PUBLIC EXPENDITURE IMPACT:
EDUCATION AND HEALTH,
INDONESIAN FAMILY PLANNING

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September 1985

CONTENTS

TABLES AND FIGURES

EXECUTIVE SUMMARY

This analysis examines, both retrospectively and prospectively, the impact of Indonesia's family planning program in two areas of public expenditure: education and health. Using the analysis of demographic data contained in "Demographic Background and Births Averted: Indonesian Family Planning, 1980-1984" (John A. Ross et al., USAID/Jakarta, 1985), two population projections are made for the period 1971-2001. One projection recognizes the effect of the family planning program, and the other purges its influence. Based on these projections, it was determined that with the program, 73.7 million births will have been averted between 1971 and 2001.

The impact of the program on the health sector, which was determined using these two projections, was found to be positive. Without the program, the health sector's expenditures in the year 2001 would reach Rp. 751 billion, while with the program, they would be approximately Rp. 414 billion in that year. (All values are expressed in 1984 constant prices.)

Educational sector expenditures were also found to be positively affected by the program. The cumulative savings for this sector over the period 1971-2001 were found to be Rp. 56 trillion. The total effect on government expenditures for health and education, with a family planning program in place, is to lower spending in these two sectors by 9% in 1981, 38% in 1991, and 41% in 2001.

Last, the returns to investment in family planning programs were examined by comparing actual and projected program expenditures under the assumption of "no program in place" with the annual savings resulting from the reduced birth rate when a program was in place. Although the analysis showed that the costs of running the program exceed the savings in the early years, net savings become positive in 1979 and continue to increase at a rapid speed. The projected net savings increased from Rp. 749 billion in 1984 to Rp. 1.6 trillion in 1988. The calculated internal rate of return for the project was found to be 40%. Using a third set of birth rate projections, where the effectiveness of the family planning program was assumed to be more limited, a sensitivity analysis was performed. The new IRR calculated for this projection was still found to be very significant at 31%.

In conclusion, it was found that Indonesia's family planning program, through its impact on population size, generates more savings to the government than it costs. Thus, public expenditures on family planning programs should be viewed positively as an economically justifiable investment.

I. INTRODUCTION

This paper, which is based on the data and findings of "Demographic Background and Births Averted: Indonesian Family Planning, 1980-1984" (John A. Ross, Terry Hull, Lulu D. Bost and David L. Piet, USAID/Jakarta, September 1985), analyzes the impact of Indonesia's family planning program on public expenditures for health and education. Building on Ross et al.'s conclusion that under the program, a signficant number of births have been averted due to contraceptive use, this paper's major finding is that the consequent long-term savings in estimated public health and education expenditures result in a very favorable benefit-cost performance for the family planning program.

A brief overview of the history and thrust of Indonesia's family planning program is provided first, followed by discussions of the demographic impact of the program, impacts on the health and education sectors, the impact on government expenditures, and returns to the investment in the program, respectively. The statistical appendix provides more detailed demogaphic data for the interested reader.

II. HISTORY OF THE INDONESIAN FAMILY PLANNING PROGRAM

Indonesia's national family planning program was officially started at the beginning of Repelita I (the first five-year development plan, 1969-1974). This clinic-based program covered six provinces in Java and Bali. In 1974, the Government of Indonesia made a major policy decision to change the tenor and speed of the clinic-based program to a community-based one known as the Village Family Planning (VFP) program. During Repelita II, program coverage was extended to ten more provinces (the Outer Island I provinces) and then to the country's remaining provinces during Repelita III. The expansion program was based on population size, density, and institutional and community readiness.

The National Family Planning Coordinating Board (BKKBN), a government agency reporting directly to the President, has the stated responsibility for coordinating, planning, supervising and evaluating all aspects of national family planning activities, both public and private. It does not directly provide contraceptive services to the public; rather, it coordinates and supplements the work of various other implementing units including government agencies and certain private organizations.

The ambitious goal of the family planning program is to reduce the level of fertility by 50% by 1990 to about 22 births per 1,000 persons. To achieve this, BKKBN has set up an extensive implementation network to motivate eligible couples, supported by nationwide contraceptive distribution centers and a comprehensive reporting and feedback system, which to date has been utilized for management, planning and supervision. Below, we discuss the primary strategies of the program: village family planning and urban programs.

Village Family Planning

From its pilot stage in 1974 through its expansion as a national model, VFP has been the mainstay of BKKBN's program. From its inception, priority was given to the 80% of the population living in rural areas. A reliable VFP

model was developed in Java/Bali, and that basic model is now being implemented throughout the 27 provinces by BKKBN. This model attempts to provide equity of information and services to every village in Indonesia through a progression of village family planning posts, sub-village posts and acceptor groups.

In each province, regency, sub-district and village, the BKKBN strategy is to:

- increase the number of new family planning acceptors and contraceptive prevalence;

- re-recruit program dropouts;

- shift acceptors to the more effective methods of fertility control;

- bring information and services closer to the people;

- increase community participation in the family planning program;

- increase the administrative, supervisory and managerial skills of BKKBN and implementing unit personnel; and

- integrate population and family planning programs into other sectors of community life.

As a model for the provinces on Java and Bali, where populations are dense, transportation and communications widespread, and supervisory staffs larger than on other islands, this style of VFP application has been highly successful. However, when one looks at this same application on the outer islands, certain problems emerge. In most of the outer island provinces, topography, transportation and communication, size of administrative areas, lack of fieldworkers and other supervisory staff, heterogeneous populations, and socio-cultural-religious and economic variations impinge on the successful implementation of VFP along Java/Bali lines. In most respects the philosophy and program implementation remain the same; it is with the provision of information and services that modifications will need to be made.

Urban Programs

Progress in urban areas has not kept pace with that in the rural areas. Although clinic-based family planning services have been available in cities since the start of the program, rural areas received, and continue to receive, priority attention because of the high percentage of Indonesia's people who currently live in rural areas.

The urban/rural ratio is changing rapidly, and between the 1971 and 1980 censuses, it shifted from 82.6% rural and 17.4% urban (1971) to 77.6% rural and 22.4% urban (1980). The ratio for 1984 is 75.6% rural/24.9% urban and it is projected to reach 70% and 30%, respectively, by the year 2000. Until recently, family planning program services have not been extended effectively to the country's major urban areas, particularly Jakarta.

Family planning services in urban areas, particularly the larger cities, are available through a wider range of public and private outlets than in the rural areas which are served almost entirely by the government family planning program. In urban areas, family planning information and contraceptives are offered through government hospitals, clinics and family planning centers; through private hospitals and clinics, through pharmacies and other commercial channels; and through private physicians and midwives.

However, it has not been possible to adapt the successful village family planning strategy to the cities. Indeed, various studies clearly show that the cities demand their own family planning strategy, especially in reaching the under-educated urban poor, let alone the low to middle income clientele. Both experience and research show that there is substantial latent demand for family planning in urban areas, but easy access to contraception in a familiar, informal setting is essential for its adoption. The foundations for the village program are the tight-knit community organization in a generally homogeneous population, an excellent distribution system and free supplies. Urban government clinics, where program services are provided, are poorly utilized by the populations they are meant to serve; neighborhoods are loose-knit and the population heterogeneous, so neighborhood communities are not strong, and the private sector service providers and service points are vastly under-utilized or over-priced. Although government involvement in meeting the contraceptive needs of the poor is essential, a successful program must extend beyond the limited and already stretched government delivery system to include the multi-faceted and more acceptable delivery channels of the private sector.

Measures of Program Success

Indonesia's family planning program is widely recognized as one of the most successful in the world. The program's success can be measured by a declining birth rate, the steadily increasing prevalence of contraceptive use, and a growing number of outlets for family planning information and contraceptive services. For example, the number of new family planning acceptors has increased from 3.2 million to 17.4 million during Repelita III (1979-1984), which constitutes about 129% of the targeted number of 13.5 million new acceptors. Since 1978 the percentage of Indonesian married women of reproductive age (MWRA) who are active contraceptive users, as monitored by BKKBN monthly service statistics, has doubled from 30% to 60%, reaching a current total of nearly over 14.4 million users. In the same period, the crude birth rate has dropped from 36 to 29 per 1000, while the number of family planning service points has increased from 65,000 to over 200,000. Success of the program can also be measured by the increasing awareness among all political, religious and cultural groups regarding the high costs of rapid population growth and the consequent gradual shift, especially in Java and Bali, in socio-cultural norms regarding family size from negative (pro-natalist) to positive (anti-natalist).

Well recognized factors that have contributed to the success of the program include: high level political commitment, steady economic growth, and a well organized, capably staffed and adequately funded BKKBN. This agency possesses organizational commitment, flexibility, innovative approaches to program planning and implementation, an open management system, and widespread participation in the program at the community level.

However, more difficult challenges now face BKKBN as it strives to maintain program momentum and improve program quality. In the coming years, the rapid gains recorded in the first 15 years will not be easily matched, as many of the new acceptors will have to come from segments of the population that the program has found difficult to reach, e.g., cities and remote areas in the outer islands. In addition, the large number of new cohorts of young marrieds who will soon be in need of contraceptive services threaten to overwhelm ongoing successful programs such as those on Java and Bali. Finally, providing a cost-effective contraceptive mix for new and continuing users will be a major issue for BKKBN to address.

III. PUBLIC EXPENDITURE IMPACT

BKKBN receives both routine and development funds from the Ministry of Finance. The funds are released based upon reasonably detailed annual budgets and are mainly utilized at the provincial level by officials of BKKBN and other government agencies and by non-governmental organizations to carry out activities agreed upon in advance. BKKBN's budget, inclusive of donor support, has increased steadily from $4.6 million equivalent in 1970 to $56.2 million equivalent in 1979. During the 1980-1984 period, BKKBN's budget increased to a high of $119.8 million in 1982, but across the board budget cuts in 1983 reduced the budget to $75.8 million. The 1984 budget is $90.1 million. A significant percentage of BKKBN's budget is provided by international donors. These percentages, however, have dramatically decreased while the GOI's have dramatically increased.

These increased budget levels have become an important concern of the Government of Indonesia during the past few years. Projections of steady cost increases over the next decade so that BKKBN can achieve its objectives add to this concern.

The following analysis examines retrospectively and prospectively the impact of the Indonesian family planning program in other areas of public expenditure. It w. be demonstrated that the family planning program, through its impact on population size, generates more savings to the government than it costs. Thus, public expenditures on family planning programs should be viewed positively as an economically justifiable investment.

Based on the analysis of demographic data contained in Ross et al.(1), two population projections covering a period of thirty years from 1971 to 2001 are presented. These projections were made incorporating

two time series of birth rates; one recognizes the effect of the family planning program and one purges its influences. The potential impact of the program on government expenditures for education and public health are then examined. These two types of expenditures are closely related to population size and have been shown to be highly sensitive to family planning programs in other similar studies(2). Functional relationships between expenditures and population were established in each of those two sectors; then estimated parameter values were utilized to simulate expenditure levels in the education and health sectors under different population projections. Savings to government, in the form of expenditures averted that resulted from the family planning program, were then compared to the total costs of the family planning program. Various benefit-cost measures were then calculated to express streams of costs and benefits associated with the program in terms of a single index. Sensitivity analysis was also performed to see to what extent the conclusions depend on the estimated effectiveness of the Indonesian family planning program. It should be noted here that all expenditures are expressed in 1984 constant prices.

Basic Data (1971-1985)

Fertility and mortality data were taken from the demographic impact work done by Ross et al. with the 1971 census used as the baseline population. Health, family planning and education expenditure data were prepared by the Bureau of Planning, Ministry of Health; Bureau of Finance, BKKBN; and the Research and Development Center, Ministry of Education, respectively. However, the routine education budgets reported were very low in comparison with development budgets and with those reported in World Bank publications. In the public expenditure analysis, World Bank estimations of routine expenditures were used. A Gross Domestic Product (GDP) was used to express all expenditures in 1984 value of rupiah.

Demographic Impact of the Indonesian Family Planning Program

In order to study the impact of the Indonesian family planning program (FPP) on government expenditures, estimates of its impact on the crude birth rate were transformed into differences in population size and age distribution. The estimates of crude birth rates in Ross et al., together with mortality rates and base-year population figures, were combined to produce two single-year, single-age-group population projections.

The first projection (designated A) is the expected population with the family planning program in place. It utilizes the estimated actual crude birth rates from 1971 to 1985 and assumes the crude birth rate will remain constant thereafter (see Table 1 in the appendix). The second projection (designated B) is the expected population with no family planning program. It assumes that there was no program from 1971 to 1985 and there continues to be none after 1985. Under this assumption, the crude birth rate stays high, around 41/1000, during the 1971 to 2001 period. Both projections assume zero net international migration, and both utilize levels of life expectancy reported by Ross (see Table 2 in the appendix).

The results of the two population projections are shown in Table 1 and Figure 1. Under projection A, the population reaches 154.6 million by 1981 and 184.4 by 1991. Under projection B, with no family planning program, the population grows to 158.6 million by 1981, and to 211.1 million by 1991. Table 1 also reports the annual number of births averted by the family planning program. From 1971 to 2001, an estimated 73.7 million births will have been averted through the family planning program. If the annual total expenditure on the FPP grows from its current level of Rp. 66.6 billion to Rp. 100 billion by 2001 (see Table 10 in the appendix), the average cost per birth averted during the thirty year period is Rp. 30,000 (equivalent of U.S.$30).

TABLE 1

Projected Demographic Impact of the
Indonesian Family Planning Program

Year	Projection A (with FPP)		Projection B (without FPP)		Births Averted by the FPP (,000)
	Total Population (,000)	Total Births (,000)	Total Population (,000)	Total Births (,000)	
1971	123,060	4,898	123,060	4,959	60.3
1972	126,063	4,910	126,117	4,996	86.1
1973	129,106	4,942	129,237	5,057	115.6
1974	132,141	4,996	132,374	5,234	237.7
1975	135,258	5,035	135,702	5,401	366.3
1976	138,442	5,072	139,211	5,509	437.3
1977	141,624	5,122	142,779	5,722	599.2
1978	144,885	5,155	146,571	5,883	727.4
1979	148,209	5,100	150,540	5,936	836.2
1980	151,445	5,039	154,514	6,067	1,027.6
1981	154,660	4,983	158,640	6,304	1,321.6
1982	157,787	4,918	162,941	6,377	1,459.1
1983	160,856	4,844	167,304	6,697	1,852.8
1984	163,858	4,761	171,958	7,161	2,399.3
1985	166,750	4,670	176,991	7,824	3,154.1
1986	169,523	4,752	182,584	7,876	3,123.7
1987	172,411	4,831	188,258	7,942	3,111.0
1988	175,335	4,914	193,938	8,001	3,087.3
1989	178,296	4,997	199,618	8,048	3,051.4
1990	181,370	5,081	205,385	8,085	3,003.1
1991	184,480	5,169	211,140	8,318	3,149.1
1992	187,628	5,258	217,065	8,551	3,293.5
1993	190,816	5,347	223,158	8,791	3,443.7
1994	194,125	5,438	229,524	9,038	3,599.6
1995	197,474	5,533	236,068	9,296	3,763.2
1996	200,867	5,628	242,796	9,561	3,932.7
1997	204,388	5,725	249,821	9,833	4,108.5
1998	207,955	5,825	257,045	10,118	4,292.7
1999	211,569	5,927	264,477	10,410	4,483.6
2000	215,231	6,030	272,123	10,711	4,681.6
2001	219,033	6,134	280,106	11,021	4,686.9

FIGURE 1   TOTAL POPULATION

Y-axis: (Millions) — 120, 130, 140, 150, 160, 170, 180, 190, 200, 210, 220, 230, 240, 250, 260, 270, 280, 290

X-axis: 1971, 1976, 1981, 1986, 1991, 1996, 2001

□   Projection A   +   Projection B
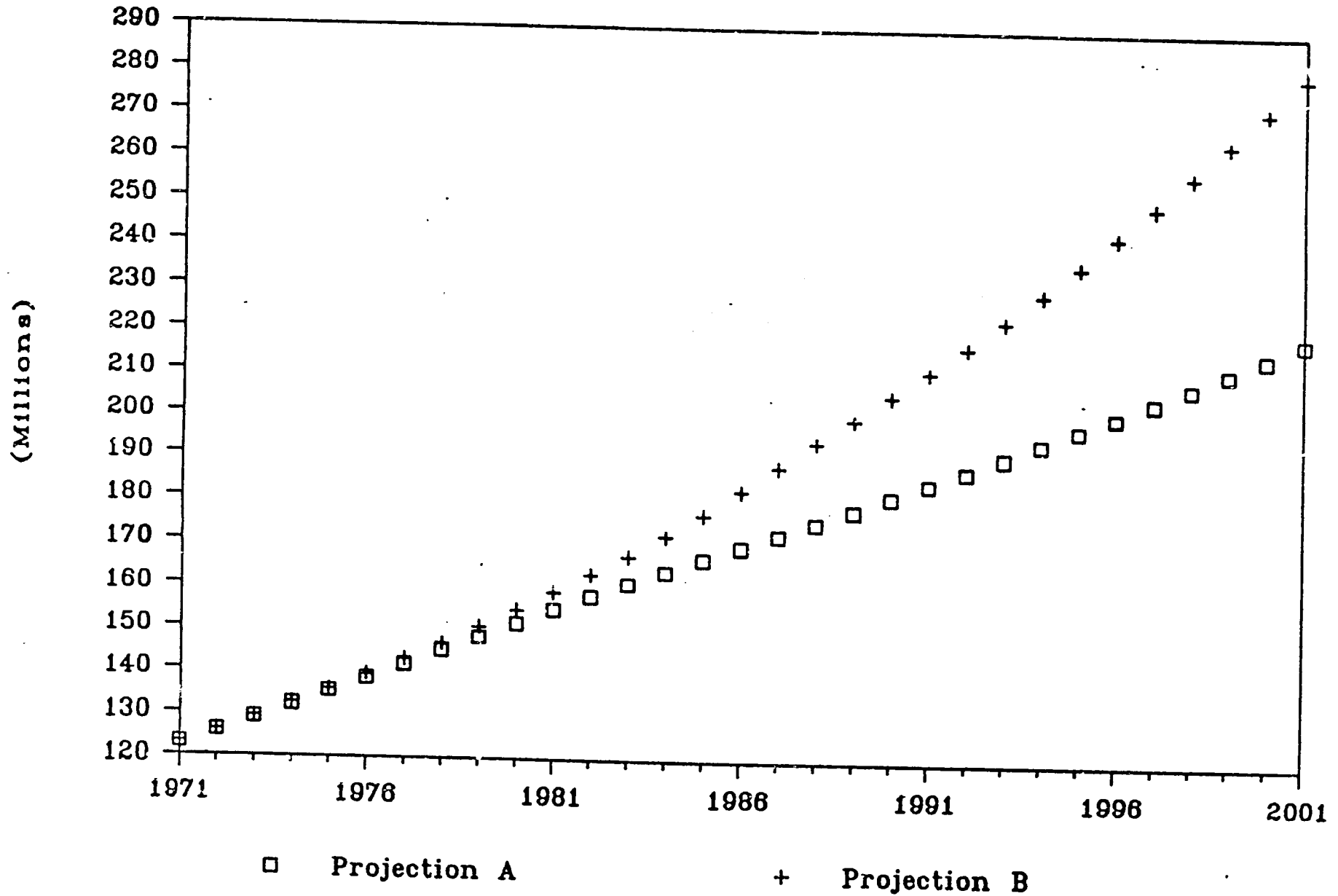
Impact in the Health Sector

The total expenditure in the public health sector was assumed to be a function of the population. Expenditures are divided into routine expenditures (for salaries and operating supplies) and development expenditures (for hospitals and equipment). Routine expenditures are assumed to be a function of the size of the population, and development expenditures are assumed to be a function of the increase in population.*

Information on health expenditures was prepared by the Planning Division of the Ministry of Health, GOI, for this study (appendix Tables 3 and 4). This information is quite complete, and it matches numbers reported in World Bank publications. These figures were used to estimate the per capita expenditure for each year from 1971 to 1985. For 1985 the figures are Rp. 653 per additional person for routine expenditures and Rp. 71,139 for development expenditures. In order not to overestimate expenditures averted, these rates are assumed to remain constant after 1985.

Calculated expenditures for the two projections begin to differ immediately after the first group of births are averted in the first year (Table 2 and Figure 2). Under projection A, health expenditures reach Rp. 325 billion by 1981, continue to Rp. 345 billion by 1991 and Rp. 414 billion by 2001. However, without a family planning program in place, health expenditures reach Rp. 411 billion by 1981 (26% higher) and Rp. 751 billion by 2001 (81% higher). In each year, the savings achieved as a result of the smaller population is the difference between expenditures under projections A and B. The cumulative savings for the period 1971 to 2001 are Rp. 4.9 trillion.

Impact in the Education Sector

The educational system in Indonesia consists of primary and secondary schooling, vocational and university level education, and other specialized training. This analysis examines only primary and secondary education expenditures.

Student enrollment for the three levels of schooling (primary, lower secondary and upper secondary) were calculated by multiplying the population of school age category (6-11, 12-14 and 15-17) by the percentage of such children enrolled in school. Actual enrollment rates are used for 1971 to 1985 (see Table 5 in the appendix); thereafter, all

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*   Total expenditures for public health in any year are found as follows:

$$THE_t = POP_t \times HRE_t + (POP_{t+1} - POP_t) \times HDE_t$$

Where:

THE_t = total health expenditures in year t

POP_t = the size of the population in year t

HRE_t = per capita routine health expenditures in year t

HDE_t = per capita development health expenditures in year t

TABLE 2

Total Public Health Expenditures*

Year	Projection A (with FPP)	Projection B (without FPP)
1971	92,744	95,536
1972	96,021	97,216
1973	79,992	81,380
1974	103,792	107,704
1975	176,764	187,794
1976	177,566	192,562
1977	204,187	227,747
1978	198,196	224,369
1979	209,390	243,652
1980	250,239	301,154
1981	325,265	411,446
1982	361,863	475,351
1983	317,403	445,312
1984	298,537	453,976
1985	306,444	513,743
1986	316,407	523,182
1987	320,870	527,299
1988	325,443	531,033
1989	335,415	540,999
1990	339,982	543,871
1991	344,760	559,730
1992	349,588	575,513
1993	360,320	599,006
1994	365,371	615,761
1995	370,653	633,200
1996	382,011	658,752
1997	387,519	677,441
1998	393,261	696,987
1999	399,064	717,102
2000	411,333	746,077
2001	413,821	751,303

* million rupiah, in 1984 constant price

FIGURE 2   HEALTH EXPENDITURE

- ii -

□   Projection A   +   Projection B
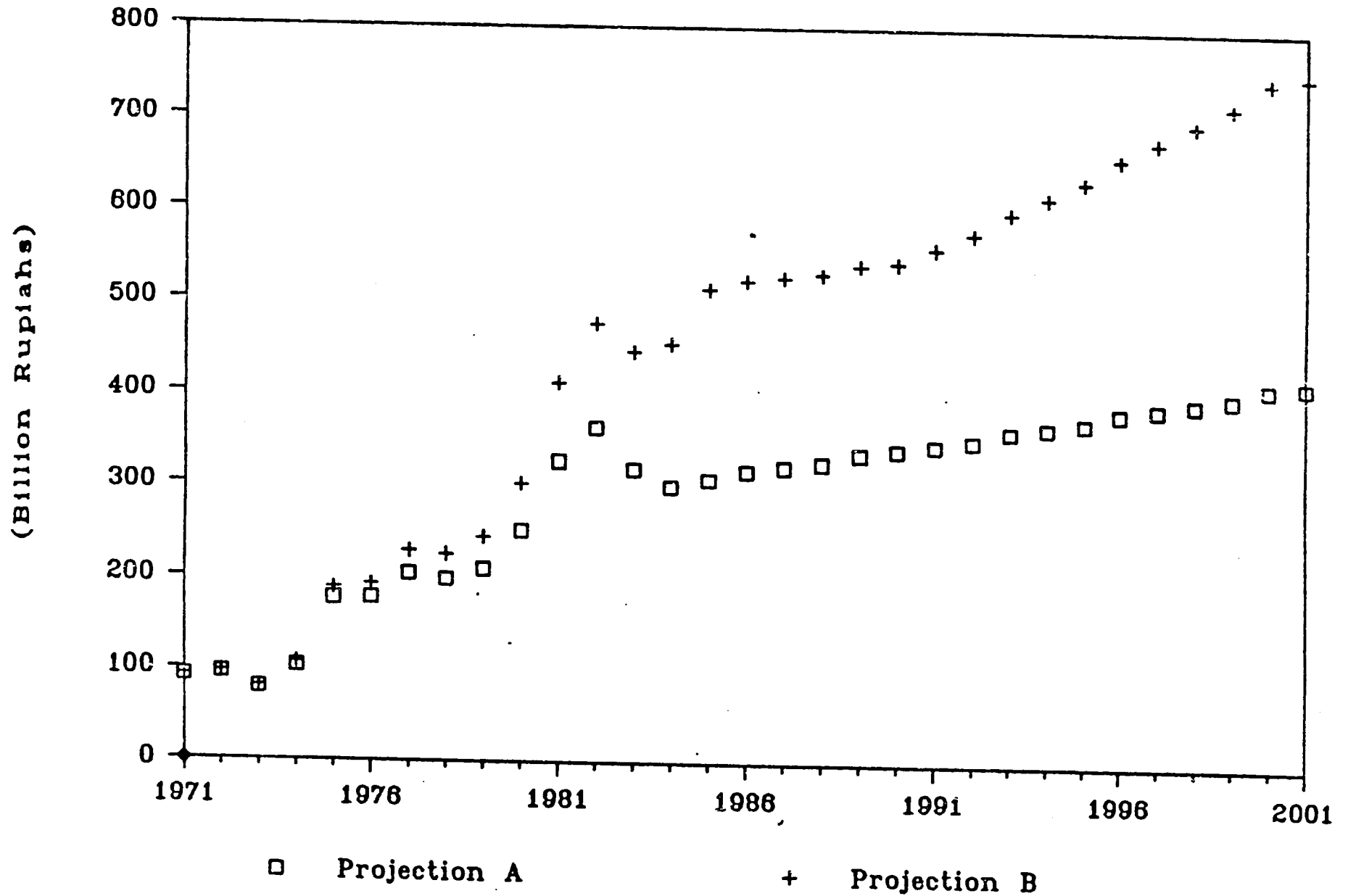
three enrollment rates are assumed to increase gradually. Table 3 and Figures 3, 4, and 5 present the projected number of students in three levels of school under the two population projections. The time needed for the initial impact of the FPP on primary, lower secondary and upper secondary schools to take place are 6, 9 and 12 years, respectively. By 1991, the number of primary students is 30% greater and secondary students is 9% greater in projection B than in projection A. By 2001, the total number of students in all levels of school is 62% greater in projection B.

The total cost of primary and secondary education associated with each student consists of development expenditures (for classrooms and equipment) and routine expenditures (for salaries and operating supplies). Routine expenditures are a function of the growth in the number of students.*

Data and education development expenditures come from the Ministry of Education and Culture (Tables 6-8 in the appendix). Routine expenditures are based on World Bank estimates for 1980 and 1990 (Table 9 in the appendix).

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* The total cost of education is found by multiplying the number of students by the routine expenditure per student and adding the development expenditure per student multiplied by the number of additional students expected in the next year. For example, in primary school,

$$TPE_t = PS_t \times PRE_t + (PS_{t+1} - PS_t) \times PDE_t$$

Where:

TPE_t = total primary education expenditures in year t

PS_t = number of students in primary school in year t

PRE_t = per capita primary education current expenditures in year t

PDE_t = per capita primary education development expenditures in year t

Similar relationships are also assumed between expenditures and present and future students in lower secondary and upper secondary school levels.

TABLE 3

Number of Primary and Secondary School Students
Under Two Population Projections

Year	Projection A (with FPP)			Projection B (without FPP)		
	Primary (,000)	Lower Secondary (,000)	Upper Secondary (,000)	Primary (,000)	Lower Secondary (,000)	Upper Secondary (,000)
1971	12,854	1,071	584	12,854	1,071	584
1972	13,301	1,267	630	13,301	1,267	630
1973	13,558	1,470	683	13,558	1,470	683
1974	13,798	1,663	728	13,798	1,663	728
1975	14,536	1,864	776	14,536	1,864	776
1976	15,306	2,093	913	15,306	2,093	913
1977	16,127	2,288	1,085	16,127	2,288	1,085
1978	16,981	2,880	1,264	17,018	2,880	1,264
1979	17,822	3,003	1,511	17,915	3,003	1,511
1980	18,682	3,275	1,745	18,853	3,275	1,745
1981	19,573	3,751	1,988	19,911	3,751	1,988
1982	20,247	4,231	2,221	20,845	4,231	2,221
1983	20,875	4,427	2,372	21,793	4,427	2,372
1984	21,498	4,637	2,524	22,824	4,656	2,524
1985	22,143	4,832	2,680	23,966	4,881	2,680
1986	22,726	5,048	2,858	25,124	5,138	2,858
1987	23,224	5,264	3,048	26,273	5,420	3,061
1988	23,635	5,492	3,231	27,486	5,757	3,263
1989	23,965	5,727	3,398	28,697	6,122	3,458
1990	24,187	5,963	3,565	30,018	6,513	3,671
1991	24,292	6,200	3,741	31,600	6,914	3,922
1992	24,355	6,401	3,920	33,727	7,302	4,190
1993	24,530	6,553	4,099	35,841	7,665	4,477
1994	24,817	6,658	4,281	37,860	8,062	4,773
1995	25,222	6,758	4,437	39,898	8,482	5,061
1996	25,411	6,844	4,560	41,162	8,996	5,333
1997	25,747	6,914	4,650	42,057	9,635	5,630
1998	26,238	6,964	4,736	42,576	10,580	5,944
1999	26,723	7,090	4,812	43,237	11,430	6,325
2000	27,233	7,297	4,876	44,076	12,104	6,795
2001	27,753	7,596	4,925	45,088	12,481	7,483

FIGURE 3   NUMBER OF STUDENTS

PRIMARY SCHOOL
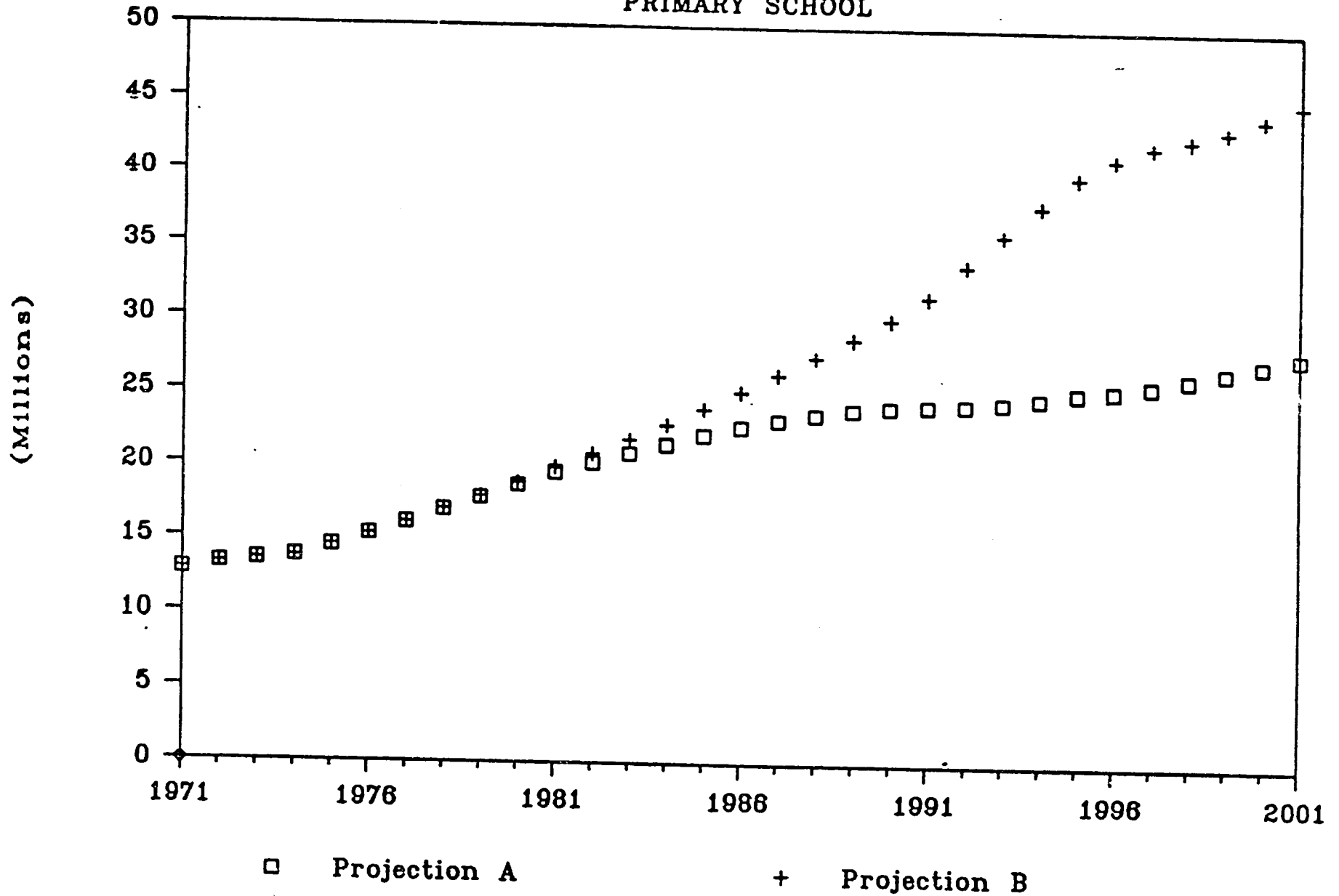
FIGURE 4 NUMBER OF STUDENTS

LOWER SECONDARY

FIGURE 5   NUMBER OF STUDENTS

UPPER SECONDARY

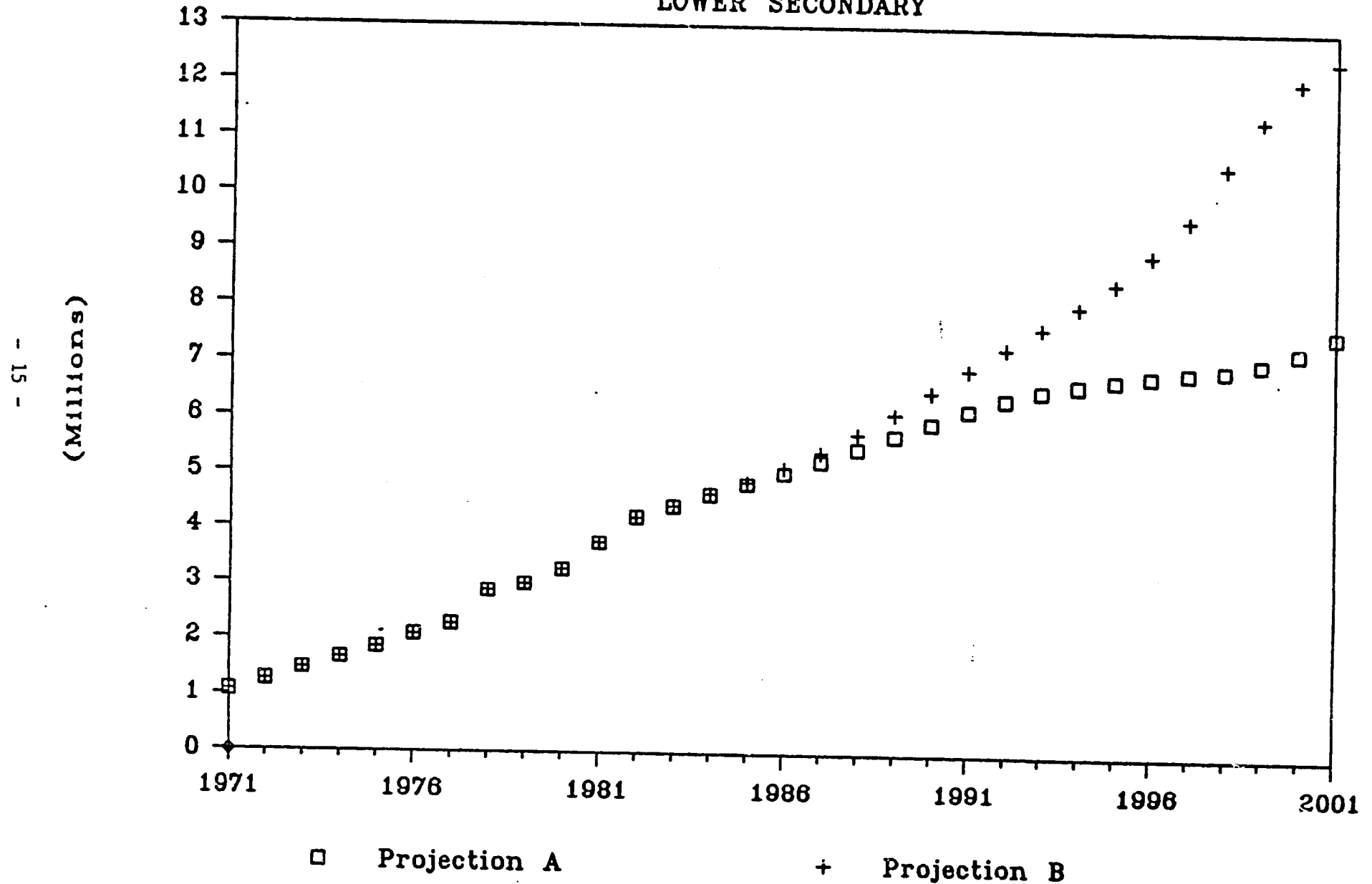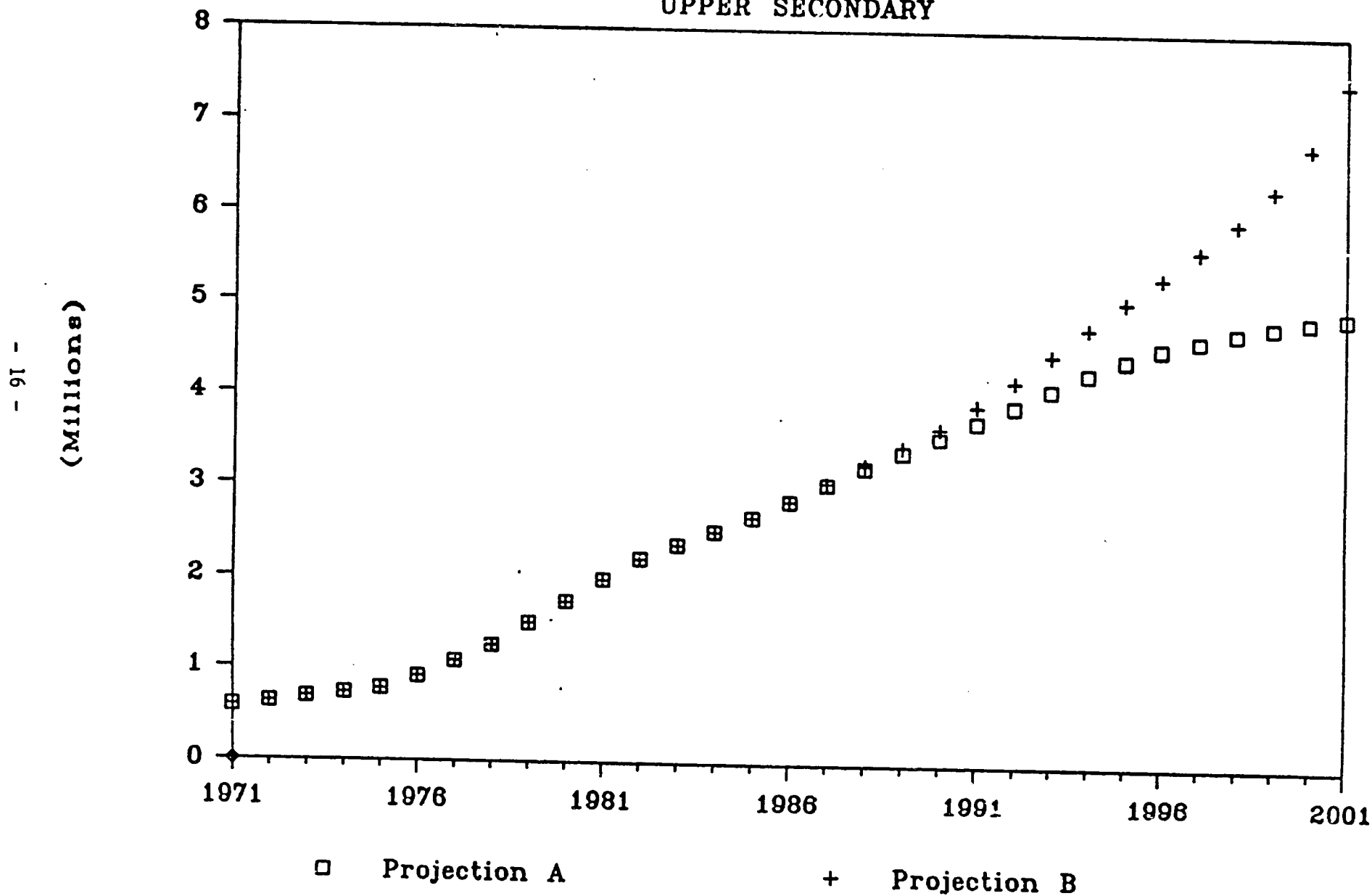□   Projection A   +   Projection B

Table 4 and Figure 6 present total educational expenditures (the sum of total expenditures in primary and secondary education) under the two projections. Under both projections, the costs rise from Rp. 513 billion in 1971 to Rp. 1,237 billion by 1976. The first difference does not appear until 1977, the year in which capital expenditures would be spent on children born in the first year affected by the program. In each year, the savings achieved as a result of the smaller school-age population is t;e difference between total expenditures under projection A and projection B, which in 1985 was Rp. 764 million. The cumulative savings for the period 1971-2001 are Rp. 56 trillion.

Total Impact on Government Expenditures

The growth in total government expenditures for health and education with and without the family planning program is shown in Table 5 and Figure 7. The effect of the program is to lower government spending in those two sectors by 9% in 1981, 38% in 1991 and 41% in 2001. Annual total savings amount to Rp. 324 billion in 1981, Rp. 3.5 trillion in 1991 and Rp. 5.2 trillion in 2001. Over the period, the program saves the government an estimated Rp. 61 trillion in expenditures.

Returns to the Investment in Family Planning Programs

A logical final step is to compare the costs of the family planning program and savings generated by the program--or costs and benefits--in order to compute the rate of return on public investment in the program. Annual family planning program expenditures for 1971 to 1984 were prepared by BKKBN (see Table 10 in the appendix). They include central government budgets and all foreign donors' contributions. To maintain the current levels of the prevalence rate and birth rate, FPP expenditure is assumed to increase to Rp. 100 billion in 2001, from the current level of Rp. 66 billion.

In columns 3 and 4 of Table 5 and in Figure 8, annual family planning program expenditures (actual and projected) under projection A are compared with annual savings resulting from the reduced birth rate. In column 5 of Table 5, the net savings in government expenditures are calculated. It is not surprising to observe that in the early years, the costs of running the family planning program exceed savings in the health and education sector, since the impact on education expenditures would not even appear until six years after the start of the program. However, the net savings become positive beginning in 1979 and continue to increase at a rapid speed. The projected net savings to the government during the current five year plan period (Rr ,elita IV) increase from Rp. 749 billion (in 1984) to over Rp. 1.6 trillion (in 1988).

Since projected program costs and benefits occur over a period of years, however, it is necessary to adjust for the effect of the passage of time on the value of each. That is, the value of a dollar of cost or benefit is determined by the time at which the cost or benefit occurs. Moreover, costs and benefits occuring far in the future are not as important to us today as are costs and benefits occuring today. If, for example, we could choose to save $1 million today or 10 years from today,

TABLE 4

Total Education Expenditures*

Year	Projection A (with FPP)	Projection B (without FPP)
1971	513,471	513,471
1972	621,490	621,490
1973	713,493	713,493
1974	809,124	809,124
1975	953,749	953,749
1976	1,236,824	1,236,824
1977	1,495,473	1,507,265
1978	1,585,392	1,592,779
1979	2,025,385	2,060,699
1980	2,382,074	2,468,653
1981	2,859,391	3,097,475
1982	3,214,246	3,456,825
1983	3,677,851	4,193,710
1984	3,998,772	4,658,786
1985	4,333,497	5,097,929
1986	4,565,953	5,521,922
1987	4,806,274	6,068,107
1988	5,038,658	6,536,446
1989	5,256,395	7,159,819
1990	5,477,493	7,967,483
1991	5,496,245	8,805,840
1992	5,627,177	9,144,229
1993	5,759,901	9,492,662
1994	5,938,901	9,912,891
1995	5,779,080	9,697,195
1996	5,929,767	9,910,922
1997	6,110,705	10,421,123
1998	6,308,264	10,844,587
1999	6,556,059	11,195,691
2000	6,825,472	11,474,326
2001	6,963,396	11,856,575

* million rupiah, in 1984 constant price

FIGURE 6   EDUCATION EXPENDITURE

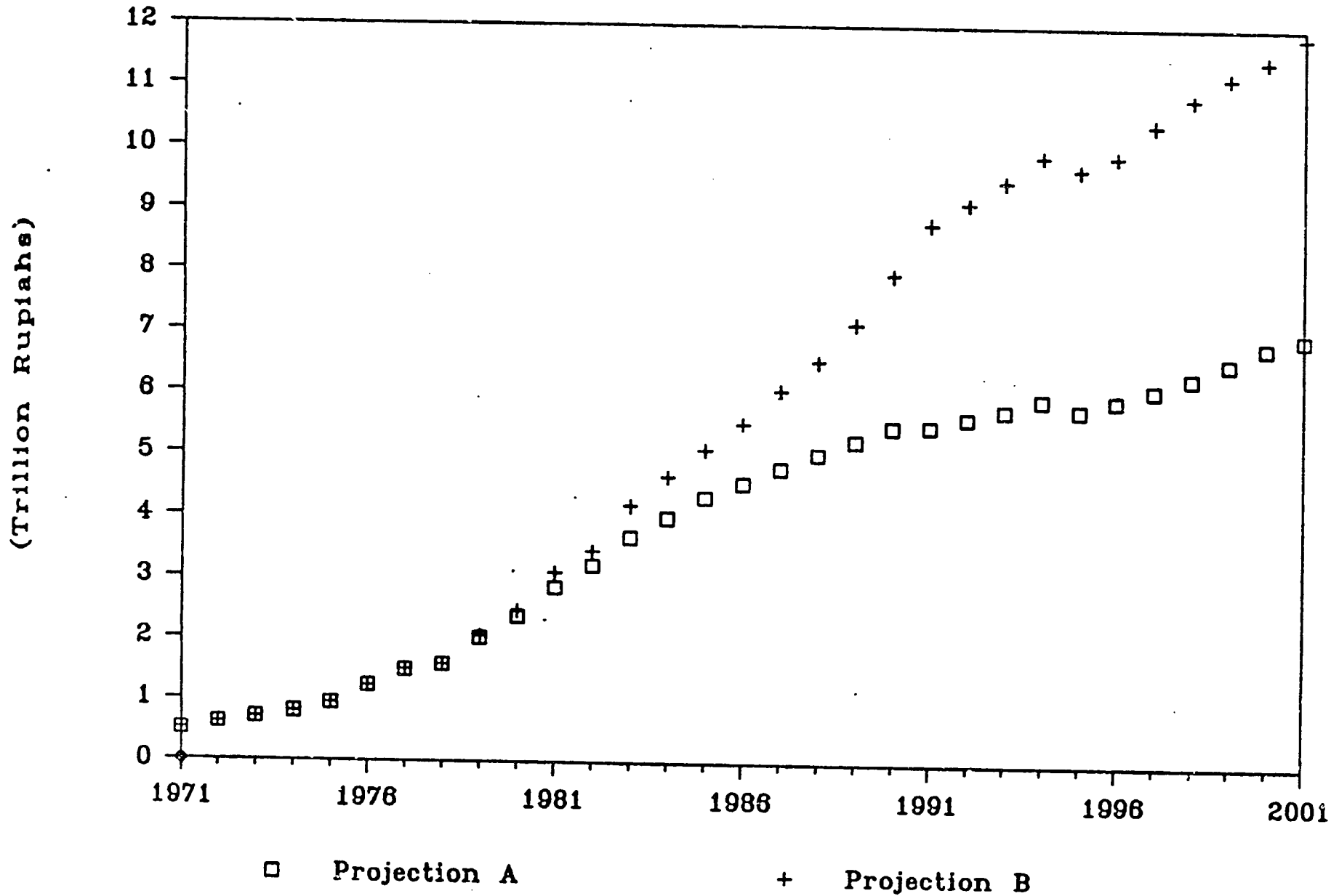□   Projection A   +   Projection B

TABLE 5

Total Savings and Net Savings in Expenditures
Generated by the Family Planning Program*

(Projections A and B)

Year	Total Expenditure Under Projection A (1)	Total Expenditure Under Projection B (2)	Total Savings in Expenditures (3)=(2)-(1)	Family Planning Expenditures (4)	Net Savings in Expenditures (5)=(3)-(4)
1971	606,215	607,007	792	25,021	-24,299
1972	717,511	718,706	1,196	28,470	-27,274
1973	793,485	794,873	1,388	46,383	-44,995
1974	912,917	916,828	3,912	32,732	-28,820
1975	1,130,513	1,141,543	11,030	35,226	-24,196
1976	1,414,390	1,429,386	14,996	41,272	-26,276
1977	1,699,660	1,735,011	35,351	56,505	-21,154
1978	1,783,588	1,817,148	33,560	56,431	-22,871
1979	2,234,776	2,304,320	69,544	60,241	9,303
1980	2,632,313	2,770,006	137,693	76,011	61,682
1981	3,184,656	3,508,922	324,266	81,765	242,501
1982	3,576,108	3,932,175	356,067	80,068	275,999
1983	3,995,254	4,639,022	643,768	69,726	574,042
1984	4,297,309	5,112,762	815,453	66,606	748,847
1985	4,639,941	5,611,672	971,731	68,519	903,212
1986	4,882,359	6,045,104	1,162,745	70,432	1,092,312
1987	5,127,144	6,595,406	1,468,262	72,346	1,395,916
1988	5,364,101	7,067,479	1,703,378	74,259	1,629,118
1989	5,591,810	7,700,817	2,109,007	76,173	2,032,834
1990	5,817,475	8,511,354	2,693,878	78,086	ʼ,615,792
1991	5,841,004	9,365,570	3,524,566	80,000	3,444,566
1992	5,976,765	9,719,741	3,742,977	82,000	3,660,977
1993	6,120,221	10,091,668	3,971,447	84,000	3,887,447
1994	6,304,271	10,528,652	4,224,381	86,000	4,138,381
1995	6,149,733	10,330,395	4,180,663	88,000	4,092,663
1996	6,311,778	10,569,675	4,257,897	90,000	4,167,897
1997	6,498,223	11,098,564	4,600,341	92,000	4,508,341
1998	6,701,525	11,541,574	4,840,049	94,000	4,746,049
1999	6,955,123	11,912,793	4,957,670	96,000	4,861,670
2000	7,236,804	12,220,403	4,983,599	98,000	4,885,599
2001	7,377,217	12,607,878	5,230,661	100,000	5,130,661
TOTAL			61,072,268	2,186,275	58,885,993

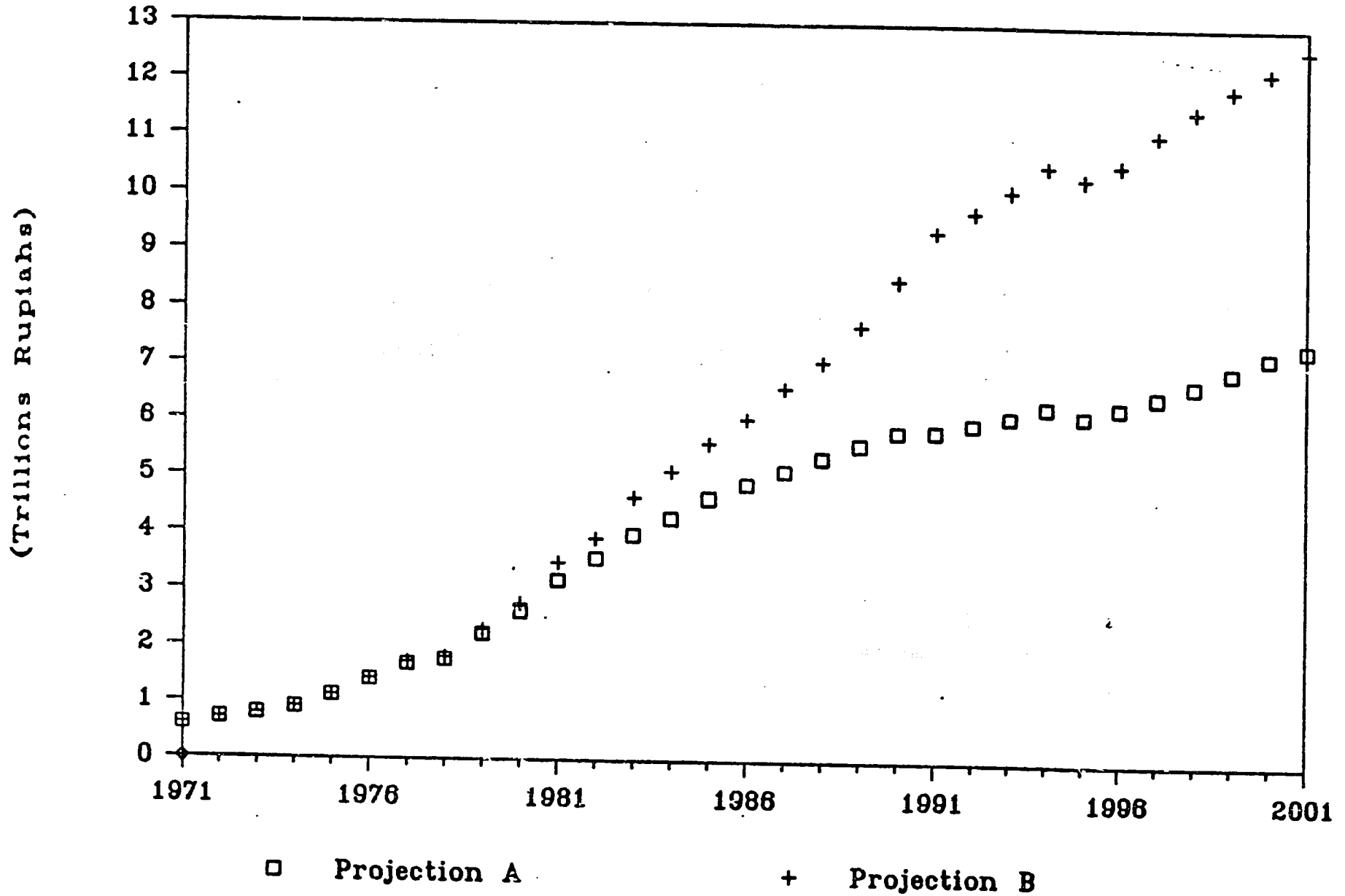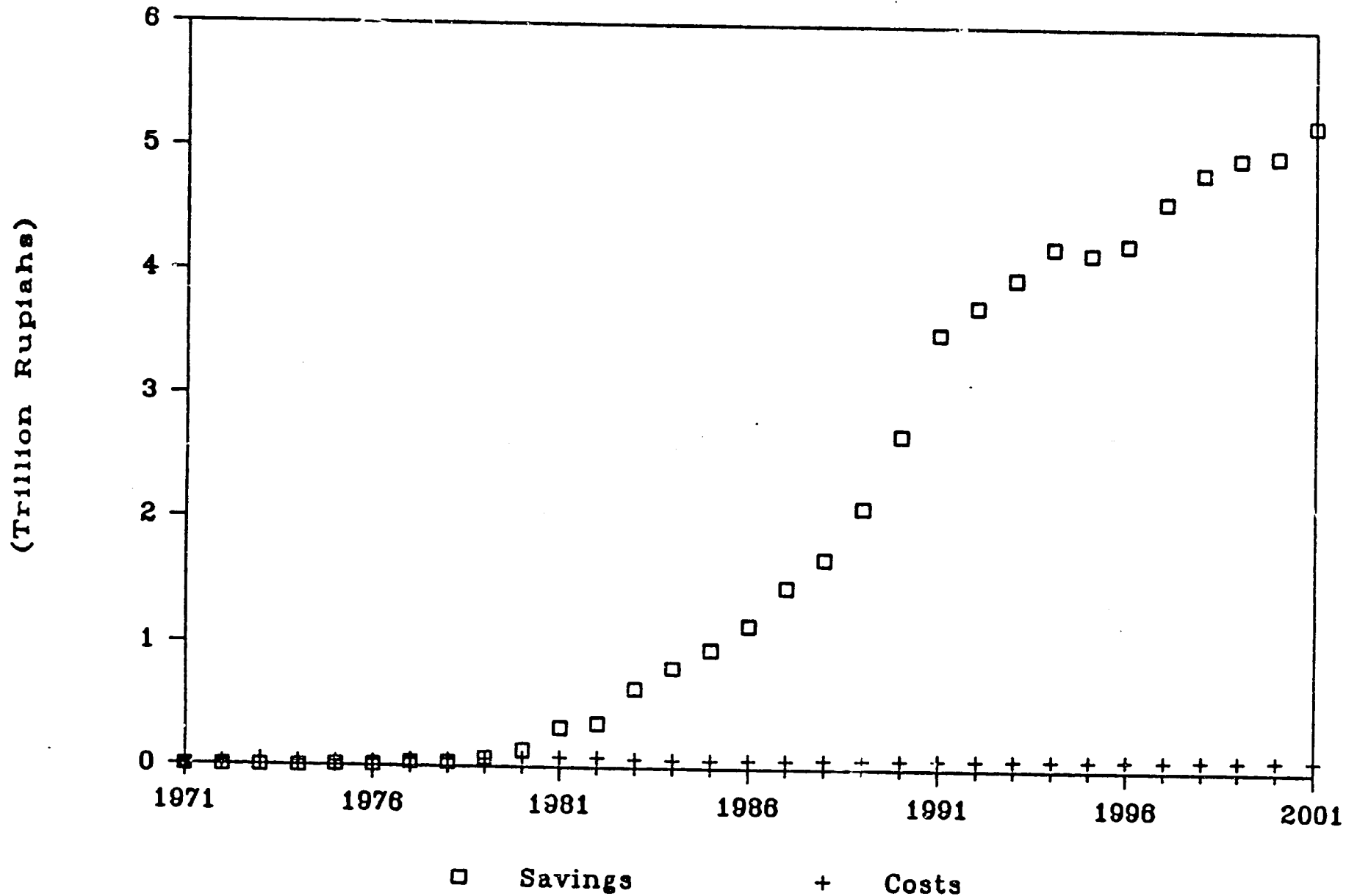* million rupiah, in 1984 constant price

FIGURE 7 TOTAL EXPENDITURES

FIGURE 8   COSTS AND BENEFITS OF FPP

we would choose to save it today, since the money could be invested and would be worth considerably more than $1 million 10 years from now. Consequently, all costs and benefits occuring in the future must be converted to present values. This is accomplished by use of the discount rate, which may be defined as the rate at which the present value of a dollar declines over time. We convert future costs and benefits to present values by finding the amount today which, if invested at some given rate of compound interest (the discount rate), would yield those future costs and benefits. The appropriate discount rate is not easy to define, because it represents the degree to which society values present consumption versus future consumption. For the current study, five different discount rates are used to calculate the present value in 1971 of costs and benefits of the family planning programs. The results are presented in Table 6. The magnitude of those calculated benefit-cost ratios, between 8.7 and 12.5, suggests that the returns to the public investment in the family planning program in Indonesia are very high.

Instead of being stated in absolute numbers, an internal rate of return can also be calculated from the streams of net savings to measure the overall rate of return to family planning program expenditures. An internal rate of return is defined as the discount rate that would make the present value of all costs equal to the present value of all benefits. It measures the actual rate of return to, or the "profitability" of, total investment in a project over a given period of time. In the present case, the calculated internal rate of return is 40%, which is much higher than that of most ordinary investment projects.

TABLE 6

Benefit-Cost Ratios
(Projections A and B)

Discount Rate (%)	Discounted Benefit (1)	Discounted Cost (2)	Return on Investment (1)/(2)
10	6,429,498	514,068	12.51
11	5,302,119	463,507	11.44
12	4,390,157	420,163	10.45
13	3,649,593	382,790	9.53
14	3,045,912	350,388	8.69

Sensitivity Analysis

To check how sensitive the benefit-cost ratios are with respect to the estimated birth rates, particularly those hypothetical rates under the assumption that there was no family planning program, the above analysis was repeated using a different set of birth rates. If the true demographic impact of the FPP is not as large as estimated by Ross et. al, then the hypothetical birth rates under the assumption of no family planning program would be somewhere between the ones used in projection A and projection B and could be represented by the third set of birth rates in Table 1 of the appendix. Using this new set of birth rates, a third population projection (designated C) was made to present a situation where the effectiveness of the family planning program is more limited. In Table 7, total expenditures in health and education calculated under projection C (column 2) are compared with those under projection A (column 1).

TABLE 7

Total Savings and Net Savings in Expenditures
Generated by the Family Planning Program*

(Projections A and C)

Year	Total Expenditure Under Projection A (1)	Total Expenditure Under Projection C (2)	Total Savings in Expenditures (3)=(2)-(1)	Family Planning Expenditures (4)	Net Savings in Expenditures (5)=(3)-(4)
1971	606,215	606,691	475	25,021	-24,546
1972	717,511	718,194	683	28,470	-27,787
1973	793,458	794,258	772	46,383	-45,611
1974	912,917	914,880	1,963	32,732	-30,769
1975	1,130,513	1,136,243	5,729	35,266	-29,497
1976	1,414,390	1,422,131	7,741	41,272	-33,531
1977	1,699,660	1,718,794	19,134	56,505	-37,371
1978	1,783,588	1,800,944	17,356	56,431	-39,075
1979	2,234,776	2,271,953	37,177	60,241	-23,064
1980	2,632,313	2,702,360	70,046	76,011	-5,965
1981	3,184,656	3,352,070	167,414	81,765	85,649
1982	3,576,108	3,758,151	182,043	80,068	101,975
1983	3,995,254	4,321,361	326,107	69,726	256,381
1984	4,297,309	4,704,094	406,785	66,606	340,179
1985	4,639,941	5,130,383	490,443	68,519	421,923
1986	4,882,359	5,466,196	583,837	70,432	513,404
1987	5,127,144	5,861,374	734,230	72,346	661,884
1988	5,364,101	6,208,234	844,132	74,259	769,873
1989	5,591,810	6,634,797	1,042,987	76,173	966,814
1990	5,817,475	7,142,743	1,325,267	78,086	1,247,181
1991	5,841,004	7,566,733	1,725,728	80,000	1,645,728
1992	5,976,765	7,802,887	1,826,122	82,000	1,744,122
1993	6,120,221	8,049,031	1,928,810	84,000	1,844,810
1994	6,304,271	8,343,919	2,039,648	86,000	1,953,648
1995	6,149,733	8,157,324	2,007,591	88,000	1,919,591
1996	6,311,778	8,349,030	2,037,252	90,000	1,947,252
1997	6,498,223	8,692,034	2,193,811	92,000	2,101,811
1998	6,701,525	8,998,674	2,297,149	94,000	2,203,149
1999	6,955,123	9,294,071	2,338,948	96,000	2,242,948
2000	7,236,804	9,575,617	2,338,813	98,000	2,240,813
2001	7,377,217	9,828,630	2,451,413	100,000	2,351,413
TOTAL			29,449,607	2,186,275	27,263,332

* million rupiah, in 1984 constant price

Under projection C, both gross and net savings in government expenditures resulting from the family planning program are smaller. Also the net savings do not become positive until 1981. However, the calculated impact of the family planning program on government expenditures under this more conservative assumption is still considerable. The internal rate of return (31% under projection C) is less affected by the change in birth rates than are the benefit-cost ratios (Table 8), but both are still very significant.

TABLE 8

Benefit-Cost Ratios (Projections A and C)

Discount Rate (%)	Discounted Benefit (1)	Discounted Cost (2)	Return on Investment (1)/(2)
10	3,270,949	519,277	6.30
11	2,691,662	467,443	5.76
12	2,224,471	423,143	5.26
13	1,846,135	385,053	4.79
14	1,538,512	352,109	4.37

Further Discussion and Conclusion

A few words of caution may be necessary here. Because the analysis was based on an estimation of births averted utilizing BKKBN service statistics only, it is subject to possible over-estimation of the demographic and expenditure impacts of the family planning program. On the other hand, the sensitivity analysis above shows that even if the effectiveness of the family planning program were considerably less than the estimate based on family planning service statistics, the direction and rough magnitudes of estimated returns to FPP expenditures and the basic conclusion about the program's economic value are not substantially altered. It also should be pointed out that the family planning program expenditures presented here do not include local contributions to the program or any indirect costs of the program, and this could lead to under-estimation of the total cost of the program. But once again, because of the relative sizes of the family planning program expenditures and total savings in government expenditures, even if the cost of the program were substantially larger, it is unlikely that any of the previous results would be seriously altered.

Overall, the estimated large benefit-cost ratios and the high internal rate of return for the Indonesian family planning program make investment in the program an extremely effective way of reducing government expenditures in the health and education sectors. These findings reveal the amount of additional resources that would have been required to maintain the quality of service in the health and education sectors had the family planning program never existed. These findings can also be interpreted as indicating the levels of savings generated by the program in the health and education sectors that could be used to improve the quality of services in those sectors.

Table 1

Fertility Assumptions Under Different Projections

Year	Projection* A	Projection** B	Projection*** C
1971	40.6	41.1	40.9
1972	39.9	40.6	40.3
1973	39.2	40.1	39.7
1974	38.7	40.5	39.6
1975	38.1	40.8	39.5
1976	37.5	40.6	39.1
1977	37.0	41.1	39.1
1978	36.4	41.2	38.8
1979	35.2	40.5	37.9
1980	34.0	40.3	37.2
1981	32.9	40.8	36.9
1982	31.8	40.2	36.0
1983	30.7	41.1	35.9
1984	29.6	42.8	36.2
1985	28.5	45.5	37.0
1986	28.5	44.5	36.5 .
1987	28.5	43.5	36.0
1988	28.5	42.5	35.5
1989	28.5	41.5	35.0
1990	28.5	40.5	34.5
1991	28.5	40.5	34.5
.	.	.	.
.	.	.	.
.	.	.	.
2001	28.5	40.5	34.5

*Actual crude birth rates (CBR) from 1971 to 1985 as estimated by Ross

**Hypothetical CBR in the absence of family planning programs as estimated by Ross

***Average of * and **

Table 2

Assumed Life Expectancies For All Projections

Year	Male	Female
1971	*45.0	*48.0
1972	45.7	48.7
1973	46.3	49.3
1974	47.0	50.0
1975	47.6	50.7
1976	48.3	51.3
1977	48.9	52.0
1978	49.6	52.7
1979	50.2	53.3
1980	*50.9	*54.0
1981	51.2	54.3
1982	51.5	54.6
1983	51.8	54.9
1984	52.1	55.1
1985	52.4	55.4
1986	52.6	55.7
1987	52.9	56.0
1988	53.2	56.3
1989	53.5	56.6
1990	53.8	56.9
1991	54.1	57.1
.	.	.
.	.	.
.	.	.
2001	57	60

*Values reported by Ross, all other values are extrapolations.

Table 3

Total and Per Capita Routine Expenditure on
Public Health

Year	Total Expenditure in Current Price* (in million Rps)	Total Expenditure in 1984 Price (in million Rps)	Per Capita Expenditure in 1984 Constant Price
1971	5,219.7	48,804	387.3
1972	6,024.8	49,403	383.6
1973	6,484.4	39,879	302.9
1974	11,285.0	47,284	351.5
1975	19,190.1	71,195	517.8
1976	17,379.1	56,482	401.9
1977	21,645.7	62,556	435.7
1978	25,978.6	67,285	458.8
1979	32,398.2	63,500	424.0
1980	50,082.5	76,125	498.0
1981	74,410.1	102,686	659.0
1982	78,531.0	100,520	633.2
1983	82,428.0	91,495	566.2
1984	93,526.4	93,526	568.9
1985	116,766.4	109,177	653.4

* Prepared by the Planning Division of the Ministry of Health

Table 4

Total and Per Capita Development Expenditure on Public Health*

Year	Total Expenditure in Current Price** (in million Rps)	Total Expenditure in 1984 Constant Price (in million Rps)	Per Capita Expenditure in 1984 Constant Price
1971	4,700.0	43,945	14,634
1972	5,684.0	46,609	15,317
1973	6,522.0	40,110	13,216
1974	13,488.3	56,516	18,132
1975	28,455.2	105,569	33,156
1976	37,254.0	121,076	38,050
1977	49,004.1	141,622	43,429
1978	50,547.3	130,918	39,386
1979	74,432.8	145,888	45,083
1980	114,546.5	174,111	54,156
1981	161,274.7	222,559	71,173
1982	204,199.9	261,376	85,167
1983	203,549.1	225,940	75,238
1984	203,549.1	203,549	70,383
1985	209,859.1	197,268	71,139

* Figures include expenditures for INPRES starting in 1974.

** Prepared by the Planning Division of the Ministry of Health.

Table 5

Educational Enrollment Rates

Year	Primary* (%)	Lower Secondary (%)	Upper Secondary (%)
1971	63.0	11.5	6.6
1972	64.0	13.4	7.0
1973	64.0	15.3	7.5
1974	64.0	17.0	7.9
1975	66.3	18.7	8.3
1976	68.6	20.6	9.6
1977	70.9	22.1	11.2
1978	73.1	27.3	12.8
1979	75.4	27.9	15.0
1980	77.7	29.9	17.0
1981	80.0	33.7	19.0
1982	81.4	37.4	20.8

Total number of students for various school levels are taken from School Statistics Summary published by the Research and Development Division of the Ministry of Education and Culture.

* 1971's net enrollment rate in primary school was estimated by the World Bank and reported in Education Sector Survey Report, Feb. 5, 1975. Net enrollment rates for the rest of the years were derived by assuming the proportion of over-age students remained the same.

Table 6

Total and Per Capita Development Expenditures on Primary Education

	Total Development Expenditure in Current Price* (in million Rps)	Total Development Expenditure in 1984 Constant Price (in million Rps)	Per Capita Development Expenditure in 1984 Constant Price (in thousand Rps)
1971	11,100.0**	103,785	232.2
1972	13,700.0**	112,340	437.7
1973	16,300.0***	100,245	418.7
1974	20,643.0***	86,494	117.1
1975	21,833.7	81,003	105.2
1976	61,583.0	200,145	243.6
1977	94,236.9	272,345	319.0
1978	32,919.5	85,262	101.3
1979	170,700.0	334,709	389.2
1980	272,660.0	414,443	465.2
1981	409,504.0	565,116	838.4
1982	314,610.0	402,701	641.2
1983	597,510.0	663,236	1,064.4
1984	679,690.0	679,690	1,055.0
1985	592,308.0	556,770	954.1

* Figures reported by the Research and Development Division, Ministry of Education and Culture.

** Extrapolations

*** "Education Sector Survey Report." World Bank Report No. 4430-IND. February 5, 1975. P.27, Table 11.

Table 7

Total and Per Capita Development Expenditure
on Lower Secondary Education

	Total Development Expenditure in Current Price* (in million Rps)	Total Development Expenditure in 1984 Constant Price (in million Rps)	Per Capita Development Expenditure in 1984 Constant Price (in thousand Rps)
1971	---	40,000*	205.0
1972	---	43,245*	212.8
1973	---	46,490*	241.1
1974	11,870	49,735	247.1
1975	12,550	46,561	203.4
1976	15,430	50,148	257.2
1977	16,870	48,754	82.3
1978	37,010	95,856	778.9
1979	30,000	58,800	216.8
1980	52,070	79,146	166.2
1981	71,390	98,518	205.4
1982	205,170	262,618	1,338.0
1983	206,170	228,849	1,089.3
1984	249,790	369,890	1279.3
1985	363,500	369,890	1,714.7

* Research and Development Division, Ministry of Education and Culture

** Extrapolations

Table 8

Total and Per Capita Development Expenditures on
Upper Secondary Education

	Total Development Expenditure in Current Price* (in million Rps)	Total Development Expenditure in 1984 Constant Price (in million Rps)	Per Capita Development Expenditure in 1984 Constant Price (in thousand Rps)
1971	---	30,000**	646.3
1972	---	31,299**	592.4
1973	---	32,598**	724.0
1974	8,090	33,897	702.8
1975	15,320	56,837	415.9
1976	18,810	61,133	355.7
1977	26,340	76,123	424.8
1978	25,390	65,760	266.9
1979	43,200	84,672	361.0
1980	63,660	96,763	397.7
1981	76,820	106,012	455.0
1982	120,000	153,600	1,022.3
1983	121,000	134,310	884.0
1984	146,600	146,600	937.9
1985	213,340	200,540	1,124.0

* Research and Development Division, Ministry of Education and Culture

** Extrapolations

Table 9

Per Capita Routine Expenditures in Education*

Year	Primary		Lower Secondary		Upper Secondary	
	1980 Price	1984 Price	1980 Price	1984 Price	1980 Price	1984 Price
1980	36,000	54,720	97,000	147,440	108,000	164,160
1990	62,000	94,240	165,000	250,800	184,000	279,680

(rupiahs)

* "Indonesia: Financial Resources and Human Development in the Eighties."
World Bank Report No. 3795-IND, May 3, 1982. P.122, Table 6.4.

Table 10

Total Expenditures of the Family Planning Program

Year	Total Expenditure in Current Price (in million Rps)	Total Expenditure in 1984 Constant Price (in million Rps)
1971	2,676	25,021
1972	3,472	28,470
1973	7,542	46,383
1974	7,812	32,732
1975	9,495	35,226
1976	12,699	41,272
1977	19,552	56,505
1978	21,788	56,431
1979	30,735	60,241
1980	50,007	76,011
1981	59,250	81,765
1982	62,553	80,068
1983	62,816	69,726
1984	66,606	66,606

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