1000
COMPUTE         VAR09=X25/1000
COMPUTE         VAR10=X21/1000
COMPUTE         VAR11=X16/1000
COMPUTE         VAR12=X07/1000
COMPUTE         VAR13=X18/1000
COMPUTE         EDV=X01/1000000
COMPUTE         ECV=(X02+X03+X04)/3000000
COMPUTE         ENV=(X08+X09+X23+X24+X25)/5000000
COMPUTE         TEV=(X19+X26+X28+X27)/4000000
COMPUTE         EXV=(X20+X22)/2000000
ASSIGN MISSING  CU1 TO CU6,TP1 TO TP5,VAR01 TO VAR13,ECV,ENV,TEV,EXV,EDV(0)
LIST CASES      CASES=13/VARIABLES=CU1 TO CU6,TP1 TO TP5/
CONDESCRIPTIVE  CU1 TO CU6,TP1 TO TP5
STATISTICS      1,5
READ INPUT DATA
PEARSON CORR    X01 TO X28 WITH X01 TO X28
PEARSON CORR    EDV,ECV,ENV,TEV,EXV WITH EDV,ECV,ENV,TEV,EXV
STATISTICS      5,6
REGRESSION      VARIABLES=X01,X02,X03,X04,X05,X06,X07,X08,X09,X10,X11,X12,X13,
                X14,X15,X16,X17,X18,X19,X20,X21,X22,X23,X24,X25,X26,X27,X28/
                REGRESSION=X01 WITH X02,X03,X04,X05,X06,X07,X08,X09,X10,X11,X12,
                X13,X14,X15,X16,X17,X18,X19,X20,X21,X22,X23,X24,X25,X26,X27,
                X28 (1)/
                REGRESSION=X01 WITH X02,X03,X04,X06,X07,X08,X10,X11,X12,X13,
                X15,X16,X17,X18,X19,X20,X21,X22,X24,X25,X26,X27,X28 (1)/
                REGRESSION=X01 WITH X02,X03,X04,X06,X07,X08,X12,X13,X15,X16,
                X17,X18,X19,X20,X21,X22,X24,X27,X28 (1)/
```

```
                REGRESSION=X01 WITH X03,X04,X06,X12,X08,X13,X15,X16,X17,X18,X19,
                X20,X21,X27,X28 (1)/
                REGRESSION=X01 WITH X03,X04,X06,X08,X13,X15,X17,X18,X19,X27,
                X12 (1)/
                REGRESSION=X01 WITH X03,X08,X15,X17,X18,X19,X12 (1)/
                REGRESSION=X01 WITH X18,X19,X17 (1)/
                REGRESSION=X01 WITH X02,X03,X04 (1)/
                REGRESSION=X01 WITH X05,X10,X11,X12,X13,X14,X15 (3)/
                REGRESSION=X01 WITH X06,X07,X08,X09,X23,X24,X25 (5)/
                REGRESSION=X01 WITH,X17,X18,X19,X26,X27,X28 (7)/
                REGRESSION=X01 WITH,X16,X20,X21,X22 (9)/
STATISTICS      ALL
REGRESSION      VARIABLES=EDV,ECV,ENV,TFV,EXV/
                REGRESSION=EDV WITH ECV,ENV,TFV,EXV (1)/
STATISTICS      ALL
SCATTERGRAM     EDV WITH ECV,ENV,TFV,EXV
SCATTERGRAM     VAR01 WITH VAR02 TO VAR13
STATISTICS      5,6
FINISH
```

VITA

Godfrey Mbiti Nguru was born in Mbere, Kenya on November 15, 1945. He received his primary education at Nyangwa primary school and his first four years of secondary school at Kangaru school in Embu. In 1965 he entered Kenyatta College for his last two years of secondary education. After six months of teaching at Siakago secondary school he joined the University of East Africa at Makerere University College, Kampala-Uganda in 1967. Three years later, in March 1970 he received his Bachelor of Education (B.Ed.) degree.

He started his teaching career at Nyangwa secondary school in April 1970 and transferred to Starehe Boys Centre in Nairobi the following year. In September 1971 he joined the University of Tennessee and was awarded the Master of Science degree in December 1972 and the Specialist in Education degree in June 1973 with a major in Educational Administration and Supervision.

He returned to Kenya in June 1973 and joined the Ministry of Education as an educational planner. In September 1974 he went to Paris, France where he took one year's advanced course work in Educational Planning at the International Institute for Educational Planning (IIEP)-UNESCO. In June 1975 he went back to his position in the Ministry of Education where he worked for three months before he joined the University of Nairobi as a lecturer in Education, Administration, Planning and Curriculum Development. He returned to the University of Tennessee to work on his doctoral dissertation and was awarded the Doctor of Education (Ed.D.) degree in June 1977.

He is married to the former Miss Betty Njoki Njuno of Kirinyaga, Kenya and has one son, Paul Mwai, and two daughters, Grace Turi and Anne Wambui.